Diversity in Health Economics

15th IHEA World Congress
Cape Town, July 8-12, 2023

Program Abstract Book

UNIVERSITY OF CAPE TOWN
IYUNIVESITHI YASEKAPA · UNIVERSITEIT VAN KAAPSTAD

IHEA
INTERNATIONAL HEALTH
ECONOMICS ASSOCIATION

2023 World Congress on Health Economics

July 8 - 12, 2023 | Cape Town, South Africa

Saturday

9:00 AM –12:30 PM   SATURDAY   [Pre-Congress And Sponsored Sessions]

Cape Town International Convention Centre | CTICC 1 – Room 1.61-1.62
Can Direct Financing for Public Facilities Improve the Availability of Health Products?

9:00 AM –5:00 PM   SATURDAY   [Pre-Congress And Sponsored Sessions]

Cape Town International Convention Centre | CTICC 1 – Room 2.41-2.42
Evolution of Health Accounts to Inform Health Reforms

9:00 AM –5:00 PM   SATURDAY   [Pre-Congress And Sponsored Sessions]

Cape Town International Convention Centre | CTICC 2 – Protea and Nerina
Immunization Economics Special Interest Group Pre-Congress Session

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9:00 AM –5:00 PM   SATURDAY   [Pre-Congress And Sponsored Sessions]

Cape Town International Convention Centre | CTICC 1 – Room 2.44-2.45
Introduction to Health Technology Assessment (HTA) Training

12:00 PM –5:15 PM   SATURDAY   [Pre-Congress And Sponsored Sessions]

Cape Town International Convention Centre | CTICC 1 – Room 1.42
Early Career Researcher Pre-Congress Session

1:30 PM –5:00 PM   SATURDAY   [Pre-Congress And Sponsored Sessions]

Cape Town International Convention Centre | CTICC 1 – Room 1.61-1.62
People Centred, Efficient Health Care Services: Rethinking Sustainable Health Care Financing in the Context of the African Union's ALM Declaration on Domestic Financing for Health

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1:30 PM –5:00 PM   SATURDAY   [Pre-Congress And Sponsored Sessions]

Cape Town International Convention Centre | CTICC 1 – Room 1.63-1.64
EQ-5D as a Measure of Population Health

Cape Town International Convention Centre | CTICC 1 – Room 1.43

Addressing Deteriorating Financial Protection in Health: Measurement Issues and Policy Responses

Sunday

Cape Town International Convention Centre | CTICC 2 – Protea and Nerina

Immunization Economics Special Interest Group Pre-Congress Session

Cape Town International Convention Centre | CTICC 1 – Room 1.61-1.62

Economic Analysis in Support of HIV Policy

Cape Town International Convention Centre | CTICC 1 – Room 1.41

Sustainable Health Financing Capacity Strengthening in Africa

Cape Town International Convention Centre | CTICC 1 – Room 1.44

Structuring and Adapting Health Economic Models for Low- and Middle-Income Settings

Cape Town International Convention Centre | CTICC 1 – Room 2.41-2.42

Evolution of Health Accounts to Inform Health Reforms

Cape Town International Convention Centre | CTICC 1 – Room 2.44-2.45

Bridging the Costing Gap: Policymaker Needs and Practitioner Approaches

Cape Town International Convention Centre | CTICC 1 – Room 2.6

Exploring the "Means" to Achieve Universal Health Coverage in Africa: Research and Insights on Contributory and Non-Contributory Means of Financing Health Care from Low- and Middle-Income Countries

9:00 AM –11:00 AM   SUNDAY   [Pre-Congress And Sponsored Sessions]

Cape Town International Convention Centre | CTICC 1 – Room 1.43

The NIHR Global Health Research Programme: Optimising Health Economics Research Funding and Policy Impact

12:00 PM –2:00 PM   SUNDAY   [Pre-Congress And Sponsored Sessions]

Cape Town International Convention Centre | CTICC 1 – Room 1.42

Achieving Equitable Health Service Use and Financial Protection - The Zambian experiences from initiation and implementation of national health insurance

12:30 PM –4:30 PM   SUNDAY   [Pre-Congress And Sponsored Sessions]

Cape Town International Convention Centre | CTICC 1 – Room 2.44-2.45

Assessing and Explaining Health Inequality and Equity in a Developing Country Context

1:00 PM –4:30 PM   SUNDAY   [Pre-Congress And Sponsored Sessions]

Cape Town International Convention Centre | CTICC 1 – Room 2.6

Challenges to Establish Sustainable Health Coverage: What Can Different LMIC Models in Asia Teach Us?

1:00 PM –4:30 PM   SUNDAY   [Pre-Congress And Sponsored Sessions]

Cape Town International Convention Centre | CTICC 1 – Room 1.43

The Establishment of HTA for Benefit Package Design in LMIC – Using Evidence-Informed Deliberative Processes

1:00 PM –4:30 PM   SUNDAY   [Pre-Congress And Sponsored Sessions]

Cape Town International Convention Centre | CTICC 1 – Room 1.41

Gender and Health Economics

2:00 PM –4:00 PM   SUNDAY   [Pre-Congress And Sponsored Sessions]

Cape Town International Convention Centre | CTICC 1 – Room 1.63-1.64

Anticipating the Potential Impacts of the Inflation Reduction Act (IRA) in the U.S.: What can be Learnt from Global Experience on the Impact of Price Regulation on Patient Access and Equity of Access?

2:00 PM –4:00 PM   SUNDAY   [Pre-Congress And Sponsored Sessions]

Cape Town International Convention Centre | CTICC 1 – Room 1.61-1.62

National Health Insurance as the Path to Universal Health Coverage in South Africa

Cape Town International Convention Centre | CTICC 1 – Room 1.42
How to get Published in Academic Journals - An Introduction

Cape Town International Convention Centre | CTICC 1 – Auditorium 1
OPENING PLENARY: Diversifying Health Economics: Balancing Power and Partnership

MODERATOR: **Kara Hanson**, London School of Hygiene & Tropical Medicine (LSHTM)

SPEAKER: **Edwine Barasa**, KEMRI Wellcome Trust Research Programme,Nairobi; **Robert Gillezeau**, University of Toronto; **Eeshani Kandpal**, Center for Global Development

Cape Town International Convention Centre | CTICC 1 – Clivia, Jasminum & Strelitzia conservatories
Opening Reception

Monday

Cape Town International Convention Centre | CTICC 1 – Room 1.63
Impact Assessment of System Wide Policy Change

MODERATOR: **Stirling Bryan**, University of British Columbia

Differences in Treatment Patterns and Outcomes of Acute Myocardial Infarction for Low- and High-Income Patients in 6 Countries: An Analysis from the International Health Systems Research Collaborative
PRESENTER: **Bruce Landon**, Harvard University
Importance: Many international comparisons, reliant on aggregated country-level data, have reported that the United States (US) spends more but has poorer health as measured by life expectancy and childbirth outcomes. These high-level analyses lack detailed information on how disease-specific processes of care and outcomes differ for patients presenting with a single illness or condition across different countries. AMI is an exemplar condition for cross-country comparison because it is common, has internationally agreed upon diagnostic criteria, and validated coding schemes in administrative data. We compared AMI treatments and outcomes of high- and low-income patients across six countries.

Objective: To determine if treatment patterns and outcomes for patients presenting with acute myocardial infarction differ for low- versus high-income individuals across six countries with .

Design/Setting/Participants: Serial cross sectional cohort study of all adults age $\geq$ 66 years hospitalized with acute myocardial infarction between 2011 and 2018 in the US, Canada, England, Netherlands, Taiwan, and Israel using population-representative administrative data. The top and bottom quintiles of income were identified in each country using similar methods.

Exposures: Being in the top and bottom quintile of income within and across countries.

Main Outcomes: 30-day mortality, rates of cardiac catheterization and revascularization, length of stay, and readmission rates.

Results: We studied 289,626 patients hospitalized with ST elevation myocardial infarction (STEMI) and 843,602 hospitalized with non-ST elevation myocardial infarction (NSTEMI). Adjusted 30-day mortality was 1-3 percentage points lower for high-income patients. For instance, 30-day mortality for high- vs. low-income STEMI patients in the Netherlands was 10.3% vs. 13.1%, difference -2.8% [95% C.I. -4.0 to -1.6]. In all countries, rates of cardiac catheterization and PCI were higher among high- vs low-income populations, with absolute differences ranging from 1-6 percentage points (e.g., 73.6% v. 67.4%, difference 6.1 percentage points [95% C.I. 1.2 to 11.0] for PCI in England for STEMI). Rates of CABG for STEMI patients in low- vs high-income were similar, but for NSTEMI were generally 1-2 pp higher among high-income patients

(e.g., 12.6% v. 11.0% in the US, difference 1.6 percentage points [95% C.I. 1.3 to 1.9]). Thirty-day readmission rates also were 1-3 pp lower and hospital length-of-stay (LOS) generally was 0.2-0.5 days shorter for high-income patients.

Conclusions and Relevance: High-income individuals had substantially better survival and were more likely to receive lifesaving revascularization and had shorter LOS and fewer readmissions across all countries. Our results suggest that Income-based disparities were present even in countries with universal health insurance and robust social safety net systems.

Comparing Multivariate with Wealth-Based Ranking for Computing Inequity in Access to Healthcare Services, Health Outcomes, and Financial Risk Protection: Toward a Better Measure of Equity in Health Policy

PRESENTER: **Bryan Patenaude**, Johns Hopkins University
AUTHORS: Salin Sriudomporn, Deborah Odihi, Joshua Mak, Gatien de Broucker

Background

Health equity has become a priority for many in the field of public health and the literature demonstrates that a policy focus on mean levels of coverage and attainment mask significant inequities in healthcare service coverage sub-nationally and across individuals, which persist for reasons linked with multiple socio-demographic, geographic, and supply-side barriers to access. Despite these multiple dimensions contributing to inequities in service utilization, most metrics assessing inequalities or inequities in service coverage only examine disparities along one dimension, such as wealth or urban/rural, which may mask persistent disparities correlated with multiple dimensions. Our study utilizes the Vaccine Economics Research for Sustainability & Equity (VERSE) measurement tool and the outcome of being fully-immunized as a case study to compare measures of wealth-based inequity in full immunization status with a composite multivariate measure of inequity for 40 countries.

Methods

The VERSE tool produces a composite equity concentration index and absolute equity gap based on this index, which, in its ranking procedure, accounts for multiple factors influencing equity in vaccination coverage, including maternal education level, sex of the child, household wealth, urban/rural designation, (subnational) region of residence, and insurance coverage. To focus on inequities and not inequalities, age of the child is utilized to control for need, by matching with recommended vaccination ages in national immunization schedules. The VERSE Equity Tool is then applied to 40 Demographic & Health Surveys (DHS) between 2014-2018 to compare the level of inequity in fully-immunized status that is captured using only a wealth-based concentration index vs. using the composite ranking criteria to generate a concentration index. Fully-immunized is defined as having received all recommended doses of every routine vaccine appropriate for the current age of the child included in the DHS, according to the country's national immunization schedule.

Results

We find that in all settings observed, inequities in fully-immunized status captured using the composite metric are between 30% and 450% larger than what would be captured examining inequities using a traditional concentration index where the ranking criteria is socioeconomic status. The absolute equity gap in coverage between the top and bottom quintiles is also between 1 and 35 percentage points larger when using the composite ranking criteria compared with using socio-economic status alone.

Conclusion

This case-study application suggests that the magnitude of inequity in healthcare service coverage missed by traditional wealth-based equity measures can be substantial. As such, closing the coverage gap between the bottom and top wealth quintiles is unlikely to eliminate persistent socio-demographic inequities in both coverage and access to vaccines as well as other primary healthcare services. The results suggest that pro-poor interventions and programs utilizing needs-based targeting based on poverty should consider expand their targeting criteria to include other dimensions to reduce inequalities wholistically. Additionally, a composite metric should be considered when setting targets and measuring progress toward reducing inequities in healthcare access, utilization, and outcomes.

Does the Pay for Performance Scheme on Public Health Services Matters? A Difference-in-Differences Event Study Evidence in Indonesia

PRESENTER: **Taufik Hidayat**, Universitas Indonesia
This study examines the impact of pay-for-performance (P4P) linked to the capitation payment system on the quality indicator in Indonesia's public primary health care (*Puskesmas*). While the national health insurance (*Jaminan Kesehatan Nasional* – JKN) program has been implemented since 2014, the payment mechanism for primary health care adopted the capitation system. However, existing literature mentioned that capitation payment might result in primary health care selecting low-risk patients or using unnecessary referrals. Therefore, the JKN program imposed the P4P in 2015 as an incentive in the capitation payment at the primary health care to improve comprehensive health service quality and avoid the adverse effect of capitation. In addition, the P4P rolled out at primary health care gradually at different times and was initially enforced on the Puskesmas. Hence, I establish a difference-in-differences event study model that exploits variation in the different times of P4P implementation in the presence of the heterogeneous effect. The research design allows for capturing the dynamic treatment effects of capitation incentives on outcomes over time. The main outcomes for this analysis encompass contact rate, referral rates from primary care to non-specialist, and attendance ratio of the chronic disease management program.

I employ monthly panel data nationally representative at the primary healthcare level from October 2014 to June 2017. Data construction is established by combining patient utilisation datasets provided by Social Security Administrative Bodies for Health Insurance (BPJS-Health) and public primary health care characteristics data from the Ministry of Health. There are 7,194 public primary healthcare facilities included in this analysis. Furthermore, I define the treatment group according to the date of P4P implementation at the public primary health care. In sum, 995 public primary health care facilities were identified as treatment at the end period of analysis. This analysis considers parallel trend as a key identification assumption in the difference-in-differences event study approach. Robust standard errors are clustered at the public primary health care facility level.

This study finds that two months after implementing a capitation P4P, there is an increase of 6 additional patient contacts per 1,000 members in a month. However, the P4P does not immediately affect referral rates to non-specialists or the chronic disease management attendance ratio. The study also finds that the decrease in referral rates coincides with an increase in the chronic disease management attendance ratio following P4P implementation. The effect of P4P on the chronic disease management attendance ratio gradually increases after one month of implementation and lasts until eight months.

Evaluating Country Performance Following GAVI Graduation: An Applied Synthetic Control Analysis
PRESENTER: **Robert John Kolesar**, Palladium
AUTHORS: Rok Spruk, Tsheten Tsheten
Overview: Over the past decade, the slowing growth of international financial assistance for health has elevated the discussion about country self-reliance and the transition from donor aid dependence (Resch et al., 2018). The Immunization Agenda 2030 calls out country ownership as key and notes that critical importance of domestic financing (WHO, 2021). As donors seek to increase domestic co-financing and ultimately graduate countries, COVID-19 and the increasing cost of debt service due to high interest rates constrains public budgets (Keller et al., 2020).

Background: Childhood immunization is among the most cost-effective and long-lasting health interventions (Ozawa et al., 2016; Brenzel et al., 2006). Further to the direct impacts on Sustainable Development Goal (SDG) 3 of good health, immunization contributes to 14 SDGs (Decouttere et al., 2021). Established in 2000, Gavi, the Vaccine Alliance, has disbursed over $13 USD billion to improve equitable access to vaccines and improve health and well-being, primarily among children in the poorest countries. There is strong evidence showing that Gavi assistance has increased immunization coverage and reduced child mortality. To promote the transition to financial self-reliance and sustainability, Gavi has increasingly invested in health system strengthening and transition planning (Storeng, 2014; Gavi, 2015). Bao et al. (2015) assert that "monitoring and evaluating large-scale global health program transitions can strengthen accountability, facilitate stakeholder engagement, and promote learning about the transition process and how best to manage". Nevertheless, the current literature focuses on challenges of domestic immunization financing which leaves an empirical gap related to immunization system performance (e.g. maintaining services and health gains) in countries transitioning from Gavi support. This study contributes to addressing this gap.

Research question: This study evaluates post-graduation vaccination coverage and post-neonatal mortality to estimate country performance of these outcomes among countries that graduated from Gavi assistance between 2000-2018.

Methods: The data set was constructed based on the 76 countries receiving Gavi assistance between 2000 and 2020. We focus on Diphtheria, pertussis, and tetanus toxoid third-dose (DPT3) coverage among one-year-olds, measles first dose coverage among one-year-olds as these are considered strong indicators of immunization program performance (Muhoza et al, 2021). We also look at post-neonatal mortality as vaccine-preventable infectious diseases accounting for about 13% of child mortality (Frenkel, 2021). We use synthetic control, a non-parametric quasi-experimental method, to generate a pre-graduation counterfactual with the same characteristics as the observation of interest to predict a future that empirically never existed. The synthetic unit is constructed from the weighted average of other units with good pre-treatment fit to the unit of interest before graduation but did not graduate. Matching variables include Gavi disbursements, non-Gavi health development assistance, population, fertility, government effectiveness, political stability, and corruption control, as well as land area, location data, roadways, and topographic/climate type.

Key results: Preliminary results indicate substantial heterogeneity following Gavi graduation. China and Guyana overperformed their expected coverage rates; Albania, Bhutan, Georgia, and Turkmenistan maintained coverage above 90%; and, Bosnia & Herzegovina and Ukraine reported precipitous drop-offs which fell below well below their synthetic controls.

8:30 AM –10:00 AM   MONDAY   [Health Care Financing & Expenditures]

Cape Town International Convention Centre | CTICC 1 – Room 2.64-2.65
Performance-Based Financing and Effective Coverage in Low-and-Middle Income Countries [FINANCING FOR UHC SIG]

MODERATOR: **Karen Grepin**, The University of Hong Kong

ORGANIZER: **Eeshani Kandpal**, The World Bank

Using and Operationalizing the Concept of Effective Coverage in Health Care to Better Understand the Constraints to Quality of Care in Low-and-Middle Income Countries.

PRESENTER: **Damien De Walque**, The World Bank

A frustrating healthcare status quo can be observed in many low-income countries: deaths are often due to poor quality of care rather than the lack of access to care.

This presentation will start by using the concept of "effective coverage" to better understand the sources of this conundrum. Effective coverage in health care is attained when everyone in need of a particular health service is getting it in a timely manner and at a level of quality necessary to obtain the desired effect and potential health gains. For measurement purposes, effective coverage can be decomposed as the product of (a) coverage (the percentage of individuals with a specific medical need who receive care) and (b) quality (the percentage of these individuals who receive the intervention(s) that produce the maximum feasible health improvement).

The presentation will use data from the Multiple Indicator Cluster Surveys (MICS) in a large set of countries to operationalize effective coverage by investigating how to measure it using existing data. The results show that the gap between coverage and effective coverage can be large. For example, coverage for antenatal care in a number of sub-Saharan African countries is high, but quality is often lacking. This pattern holds not only for maternal health but many other health services as well. Thus, understanding the drivers of the gap between quantity and quality of care is crucial to figuring out why service utilization increases may not translate into improved health outcomes.

In trying to improve quality of care, the first step is to understand what the constraints to quality are. Thus, in a second step, the presentation will examine those constraints, using data coming from direct clinical observations of antenatal care visits from the Health Results Innovation Trust Fund (HRITF) impact evaluation surveys in Cameroon, the Central African Republic, Nigeria, the Democratic Republic of Congo and the Republic of Congo. To identify the relative importance of various constraints, the analysis relies on a "know-can-do" framework that examines structural gaps (e.g., do health care facilities have drugs and equipment in stock?), knowledge gaps (e.g., have health care workers received adequate training to know the correct treatment in a situation?), and gaps in worker effort.

Overall, results indicate that a high percentage of health facilities still lack even basic supplies. Moreover, two thirds of poor-quality care cannot be attributed to low worker effort, suggesting that health financing reforms such as performance pay alone would have limited impacts. This finding suggests that effective policies need to address not only worker effort, but other factors like structural capacities and medical training.

Can Performance-Based Financing and Other Financial Incentives Improve Effective Coverage? Evidence from Low-and-Middle-Income Countries

PRESENTER: **Eeshani Kandpal**, The World Bank

This presentation will take a broad-based look at the impact of performance pay and broader performance-based financing (PBF) projects in low-and-middle-income country health systems and provide new evidence from multiple rigorously designed impact evaluations. This evidence shows that PBF projects have led to gains in primary health service delivery even in low-income, centralized health systems. However, questions of comparative efficacy and effectiveness arise when the impacts of PBF projects are juxtaposed against other interventions related to financial incentives on the demand and supply sides. On the demand side, we will consider conditional cash transfers (CCTs) and vouchers, while on the supply side, it considers direct facility financing (DFF), which shares many features of PBF projects in terms of providing an operating budget to the frontlines as well as autonomy over how to disburse that budget, but does not include performance pay.

The evidence base will draw on pooled regression analysis, formal meta-analysis, and a systematic review of over 50 programs from 30 countries around the world. The results show that financial incentives on the demand and supply sides can increase coverage. However, such incentives typically work on the margins, while large gains in effective coverage remain an elusive goal. The discussion and interpretation of these findings highlight the importance of the institutional setting. Performance pay may make sense in decentralized, high-quality health systems that already support facility financing and autonomy as well as accountability and transparency. In contrast, its potential may be more limited in centralized, under-resourced health systems that have key gaps at various points. Incentives on the demand and supply sides may further work on margins that complement each other by addressing different constraints. It highlights the role of baseline coverage, content, and quality; the provider's effort response to price; and task complementarity as key determinants of the impact of performance pay on purchased indicators.

Impact Evaluation Results of Salud Mesoamerica Initiative on Coverage and Quality of Reproductive, Maternal and Child Health Services: A Difference-in-Differences Study in Four Countries

PRESENTER: **Pedro Bernal**, Inter-American Development Bank

The Salud Mesoamerica Initiative (SMI) is a public-private regional partnership that aims to reduce inequities in the access and quality of reproductive, maternal and child health care (RMNCH) services in eight countries in Central America and Mexico. SMI's model is unique in that is geared to strengthen public health systems by combining a results-based financing (RBF) model for Ministries of Health (MoHs) with technical assistance focused on the implementation of strategies to improve RMNCH services. While there is an increasing body of evidence on the effect RBF models for health care services providers, there is limited evidence on models such as SMI's that provide organizational incentives and support to address performance gaps to MoHs.

In this presentation we will show the results of the impact evaluation of SMI's model on the coverage and quality of RMNC health services in four countries: Guatemala, Nicaragua, Honduras and Mexico. We use a difference-in-difference design and treatment and comparison group

data from household surveys and medical record reviews in these countries.

Results show that SMI effectively improved quality and coverage of maternal care. Using household data, we found that SMI increased antenatal care coverage by over 9 percentage points, early catchment by nearly 5 percentage points, and quality criteria of prenatal care by over 6 percentage points, and coverage of timely post-partum care increased by 9 percentage points. Using medical record data, we found that the clinical quality of care of obstetric and neonatal complications in hospitals improved on average 10 percentage points attributable to SMI.

Even when SMI targeted the poorest municipalities in each country, SMI effects were equitably distributed with effects of the same magnitude or higher among the poorest of the poor.

Improving Health System Resilience in the Face of the COVID-19: Regional Outcomes of the Salud Mesoamerica Initiative during the Pandemic
PRESENTER: **Diego Rios Zertuche**
AUTHOR: Emma Iriarte
As the immediate COVID-19 crisis recedes, and evidence demonstrating the severe impact of the pandemic on health systems in low- and middle-income countries is growing, the emerging concern is to prepare health systems for the next pandemic. How can international donors and countries increase health system readiness and resilience during pandemics?

In February 2020, when the COVID-19 crisis exploded, the Salud Mesoamerica Initiative (SMI) was on its third and final phase of implementation in four countries: Belize, El Salvador, Honduras, and Nicaragua. SMI is a results-based financing (RBF) program providing high-level incentives to Ministries of Health (MoHs) to improve coverage and quality outcome-level indicators together with technical assistance to strengthen health systems to achieve results. The crisis prompted SMI to adapt and continue supporting Ministries of Health improve reproductive, maternal, neonatal, and child health (RMNCH) services in the poorest areas of Mexico and Central America.

In this presentation, we will show the results of SMI before, during and after the COVID-19 crisis on RMNCH services. We will also discuss the adaptations that donors, countries, and the Inter-American Development Bank had to consider.

Despite the pandemic, MoHs in the four countries continued improving quality of care of maternal and neonatal services. Although interventions that relied heavily on community outreach and community platforms did not improve at a similar rate, in most cases we did not observe declines in coverage. In contrast with comparison areas, SMI target areas appeared to have a protective effect, either by preventing decreases or by recovering faster. The biggest challenge was in implementing new interventions.

The SMI health system strengthening approach improved health system resilience during the pandemic. High-level incentives to improve quality and coverage paired with health system strengthening technical assistance can be an effective mechanism to direct international funding towards lasting improvements. Lessons from SMI can be used to improve health system readiness and resilience for the next pandemic in low- and middle-income countries.

8:30 AM –10:00 AM   MONDAY   [Health, Its Distribution And Its Valuation]

Cape Town International Convention Centre | CTICC 1 – Room 1.41

Economics of Child Health and Wellbeing SIG ECR Session: Improving the Measurement and Valuation of Child Health to Inform Coverage Decisions

MODERATOR: **Stefan Lipman**, Erasmus University Rotterdam

DISCUSSANT: **Aisha Moolla**, The SAMRC/Wits Centre for Health Economics and Decision Science (PRICELESS SA)

Mapping the Pediatric Quality of Life Inventory to EQ-5D-Y Utilities to Inform Economic Evaluations in Child Populations
PRESENTER: **Christine Mpundu-Kaambwa**, Flinders University
AUTHORS: Gang Chen, Kim Dalziel, Julie Ratcliffe, Mina Bahrampour
Background: The Pediatric Quality of Life Inventory™ 4.0 Generic Core Scales (PedsQL GCS) is the most widely used patient-reported outcome measure (PROM) designed to measure health-related quality of life in healthy children and those with acute and chronic health conditions. Although the PedsQL GCS is widely used among pediatric populations. Currently, it is not possible to directly or indirectly estimate health utilities based on the PedsQL GCS to calculate quality-adjusted life-years (QALYs) to inform economic evaluations.

Aim: This study aimed to map the PedsQL GCS to the EQ-5D-Y (3l and 5L) to generate EQ-5D-Y health utilities.

Methods: This study is based on data from the Australian Pediatric Multi-Instrument Comparison (P-MIC) study for 845 children aged 6 -11 years. We estimated models using direct and response mapping approaches to predict EQ-5D-Y health utilities and responses, including ordinary least squares estimator, generalized linear model, robust MM estimator, multivariate factorial polynomial estimator, beta-binomial

estimator, finite mixture model and multinomial logistic model. The models were internally validated on an estimation dataset that included complete PedsQL GCS and EQ-5D-Y scores. K-fold cross-validation (in sample) was used to compare the predictive performance of the estimated models. Final models were selected based on the mean squared error (MSE) and mean absolute error (MAE). External Validation was performed using a separate dataset for 150 respondents.

Results: Generalized Linear models (GLM) that used the PedsQL™ GCS dimension scores, their squared terms, and interactions (with and without age and gender) to predict EQ-5D health utilities had the best prediction accuracy. In the external validation sample, the GLM model with age and gender had an MSE (MAE) of 0.028 (0.132) compared with an MSE (MAE) of 0.028 (0.131) for the GLM model without age and gender.

Conclusions: Our mapping algorithms facilitate the estimation of health utilities in childhood when EQ-5D-Y data is unavailable. These algorithms are suitable for use in populations comparable to ours (children aged 6-11 years). The performance of these algorithms in childhood populations, which differ according to age or clinical characteristics to our own, is yet to be evaluated.

Comparing (Heuristic) Valuation Processes between EQ-5D Valuation from Adult and Child Perspectives

PRESENTER: **Vivian Reckers-Droog**, Erasmus University Rotterdam
AUTHOR: Stefan Lipman
Objectives EQ-5D valuation assumes that respondent's trade-off between all relevant aspects of choice tasks and maximize their utility. Yet, respondents may not maximize utility due to limited time, knowledge, computational capability, or emotional impulses. Although not necessarily desirable in EQ-5D valuation, the use of such heuristic valuation processes may help respondents simplifying or even avoiding the considered cognitively and emotionally straining trade-offs that are core to EQ-5D valuation. Earlier qualitative work suggested that the use of a 10-year-old child's perspective (as in EQ-5D-Y-3L valuation) may increase individuals' reliance on heuristic valuation processes as compared to the use of an adult perspective. It is, however, unclear whether and with what strength heuristic valuation processes impact the utility of child health states. Hence, the objective of this study was to examine whether such processes can also be identified using quantitative data obtained from a representative sample and, if so, what the impact of such processes on EQ-5D valuation in child and adult perspectives.

Methods: We reused the data reported in Kreimeier et al. (2018). In this study, respondents from four countries valued EQ-5D-3L/EQ-5D-Y-3L health states from adult and child perspectives with time trade-off (TTO) and discrete choice experiment (DCE) tasks. We will use the in the EQ-VT protocol to explore the degree to which heuristic valuation processes occur. Our analyses focused on comparing process data across adult and child perspectives, i.e., comparing, for example, decision time, decision paths, dominance failures, clustering, and lexicographic respondents. We also explored how reflective of a set of simple decision strategies respondents' choices were in both perspectives.

Results: Our preliminary results provide some evidence for differences in (heuristic) valuation processes between adult and child perspectives, albeit not across all data sources. We found no evidence for differences between the perspective in terms of the time respondents take to complete decision tasks. Some evidence was observed suggesting lower data quality in child perspectives, e.g., more dominance violations. Interestingly, we found a clustering of responses around utilities of 0.8 in the child perspective.

Discussion: Our results suggest that some of the decision strategies that may simplify the difficult task of valuing health from a 10-year-old child's perspective identified in earlier qualitative work affect the resulting EQ-5D utilities. Hence, it seems that, rather than being based on trade-offs of those aiming to maximize utility, EQ-5D value set partially reflect simplifying strategies respondents use to avoid trade-offs. For example, clustering of utilities in the child perspective suggests that individuals are disproportionally likely to state indifference in the TTO task when the 10-year-old child reaches age 18. Earlier qualitative work suggested this happens because individuals believe the child can decide for themselves at that age, i.e., absolving them from making further trade-offs. Future work should explore if and how effects of heuristic valuation processes may be reduced.

Ceiling Effects and Known Group Validity of PedsQL, EQ-5D-Y-3L, EQ-5D-Y-5L, and CHU9D Among Children with Asthma, Sleep Problems and Epilepsy: Results from the Australian Paediatric Multi-Instrument Comparison (P-MIC) Study

PRESENTER: **Renee Jones**, Health Economics Unit, Melbourne School of Population and Global Health, The University of Melbourne
AUTHORS: Nancy Devlin, Harriet Hiscock, Brendan Mulhern, Rachel O'Loughlin, Kim Dalziel
Background:

There is a lack of evidence on the comparative psychometric performance of generic paediatric health-related quality of life (HRQoL) instruments among children with common health conditions.

Aim:

Compare ceiling effects and known group validity of common generic paediatric HRQoL instruments (EQ-5D-Y-3L, EQ-5D-Y-5L, CHU9D and PedsQL) among children with asthma, sleep problems and epilepsy.

Methods:

The Australian Paediatric Multi-Instrument Comparison (P-MIC) study collected HRQoL data on a diverse sample of Australian children aged 2-18 years. The P-MIC study included specific samples of children with asthma, sleep problems, and epilepsy. Participants completed an initial and follow-up survey. Surveys were online and involved the completion of common generic paediatric HRQoL instruments and a condition specific instrument. Children aged ≥7 years whose caregiver deemed them able to, self-reported the HRQoL instruments, otherwise HRQoL instruments were proxy reported by the caregiver. Ceiling effects and known group validity were assessed. An instrument was considered to have a ceiling effect if ≥15% of participants reported the lowest severity level (e.g., 'no problems') across all items. Known group validity was assessed by comparing the mean total instrument or level sum score for each known group. Known groups for each condition were based on pre-specified severity questions designed with clinicians - asthma (previous hospital admission or emergency visit versus none), sleep problems (large sleep problem versus moderate), and epilepsy (seizures monthly or more frequent versus yearly or less frequent). Analyses were completed using P-MIC data on children with asthma aged 5-18 years, sleep problems aged 5-16 years, and epilepsy aged 5-18, as all included instruments are validated in these age groups.

Results:

A total of 487 children with asthma, 346 with sleep problems, and 272 with epilepsy had an initial survey completed. Both the EQ-5D-Y-3L and 5L demonstrated ceiling effects for all condition groups. The CHU9D demonstrated ceiling effects in children with asthma and no ceiling effects in the children with epilepsy and sleep problems. The PedsQL demonstrated no ceiling effects for any condition group. No instrument demonstrated floor effects. Except for the EQ-5D-Y-3L in children with sleep problems and the CHU9D in children with epilepsy, all instruments differentiated between known groups for all three conditions, demonstrating a statistically significant (p value <0.05) mean difference in total instrument or level sum score in the hypothesised direction.

Conclusion:

Compared to other instruments, PedsQL has the advantage of demonstrating no ceiling effects in any condition group. An instrument with more items designed to obtain a detailed profile of HRQoL, such as the PedsQL (23-items), is less likely to demonstrate a ceiling effect compared to an instrument with fewer items designed to obtain a brief profile of HRQoL and elicit values, such as the EQ-5D-Y (5 items). Almost all instruments demonstrated the tendency to be sensitive to the known groups assessed for each condition. Additional condition severity known groups, such as severity defined by validated condition specific instruments, should be assessed to confirm these results. Future analysis will explore additional known groups, responsiveness, and comparison of generic and condition specific instruments.

Mind the Gap. Psychological Distance in EQ-5D-Y Valuation with Different Perspectives

PRESENTER: **Stefan Lipman**, Erasmus University Rotterdam
AUTHORS: Zhongyu Lang, Arthur Attema, Werner Brouwer
Objectives

EQ-5D-Y is an instrument used for measuring and valuing health in children aged 8 to 15. This pediatric instrument is valued by adults taking the perspective of a 10-year-old child. Previous research has discovered that the use of such a child perspective yields higher valuations compared to adults taking their own perspective. It is unclear what exactly causes this difference in valuation between perspectives. This study, therefore, tries to explain how and why different perspectives influence EQ-5D-Y utilities by using an existing framework, construal level theory (CLT). This psychological theory suggests that decision-making is affected by psychological distance. The theory distinguishes between four types of psychological distance: temporal, social, spatial, and hypothetical. This study explores the effect of all four on EQ-5D-Y utilities elicited with composite time trade-off (cTTO).

Methods

This study used a within-subjects experimental design to test the effect of psychological distance. In the experiment, each respondent valued EQ-5D-Y-3L states (i.e., 11312, 22222, 32323, 33333) from four different perspectives that were increasing in terms of psychological distance. Each of the dimensions was operationalized as follows: temporal - deciding for a child or an adult, social – deciding for oneself or another person, spatial: deciding for someone nearby or far away and hypothetical – deciding for health states that people were familiar with or not. We collected data from a representative sample of 150 (UK) adults in online interviews, using composite time trade-off methodology. We explored how distance affected the mean, variance, and internal validity of cTTO utilities.

Results

Overall, our preliminary results suggest that the mean cTTO utilities are higher in perspectives with higher psychological distance (understood as distance on more dimensions simultaneously). When looking at this effect at the health state level, the effect is significant only for severe health. In terms of variance, we found that variance decreases when social and hypothetical distance increases. A set of regression analyses, in which the effect of each of the dimensions was modeled separately, suggests that effect is mostly driven by social distance, i.e., deciding for others.

Conclusions

Collectively, these results suggest that the difference between utilities elicited in adults' own perspective and child perspective may be explained through psychological distance as understood in CLT. In this theory, psychological distance is hypothesized to increase the level of abstraction

of peoples' thinking. Indeed, our finding of lower variance for higher distance suggests that this effect may extend to EQ-5D valuation. It could from people focusing less on the concrete effects a state may have (due to higher abstraction) and therefore agreeing more on health states further away from them. In conclusion, our findings suggest that the coverage decisions based on utilities will be influenced the psychological distance of perspective used for valuation, with increasing social distance leading to the largest effects.

8:30 AM –10:00 AM   MONDAY   [Economic Evaluation Of Health And Care Interventions]

Cape Town International Convention Centre | CTICC 2 – Freesia
Cost-Effectiveness of Vaccines [IMMUNIZATION ECONOMICS SIG]

MODERATOR: **Mariana Marzullo Pedreira**, Brazilian Ministry of Health

Cost-Effectiveness of Primary Human Papillomavirus (HPV) Triage Approaches Among Vaccinated Women in Norway: A Model-Based Analysis

PRESENTER: **Allison Portnoy**, Harvard University
AUTHORS: Kine Pedersen, Jane J. Kim, Emily A. Burger
Introduction:

The Norwegian organized cervical cancer screening program recommends three-yearly cytology starting at age 25, followed by five-yearly human papillomavirus (HPV) testing for women aged 34–69 years. With Norway's first adolescent-vaccinated cohort entering screening in 2022, improved triage approaches for vaccinated women may be required for the screening program to remain cost-effective and limit overdiagnosis. To help inform revised guidelines for adolescent-vaccinated cohorts, we analyzed the health impact, colposcopy use, and cost-effectiveness of alternative primary HPV triage approaches for women initiating screening in 2023.

Methods:

We used a multi-modeling approach that captured HPV transmission and cervical carcinogenesis to compare alternative triage scenarios for five-yearly primary HPV testing with a status-quo scenario for women born in 1998 (i.e., age 25 in 2023). For each strategy, we estimated the cervical cancer screening and treatment costs per person, number of colposcopy referrals, quality-adjusted life years (QALYs), and incremental cost-effectiveness ratios (ICERs). We examined 72 scenarios that varied the inclusion and management of women who tested positive for alternative grouped HPV genotypes to either direct colposcopy referral or active surveillance (genotype groups: 16/18, 16/18/45, or 16/18/31/33/45/52/58) as well as variations in wait time for re-testing for positive HPV tests (12/24 or 18/36 months for selected/non-selected genotype risk groups, respectively). We also considered variations in the age that women switch from cytology to HPV-based screening (age 25, 28, 31, or 34 years). Cost outcomes were discounted (4% annually) and presented in 2020 USD (USD1 = NOK9.4004).

Results:

Given benchmarks for severity-specific cost-effectiveness thresholds in Norway, we found that the preferred strategy for vaccinated women aged 25 years in 2023 involved starting primary HPV-based screening at age 25 with direct colposcopy referral for 16/18-positive women alongside extended re-testing wait times (i.e., 18/36 months) for women referred to triage (ICER of $28,900 per QALY gained). Strategies directly referring women who test positive for additional genotypes to colposcopy yielded ICERs above the maximum threshold in Norway ($90,000 per QALY gained), while the currently-recommended strategy (switching to primary HPV testing at age 34) was dominated and therefore not considered efficient or cost-effective. Among the efficient strategies, only primary HPV-based screening starting at age 28 alongside active surveillance with extended re-testing wait times for all positive women reduced the number of colposcopy referrals compared to the currently-recommended strategy (lifetime risk = 0.002237), but these strategies increased the associated lifetime risk of cervical cancer up to 0.002279.

Conclusions:

As vaccinated cohorts enter screening age in Norway, obtaining more information from an HPV test to improve triage approaches ensures balancing overdiagnosis and resources use among the cohorts of vaccinated women who face a low risk of cervical cancer compared with unvaccinated women. The Norwegian program should consider transitioning the program away from using primary cytology-based screening towards exclusively primary HPV-based screening and use triage approaches to improve program effectiveness and efficiency.

Impact and Cost-Effectiveness of Potential Interventions Against Infant Respiratory Syncytial Virus (RSV) in Low- and Middle-Income Countries.

PRESENTER: **Ranju Baral**, PATH
AUTHOR: Clinton Pecenka
Background. Respiratory syncytial virus (RSV) is a leading cause of respiratory illness among infants, globally. Interventions currently available to prevent childhood RSV disease are limited; and the one currently available is costly even for high income countries. A few candidate interventions to protect against childhood RSV illness are in relatively advanced stages of development and could be available for

global use in the near future. Here we evaluate the potential impact and cost-effectiveness a maternal RSV vaccine to help inform decision making around further development of such intervention and eventual use in low- and middle-income countries (LMICs).

Methods. We used a static population-based cohort model to evaluate impact and cost-effectiveness of RSV maternal vaccine across 133 low- and middle-income countries (LMICs), from a health systems perspective. Disease burden inputs as well as unit cost inputs were based on published literature. Intervention characteristics such as efficacy and duration of protection were derived from a recent phase 3 clinical trial for maternal vaccine (Pfizer). The intervention was evaluated at US$3 and $5 per dose for Gavi and non-Gavi countries, respectively. Country-specific co-financing for Gavi-eligible countries was not considered. A range of input values were considered to explore uncertainty.

Findings. This is an update to the previous model of impact and cost effectiveness using the more recent clinical trial data. Results using the updated vaccine efficacy and duration of protection data were consistent with previous estimates confirming the positive impact and cost effectiveness of RSV maternal vaccine across LMICs. The maternal vaccine was projected to be cost saving in 48 of the 133 LMICs, averting on average 30% of RSV related deaths among under 6 months old. The average incremental cost-effectiveness ratio (ICER) expressed in US$ per DALY averted was estimated to be cost $437 (across country range $7 to $1,045) under baseline assumptions.

Conclusions. Informed by the latest clinical trial on efficacy and duration of protection, the RSV maternal vaccine is projected to be impactful and cost effective across many LMICs. The final product characteristics and the product prices the governments will have to pay will influence this finding.

The Distributional Economic Impact of Introducing an Adjuvanted Recombinant Zoster Vaccine into the Swedish Universal Vaccination Programme

PRESENTER: **Camilla Nystrand**
AUTHORS: Emelie Heintz, Katarina Widgren, Shuang Hao, Vibeke Sparring

Background

The new adjuvanted recombinant zoster vaccine (RZV) has shown higher vaccine efficacy for herpes zoster than the live-attenuated vaccine. While some European studies have assessed its cost-effectiveness, the economic impact of introducing it in the Swedish universal vaccination programme is unknown. In addition, the impact of introducing RZV on population health distribution is largely unknown. The aim of the current study was to assess the cost-effectiveness of the RZV if implemented in Sweden, and its impact on the distribution of health.

Methods

A decision-analytic model was used to estimate the health economic impact of introducing RZV in Sweden. Five-year age-cohorts were modelled between ages 65 to 100+, comparing the cost-effectiveness of RZV to no vaccine. Due to large differences in vaccine efficacy between RCT- and RWD-studies, two separate scenarios were analyzed using both types of data. The model was populated with Swedish register-based data and estimates from the literature. A lifetime time horizon was implemented, along with a healthcare payer perspective including out-of-pocket expenses, incorporating health care resource use due to HZ and related complications. Cost of the vaccine was set at market price and varied in additional analyzes. A three-percentage discount rate was applied to costs and outcomes. Differential quality-adjusted life years (QALYs) and uptake rates based on sex and educational level were incorporated into the model to estimate distributional health impacts. Incremental QALYs were put into comparison to incremental costs to estimate the cost-effectiveness.

Results

Preliminary results show that compared with no vaccination, RZV would not deemed cost-effective at a willingness-to-pay of 50,000 euro across cohorts. The vaccine price would have to drop by roughly 50% for the vaccine to be considered cost-effective. In addition, preliminary findings show that it would also lead to an increased health gap.

Conclusion

At the current market price for the RZV, preliminary findings show that it would not be a cost-effective option to adopt within a national mass vaccination programme, also considering its equity impact on population health. The price would need to considerably drop for the RZV to be cost-effective in Sweden.

Cape Town International Convention Centre | CTICC 2 – Daisy
Making Health Economics Count: The Use of Economic Analysis and Behavioural Economics in Informing Health Policy in South Africa over the Last 20 Years

MODERATOR: **Jacqui Miot**, University of the Witwatersrand

DISCUSSANT: **Nthabiseng Khoza**, South African National Department of Health

Building the Perfect Data-Model-Policy-Budget Cycle: The Role of Economic Evaluations in the Public HIV and TB Planning Process in South Africa

PRESENTER: **Gesine Meyer-Rath**, Boston University
Introduction: Over the past 20 years, our institution has used local data and built local capacity to improve on decision making, planning and budgeting for the two diseases responsible for the highest disease burden in South Africa- HIV and TB.

Methods: Starting in 2003, we used a variety of economic evaluation techniques, ranging from budget impact analysis to cost-effectiveness analysis to allocative efficiency optimisation, to establish and optimise fiscal space for South Africa's HIV and TB programmes. Based on cost data collected through bottom-up cost analyses in relevant facilities where possible, local disease transmission models parameterised with and calibrated to local disease data, and government's own decision criteria, these analyses were able to produce results regarding average costs and incremental cost-effectiveness that could be used both for decision making and strategic planning as well as for budgeting, especially under the country's HIV/ TB Conditional Grant. Through collaborations, we incorporated into this cycle a process of quarterly expenditure and performance tracking at the national and provincial level, and regularly update our models with annual service statistics, achieved intervention coverage and effectiveness, and the most recent prices and salaries.

Results: Since 2009, the country's HIV/ TB Conditional Grant has increased 9-fold, while the average costs, in particular for antiretroviral treatment, have decreased significantly, now funding the world's largest HIV and TB programmes in which novel diagnostic, screening and treatment interventions are routinely made available and scaled up. Recent key informant interviews with 23 of our main stakeholders showed a high overall confidence in the validity of our methods and results, satisfaction with stakeholder involvement in the process of soliciting analyses and choosing scenarios, and a desire to expand the use of similar methods beyond HIV and TB. Highlighted challenges include remaining lack of capacity within government departments and lack of data at lower administrative levels.

Conclusions: The data-model-policy-budget cycle developed and optimized for the South African HIV and TB programmes has resulted in a steady increase in government funding for these diseases, an expansion of both programmes' reach, and an increase in the efficiency of spending, Based on these successes, stakeholders suggest its expansion into other areas, including non-communicable diseases.

Indlela: A First-of-Its-Kind 'Nudge Unit' Strengthening Behavioural Economics Capacity and Addressing Last Mile Challenges for HIV in South Africa

PRESENTER: **Caroline Govathson-Mandimika**, University of the Witwatersrand
Introduction: Insights from behavioural science, specifically from the emerging field of behavioural economics offer new ways to design and deliver HIV care. Behavioural economics offers insights for developing low-cost solutions, or 'nudges', that can increase effectiveness of HIV services and improve HIV outcomes. Over the past two decades, South Africa has made significant gains in delivering HIV services to millions of individuals. In South Africa, home to the world's largest HIV epidemic, prevention and treatment services are widely available, but engagement is below levels needed to reach the UNAIDS 95/95/95 targets. Human behaviour poses a "last mile" challenge to ensuring the effectiveness of biomedical interventions and maximizing the impact of existing HIV/AIDS resources.

Despite the proliferation of nudge units worldwide, there are two important gaps that have limited their potential impact. First, the vast majority of these units have been established in high-income countries largely in the global north. Second, nudge units in low-to middle income countries (LMICs) have seldom invested in local capacity building. The question remains on what can be done to accelerate the capacity of local researchers and implementers to develop and test behavioural economics solutions to improve HIV programming, and other public health interventions in resource constrained LMIC contexts?

Methods: The newly released PEPFAR Strategic Direction places Behavioural Science as a key focus area and calls for the identification and scale-up of systematic, evidence-backed interventions in behavioural and social science.

In 2020, we launched the *Indlela* Behavioural Insights for Better Health, a first-of-its-kind "nudge unit" designed to strengthen the behavioural economics capacity of South African implementers and researchers to support rapid testing of behavioural interventions for HIV programmes. *Indlela* supports several HIV Behavioural Insights Tests (BITs) through co-design and impact evaluation of contextually appropriate, low-cost, scalable interventions to improve HIV outcomes.

Results: In this presentation, we will share the goals, structure, activities, and lessons learned from the first three years of *Indlela*, with a focus on interdisciplinary, cross-sector, and transnational collaboration. We will also share the designs and preliminary results from our BIT projects,

and introduce *Indlela's* Behavioural Hub (B-Hub), an innovative concept in South Africa. Activities in the B-Hub include obtaining rapid feedback on intervention designs, testing interventions and assessing knowledge, attitudes, beliefs and intentions of potential users through A/B tests, rapid surveys and contextual inquiry. Importantly, the B-Hub is not a longitudinal cohort but rather draws on different participants at various time points to provide feedback on a range of projects. Additionally, we will share results on applying behavioural science to advance COVID-19 vaccination roll-out in South Africa.

Conclusion: Building upon the past three years of growth and learning, *Indlela* is ideally placed to boost the development of behavioural interventions that encourage health-promoting behaviour changes. We seek to strengthen support to the Department of Health, other stakeholders and implementing partners in order to continue addressing high priority gaps and further build capacity in behavioural economics to support research and health programme priorities both for, and beyond HIV.

Using Health Technology Assessment to Assist Government Decision-Making Regarding Novel Interventions in South Africa: Applications from PrEP to COVID-19 Therapeutics

PRESENTER: **Lise Jamieson**, Health Economics and Epidemiology Research Office, Faculty of Health Sciences, University of Witwatersrand, Johannesburg, South Africa
AUTHORS: Gesine Meyer-Rath, Mariet Benade, Jacqui Miot

Introduction

South Africa is in the process of establishing new Health Technology Assessment (HTA) guidelines that will be a cornerstone of decision-making regarding benefits under South Africa's new universal health coverage system, National Health Insurance. HTA uses multi-disciplinary analysis to inform decisions about the introduction of new health interventions into the public health sector. The overarching aim of HTA in the South Africa is to inform the inclusion or exclusions of medicines into the South African National Essential Medicines List (NEML), incorporating notions of intervention efficacy, safety, cost-effectiveness, affordability, equity, feasibility and acceptability.

Methods:

This abstract summarises our most recent HTA work solicited by the South African National Department of Health's Affordable Medicines Directorate (AMD). For long-acting injectable cabotegravir (CAB-LA) for HIV prevention, we used an established HIV transmission model, Thembisa, to model the long-term impact of scaling up CAB-LA compared to scaling up standard-of-care oral pre-exposure prophylaxis (PrEP), compared to a baseline of low oral PrEP roll-out. We evaluated the impact and cost over a 20-year time horizon, and conduct a threshold analysis to estimate the price of CAB-LA that would just make it as cost-effective as oral PrEP. During 2020 and 2021, we evaluated several COVID-19 therapeutics, including baricitinib, remdesivir, molnupiravir and tocilizumab. Where possible, analyses performed included a budget impact analysis and a cost-effectiveness analysis.

Results:

Our analysis for CAB-LA estimated a threshold price of $9-$15 per injection, and informed the AMD's price negotiations. Analysis on COVID-19 therapeutics were used in the decision-making process National Essential Medicines List Committee (NEMLC). Only baricitinib was recommended for use in hospitals, with an estimated incremental cost of $970 per life year saved. The remaining interventions were not recommended due to not being registered for use in South Africa at the time (remdesivir, molnupiravir), low impact (remdesivir, tocilizumab) or infeasibility of implementation (molnupiravir) due to the need to start within 5 days of a new COVID-19 infection.

Conclusion:

Our working examples show how routine HTA has been used to assist policy-makers in a middle-income country in making decisions about the introduction of novel interventions in real time.

Costing South Africa's National Cancer Guidelines: The Cost of Chemotherapy and Palliative Care in Lung Cancer

PRESENTER: **Refiloe Lerato Cele**, University of the Witwatersrand

Introduction

Lung cancer is a leading cause of mortality in South Africa and globally. Chemotherapy has been shown to prolong survival and improve quality of life in patients with advanced or metastatic cancer. The majority of patients in South Africa are diagnosed with late stage lung cancer and need to be referred for palliative care. However, there is little data on costs of managing lung cancer using chemotherapy or palliative care in South Africa. On request from the Department of Health we estimated these costs to guide development of national lung cancer guidelines, highlighting the cost drivers of implementing "best practice" care.

Methods

For chemotherapy, we estimated resource use from the provider perspective, using a combined ingredients-based and bottom-up approach. Per patient costs for each chemotherapy regimen option were stratified by cancer type and stage: adjuvant vs advanced non-small cell lung cancer

(NSCLC) and limited stage vs extensive stage small cell lung cancer (SCLC). Costs included staff, medicines and consumables costs and overheads.

For palliative care, a typical package was developed based on national guidelines. Utilisation and cost data were obtained from a study of palliative care in South African lung cancer patients. Costs per patient per month in home-based palliative care including staff salaries, medicines, psychosocial support, consumables, hospital visit check-ups were estimated.

All costs were collected in South African Rand (ZAR), converted to US dollars (16.00 ZAR/USD), and presented as 2021 values.

Results

For chemotherapy, the baseline costs per patient per cycle per stage were: NSCLC (adjuvant treatment) $206, NSCLC (advanced first-line) $179, NSCLC (advanced second-line) $114, SCLC (limited stage) $198, SCLC (extensive stage first-line) $198 and SCLC (extensive stage second-line) $253. The most expensive regimen was cyclophosphamide/doxorubicin/vincristine which is administered as second-line treatment for SCLC (extensive stage). The main cost drivers were medicine and staff costs associated with each regimen. Some alternative treatment regimens for NSCLC (adjuvant/advanced) and SCLC (second-line) stages were less expensive than the baseline regimens.

The total cost per patient per month of palliative care support was $70 and, assuming 10 months of care, the total cost per patient was $698. Medicines made up the largest proportion of the total palliative care costs, with low costs for consumables and psychosocial follow-up. The average monthly cost of the basket of medicines used in palliative care was $43, with morphine being the highest cost medicine.

Conclusion

Given that the main cost drivers for chemotherapy are staff and medicine costs, measures such as task-shifting and use of cheaper alternative medicines to reduce these costs could increase the affordability of chemotherapy in South Africa. Current treatment regimens have a potential to be costlier than alternative available regimens for some lung cancer stages. Our study also showed the relatively low costs of providing home-based palliative care as an alternative to in-hospital care.

8:30 AM –10:00 AM   MONDAY   [Health Beyond Health Care Services: Health Behaviors]

Cape Town International Convention Centre | CTICC 1 – Room 1.64

The Economics of Hesitancy, Behaviors and Preferences Towards Vaccination and Policy Stringency: Results from a Standardised Stated Choice Survey on 21-Countries

MODERATOR: **Aleksandra Torbica**, Università Bocconi

ORGANIZER: **Marcello Antonini**, University of Newcastle

DISCUSSANT: **Alessia Melegaro**, Bocconi University; **Josefa Henriquez**, College of Human and Social Futures,Newcastle Business School, University of Newcastle, Callaghan, New South Wales

Exploring Covid-19 Vaccine Hesitancy and Resistance: Are We Ready for the Endemic Phase? Insights from a Global Questionnaire

PRESENTER: **Francesco Paolucci**, University of Newcastle

During the Covid-19 pandemic, vaccine hesitancy and resistance phenomena generated delays in vaccine uptake and the consequent lifting of policy restrictions. Previous literature identifies several reasons for vaccine refusal or hesitancy such as belief against vaccines, concerns about vaccination safety, and general lack of trust. The current impact of the virus requires countries to maintain a high vaccination coverage to face the possible emergence of new variants and antibodies waning and avoid new societal restrictions. Nevertheless, a significant reduction in vaccine uptake is recorded globally compared to the initial vaccination cycle.

Building on the existing literature we developed a global survey to collect data from the general population across 6 continents to understand this evidence and gain new insights into the vaccine-resistant phenomenon. Respondents were recruited through a specialized market research company from July 2022 to December 2022. Quota sampling based on age, gender and location was used to ensure the representativeness of the data and minimize underrepresented groups of the population. 51,000 respondents from 21 countries (Australia, Brazil, Chile, Croatia, France, India, Israel, Italy, Latvia, Norway, Russia, Singapore, Slovak Republic, Slovenia, Spain, South Africa, South Korea, Sweden, Turkey, UK and the US) are included in the database. Such heterogeneity makes our database unique in terms of both its coverage of geographic regions and inclusion of diversity from cultural, economic and political perspectives.

Preliminary results based on 35,415 respondents in 15 countries show that on average, 82.6% of our sample received at least two doses of the vaccine with significant variations across countries. Considering boosters uptake, the scenario is more blurred with Russia recording the lowest share of people with a booster (15%) followed by Croatia (31.3%) and Slovenia (36.2%). Overall, 8.6% of our sample reports to be no-vax, whilst only 5.58% did not get the vaccine because hesitant. Our dataset provides clear evidence for the decreasing trend in boosters uptake with 16.7% of the overall sample (17.5% among those vaccinated with at least one dose) that stated that they would not take the booster because

there is no need for more than two doses. Compared to vaccinated people, vaccine-resistant people report statistically significant lower levels of trust toward public health bodies, newspapers and social media (mean=-1.51, 95% CI = -1.56, -1.47); lower levels of social responsibility (mean=-1,10, 95% CI = -1.13, -1.06); lower levels of education (mean=-1.56, 95% CI = -1.82, -1.30) and income (mean=-0.25, 95% CI = -0.28, -0.23). No difference is found by gender and political orientation. However, significant heterogeneity is found across countries.

Understanding the characteristics, social values and preferences of vaccine-resistant individuals is essential to guide the design of tailored vaccination programs that can support the transition to a "controlled" endemic phase. Our dataset is a unique tool to assist this goal, particularly in the context of closing the gap between the initial vaccination coverage and boosters uptake.

Are Sticks More Important Than Carrots? Investigating Public Preferences and Predicting Uptake for Covid-19 Vaccination Programs across 6 Continents

PRESENTER: **Aleksandra Torbica**, Università Bocconi

Many governments were forced to implement penalties and mandates to incentivize Covid-19 vaccine uptake and ensure a safe level of vaccination coverage to return to business as usual and lift societal restrictions. Nowadays, most countries around the world have lifted any form of restrictions or mandates. The absence of mandates and penalties might partially explain the significantly lower levels of booster uptake compared to the initial vaccination cycle that is observable globally. Previous literature has underlined the importance of the vaccine characteristics on the uptake, particularly the effectiveness of the vaccines, the risk of side effects and the possible duration of the protection. Little evidence is available on the relative role that social restrictions and mandates play in vaccination decisions. This paper aims at investigating the relative importance that vaccine characteristics versus the intensity of social restrictions and mandates (i.e. lockdown and vaccination mandate to return to work) have on the public vaccination uptake.

A standardized stated choice (SC) survey was administered across 21 countries from 6 continents to provide evidence on: (1) preferences and trade-offs between different vaccine characteristics versus social restrictions; (2) predicted uptake of vaccination against Covid-19; (3) explore vaccine refusal and hesitancy within and across countries. Respondents were asked to indicate their preferred vaccination program between two options and then to indicate whether they would take the vaccines. A total of 7 attributes were included in each option: 5 related to the vaccine characteristics (effectiveness in reducing severe symptoms, risk of severe side effects, duration of the protection, time between the first clinical trial to the market approval and the origin of the manufacturer); 2 related to the policy restrictions (stringency of the social restrictions for leisure activities and the vaccination mandate to return to informal or informal work activities). Respondents were recruited through a specialized market research company from July to December 2022. Our final sample size will be composed of 51,000 respondents and will be representative of the age, gender and geographical location distribution of the general population in each country. Data will be analyzed through advanced discrete choice models (e.g., hybrid choice models) that will allow the exploration of preference heterogeneity across countries and different subgroups of the population based on age, gender, education, religion, and political orientation.

Preliminary analysis from 15 countries reveals that public uptake of COVID-19 vaccination was primarily influenced by the risk of developing severe side effects ($b = -3.552$, 95% CI $= -3.616$, - 3.489), vaccine effectiveness ($b = 1.262$, 95% CI $= 1.235$, 1.289) and the level of social activity restrictions ($b = -0.372$, 95% CI $= -0.383$, -0.361). Significant heterogeneity is found across sub-groups of the population by age, income and education levels.

Vaccine characteristics appear to be relatively more important than the level of social restrictions in place for the public. Therefore, consideration of which vaccines to offer may be an effective strategy for policymakers to design vaccination campaigns and increase vaccine uptake.

Our Moral Values Say a Lot about Our Vaccination Status: Does Moral Purity Play a Role?

PRESENTER: **Marcello Antonini**

During a pandemic, noncompliance with vaccination programs is a complex issue that has the potential to create uncertainty for public health outcomes and undermine management efforts. Vaccines are intended to reduce the introduction of infection into the body, and thus are associated with moral purity. Moral purity is about protecting people and communities against potentially harmful pathogens. According to studies on moral foundations, people with high levels of moral purity avoid individuals, objects, and experiences that violate a sense of sanctity or self-control or that induces disgust. Furthermore, people with high moral purity fear biological contamination and see disease antigen injection as a damaging corruption of the body's integrity. While we know that during a pandemic, people make trade-offs between accepting or rejecting the offered vaccines, it is critical to understand how moral purity shapes preferences and trade-offs for vaccination policies enacted to reduce virus transmission and excess death.

We use a DCE and a moral attitudes survey to investigate how moral purity influences preferences for vaccination campaigns to mitigate the effects of a pandemic. Because the effectiveness of vaccination campaigns is dependent on individuals' willingness to be vaccinated, it is important to understand preferences for vaccination programs. The DCE included vaccine-related attributes (efficacy, risk of side effects, origin of manufacturer, duration of protection, time spent in development), as well as the corresponding policy adopted (societal restrictions and employment mandates). The survey was sent to residents in 21 countries: Australia, Brazil, Chile, Croatia, France, India, Israel, Italy, Latvia, Norway, Russia, Singapore, Slovak Republic, Slovenia, Spain, South Africa, South Korea, Sweden, Turkey, UK, and the US), via an online panel managed by DemetraOpinioni, between July and December 2022. The total sample size is 51,000 respondents, who are representative of the country's population in terms of age, gender, and geographical distribution. We estimated the effects of moral purity on preferences for COVID-19 vaccine characteristics and hesitancy using a mixed logit model.

Moral purity consistently influenced preferences for COVID-19 vaccine characteristics. We also find that individuals with a higher moral purity are more likely to be vaccine hesitant. Vaccines may feel wrong to someone with significant moral purity concerns. Thus, people with high moral purity have a negative preference for most vaccine attributes and are more likely to become vaccine hesitant. The purity foundation includes "physical and spiritual contagion, including virtues of chastity, wholesomeness, and control of desires", the need to avoid people with diseases and being pure. During a pandemic, vaccination campaigns may be identified as potential threats to individuals and their families in their households.

Understanding moral attitudes may be useful for communication strategies, with information tailored around moral purity attitudes. Using messages focused on moral purity to promote vaccine campaigns, for example, may encourage vaccine roll-out.

Vaccine Hesitancy or Future Hesitancy? Investigating the Role of Future Discount Rates in Vaccination Policy Preferences

PRESENTER: **Marcello Antonini**

It has become clear throughout the COVID-19 pandemic that decisions concerning vaccination were not as straightforward as anticipated with individuals displaying varying levels of vaccine hesitancy. In the wake of this, it is important to consider how people make decisions and what factors may influence them. It is well known that people discount future gains at significantly higher rates than generally assumed, and far in excess of those used in health decision making. This can lead to policy headaches for governments and health professionals alike as higher rates of discounting have been found to lead to poorer health choices and a lower likelihood to engage in preventative healthcare and screenings. Previous studies have also found that discounting was steeper in unvaccinated individuals and that time preferences had significant effects on immunization decisions. While it has been identified that the safety and side effects of the vaccine are a major concern for those considering vaccination, how these factors interact with discounting and competing policy outcomes has not yet been explored.

To understand this, we will use a Discrete Choice Experiment (DCE) and discounting questionnaire to explore if vaccine hesitancy is explained by discounted utility and how discount rates impact vaccination and policy preferences. The DCE was carried out in 21 countries and designed to elicit preferences on trade-offs between vaccine effectiveness, risk of side effects, duration of protection, time to market approval, origin of vaccine manufacturer, and health policy restrictions. Two discounting tests, in the style of a Multiple Price List developed by Coller & Williams, were also included in the questionnaire to understand how participants discounted gains between today and 3-months in the future and also between 3-months and 6-months in the future. The total sample size for the questionnaire was 51,000 respondents and was representative of the age, gender and geographical distribution for the countries sampled. A multinomial logistic regression will be used to model the trade-offs between the options selected by the participants and how discounting impacts the likelihood they would choose one option over another.

Understanding the impact of discounting on these trade-offs is important for policymakers going forward for both the continuing COVID-19 pandemic and any future pandemics. It is expected that high discounting will lead to adverse decision making due to a preference for immediate rewards and a lower value for the future. This preference for immediate gains, or present bias, could lead to individuals accepting sub-par options now rather than waiting for the best overall health outcome for themselves and/or others. Conversely the opposite is also true, where without any immediate incentives, those with high discount rates would be expected to delay vaccination, putting themselves and the community at unnecessary risk. It is key to consider if people will see a vaccine to be the point of utility maximization at a personal level if the government is to achieve their goal of complete vaccination. Especially as vaccination rates have increased the benefits to getting vaccinated quickly fall off, exacerbating the problem

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8:30 AM –10:00 AM   MONDAY   [Health Beyond Health Care Services: Social And Related Determinants]

Cape Town International Convention Centre | CTICC 1 – Room 1.44

Causes and Consequences of Child Ill-Health [ECONOMICS OF CHILDREN'S HEALTH AND WELLBEING SIG]

MODERATOR: **Nickhill Bhakta**, St. Jude Children's Research Hospital

Identifying the Risk Factors in Explaining Child Nutrition in Two Bengals (West Bengal of India and Bangladesh): A Gender Perspective

PRESENTER: **Sourav Biswas**, PhD research fellow (International Institute for Population Sciences)
Background:

Gender is a crucial factor in child undernutrition, resulting in stunting, wasting, and underweight, and has a significant impact on the quality of life, morbidity, and mortality of both male and female children. In the two Bengals - West Bengal of India and Bangladesh, inhabited by Bengali speaking population, child undernutrition affects boys and girls alike. Although the two regions are identical in ethnic, environmental, and linguistic parameters, their religious composition differs significantly. West Bengal has a Hindu majority (75%), while Bangladesh has a Muslim majority (89%). However, there is a lack of comparative studies on predictors of child undernutrition in the two Bengals that consider gender differences, especially in male and female child stunting and underweight. Therefore, this research aims to understand the factors

contributing to child undernutrition in the two Bengals from a gender perspective, with a particular focus on male and female child stunting and underweight.

Data & Methods:

The study used data from nationally representative cross-sectional surveys, the Bangladesh Demographic Health Survey (BDHS-VII, 2017-18) and National Family Health Survey (NFHS round 5, 2019-21), to analyze the nutritional status of children under 5 years old, the sample consisted of 6,370 children in the two Bengals. The analysis focused on child stunting and underweight separately for male and female children. Bivariate, and binary logistic regression analyses were performed to identify important risk factors for child undernutrition, and a multivariate decomposition analysis was conducted to understand the gender differences in child undernutrition. The decomposition analysis aimed to identify the covariates that contribute to the nutritional status differences between male and female children.

Results:

The study found that male children had a higher prevalence of stunting and underweight compared to females in both Bangladesh and West Bengal. Factors such as the mother's BMI, place of residence, wealth index, and sources of water were significant contributors to the nutritional gap between male and female children in both regions. However, the specific factors driving the gap differed between the two regions. In West Bengal, the mother's BMI and place of residence were major contributors to both stunting and the underweight gap between male's and female's children, while in Bangladesh, consuming fresh milk and fruits were major contributors between males and female's children. The magnitude of the contribution of the wealth index was larger in Bangladesh, indicating the need for tailored interventions in each context to address the specific factors driving the nutritional gap between male and female children.

Conclusion:

Gender plays a critical role in child undernutrition, as this study has highlighted significant differences in the prevalence of stunting and underweight between male and female children in the two Bengals. The findings underscore the importance of adopting gender-sensitive approaches in designing and implementing interventions to address child undernutrition. Therefore, interventions that consider socio-economic, cultural, and dietary factors and focus on gender aspects are essential to reduce the burden of undernutrition among children.

Being Born Early, Small or Both and Health-Related Quality of Life in Adulthood: Evidence from an Individual Participant Data Meta-Analysis of Very Preterm and Very Low Birthweight Adults

PRESENTER: **Corneliu Bolbocean**, University of Oxford
AUTHOR: Stavros Petrou

Background: There is limited and conflicting evidence about the impact of preterm birth defined as very preterm (VP; < 32 weeks gestation) birth or very low birthweight (VLBW; < 1500 g) on health-related quality of life (HRQoL) outcomes in adulthood. It remains unclear whether, and to what degree the socioeconomic factors around birth and early childhood are associated with HRQoL in adulthood.

Objective(s): To estimate the differential impact of being born early (birth before 32 weeks' gestation, or VP), born small (birth weight below 1500 g, or VLBW), born early and small (birth VP and VLBW) compared to term-born and normal birthweight controls on preference-based HRQoL outcomes in early adulthood (Health Utilities Index Mark 3 (HUI3) and (b) to identify the impact of sociodemographic factors during perinatal and early childhood on HRQoL in adulthood.

Data and Methods: Individual participant data were obtained from three prospective cohorts of individuals born VP/VLBW and controls contributing to the 'Research on European Children and Adults Born Preterm' consortium previously identified by published systematic reviews. The combined dataset included a total of 950 adult VP/VLBW survivors as well as term born and normal birthweight controls, ranging in age from 18 to 26 years. Data were analyzed using generalized linear mixed models in a one-step approach using fixed effects estimators under the selection on observables assumption. As a sensitivity analysis, we utilised matching methods and stochastic dominance tests and provided bounds for the effect using a partial identification approach proposed by Oster. Heterogeneity of treatment effects were investigated using the causal forests. Disparities by socioeconomic status in early childhood were quantified using concentration indices. Lee bounds were used to adjust results for potential non-random attrition.

Results: Clinically significant differences in HUI3 multi-attribute utility scores were detected when preterm individuals were classified by born early, small or early and small and compared to term born and normal birthweight controls. Individuals born VP and VLBW consistently recorded the lowest HUI3 multi-attribute utility scores during adulthood (0.83) compared to either VP or VLBW (0.87). However, individuals VLBW and not VP had lower utility scores (0.85) compared to those who were born VP but not VLBW (0.88). Term-born and normal birthweight controls recorded the highest HUI3 multi-attribute utility scores during adulthood (0.92).

The evidence shows that adults from most deprived socioeconomic groups around birth or early childhood area were more likely to record lowest HUI3 multi-attribute utility scores. The causal forest algorithm identified significant heterogeneity in the impact of preterm birth along socioeconomic variables but also to characteristics not foreseen prior to the analysis.

Conclusions: Being born VP, VLBW or VP and VLBW likely determines different developmental patterns and trajectories for infants born preterm. Studies which assess the long-term consequences of preterm birth status should not use VP, and VLBW interchangeably. High socioeconomic status around birth or during early childhood likely plays a buffering effect for children born VP/VLBW.

Exploring mechanisms which would explain how socioeconomic factors buffer preterm-induced HRQoL decrements is a fruitful direction for future research.

Child Health and Its Effect on Adult Social Capital Accumulation
PRESENTER: **Audrey Laporte**, University of Toronto
AUTHORS: Michael Lebenbaum, Claire de Oliveira, France Gagnon
Background: Despite the importance of individual-level social capital to health, well-being, and labour market outcomes, and the growing attention to the early life determinants of other types of capital (human and health capital) in the economics literature, there is a dearth of research on the early life determinants of social capital. Poor child health may be a key determinant of adult social capital given it may result in individuals being less efficient producers of social capital and health-related stigma may erode individuals' ability to make connections with others to build social capital. Prior studies on child health and adult social capital have had mixed findings, have largely focused on depression, volunteerism and social support as measures of social capital, and have not used sibling fixed effects analyses to account for unmeasured family and genetic characteristics that are likely to be important. Therefore, this study aims to fill this gap in the literature by applying sibling fixed effects analyses to study the casual effects of child (mental and physical) health on an individual's social capital in later life.

Research question/aim: What is the causal effect of child health on adult social capital?

Methods: We conducted analyses using Waves 3-5 (2000-2001, 2007-8 and 2016-18) of the US Add-Health sample, when respondent are adults, ages 18-42. Social capital was defined as volunteering, religious service attendance, team sports participation, number of friends, social isolation, and social support. Child health was measured as Wave 1 (ages ~10-18) self-rated health, the occurrence prior to age 18 of a physical health condition or a mental health condition. We used hybrid correlated random effects models to estimate sibling fixed effects in which we controlled for a range of characteristics that have been shown in to influence the ability of individuals to build connections with others including demographics, relationship quality with the mother, verbal intelligence, exposure to violence/abuse, parental social capital and socioeconomic status, and geographic characteristics (income, population density, crime).

Results. Greater self-rated health in childhood was positively associated with volunteering while having a mental health condition in childhood had a negative association; however, these findings did not hold in sibling fixed effects analyses. In sibling fixed effects analyses, there was significant ($p<0.1$) positive effects of greater self-rated health in childhood on increasing participation in team sports ($\beta=0.116$) and having social support ($\beta=0.099$) and reducing isolation ($\beta=-0.067$). Having a mental health condition in childhood resulted in a much greater likelihood of social isolation in adulthood ($\beta=0.318$; $p<0.01$) in sibling fixed effects analyses.

Conclusions. The within-sibling effect of child health on some measures of social capital (isolation, social support) remained significant, while for other measures of social capital (i.e., volunteering), sibling fixed effects analyses completely attenuated associations. These results highlight further potential benefits to efforts that address poor child health and suggest that children with poor health require additional supports to build and maintain their stock of social capital, with an especially large need to ensure adequate access to evidence-based interventions and preventive strategies to improve child mental health.

8:30 AM –10:00 AM   MONDAY   [Health Care Financing & Expenditures]

Cape Town International Convention Centre | CTICC 1 – Room 2.63

Global Financing Facility for Women, Children, and Adolescents: Examining National Priorities, Processes, and Investments [ECONOMICS OF CHILDREN'S HEALTH AND WELLBEING SIG]

MODERATOR: **Asha George**, University of Western Cape

ORGANIZER: **Meghan Kumar**, London School of Hygiene and Tropical Medicine

DISCUSSANT: **Janeen Madan Keller**, Center for Global Development; **Kingsley Addai Frimpong**, World Health Organization / AFRO

Methods for Accountability of Global Health Initiatives
PRESENTER: **Mary Kinney**, University of Western Cape
Background

There have been few independent assessments of the Global Financing Facility (GFF), hosted by the World Bank. GFF provides catalytic financing and technical assistance to advance national reproductive, maternal, newborn, child, adolescent health and nutrition (RMNCAH-N) plans in high burden settings. This investigation set out to if the policy processes and content of country GFF-related documents are country-led and reflect national priorities as propagated. The GFF documents included the Investment Cases (ICs), linked to their national RMNCAH-N strategies, and the Project Appraisal Documents (PADs), a World Bank document describing resources allocation.

Methods

The programme of work involved several multi-country, mixed-methods analyses from 27 low- and middle-income countries. An adapted framework was applied for the thematic content analysis of GFF documents for 27 countries with three components: mindset (how thematic area is described and framed), measures (how thematic area is monitored), and money (how thematic area is financially resourced). One thematic area also assessed "mentions" (how frequently mortality outcomes are included). To investigate national processes, we used the health policy triangle framework to explore the political processes and power involved in developing the GFF documents in four African countries (Burkina Faso, Mozambique, Tanzania and Uganda). All analysis tools were developed iteratively and collaboratively with the teams involved in data collection and analysis.

Results

For the content analysis, we examined adolescent health with a lens on gender in 15 countries, maternal and newborn health with a lens on quality in 10 countries, and community in six Francophone African countries. Across each thematic area, we found misalignment in content between the IC and PADs, signalling a disconnect between stated priorities in the national RMNCAH strategies and the funded priorities listed in the PADs. Thematic content generally faded from mindset to measures and money, with stated priorities in the situation analysis not receiving consistent attention in indicators and investments. Adolescent health and gender received the least amount of attention compared to the other themes investigated. In the country studies, the processes for developing the GFF documents varied greatly between countries with different contextual priorities, timelines and processes, and actors engaged. Though multiple stakeholders engaged in the development of the documents in each country, the power dynamics between actors may have resulted in disjointed agendas and priorities.

Discussion

The GFF claims to be multi-stakeholder, country-led, evidence-based and catalytic. From our assessment, the GFF documents reflects evidence-based and context-specific elements but gaps remain on key RMNCAH issues. The lack of consistency between documents in many countries indicates national priorities may not be receiving adequate resourcing through the World Bank and linked GFF funds. These disconnects may also reflect the detached processes by which these documents are developed in countries. The country studies indicate that development of the ICs may enable wide stakeholder engagement; however the World Bank and governments could strengthen meaningful multi-stakeholder engagement and understanding of the processes relating to the PADs. Greater transparency and improved tracking of how the GFF is increasing and linking to domestic resources will generate more buy-in and accountability.

Stated and Funded Priority Setting for High-Quality Maternal and Newborn Health in Global Financing Facility Investments

PRESENTER: **Meghan Kumar**, LSHTM

Background

Maternal and newborn mortality have remained stubbornly high in the context of reducing child mortality globally, despite political will and global goals to support these reductions. The Global Financing Facility (GFF) aims to accelerate progress to meet 2030 Sustainable Development Goals for reproductive, maternal, newborn, child, adolescent health and nutrition. This paper examines how GFF policy documents encompassing USD$1552 million total investment (US$266 million from GFF) address vulnerable populations of mothers, newborns and stillbirths (MNH), given the persistently high mortality burden.

Methods

We undertook a content analysis of national GFF documents (Investment Cases [IC] and Project Appraisal Documents [PAD]) for 10 African countries: Burkina Faso, Code d'Ivoire, Ethiopia, Kenya, Liberia, Malawi, Nigeria, Senegal, Tanzania, and Uganda. The analysis framework considered progression from *mentions* of related outcomes (maternal and newborn mortality and stillbirths) through *mindset* (framing and content) to *measures* (indicators) and *money* allocated (investment). We included both quantitative concept counts as well as qualitative assessments. In the context of the technical focus on MNH, we looked at how and where quality was presented to consider efficiency of investment in this area.

Results

Mentions of both maternal and newborn mortality are robust in all ICs and included as targets or indicators, whereas stillbirth is only mentioned in six ICs (as indicator in three). PADs, which integrate investment by the GFF alongside the World Bank and other donors, mention MNH outcomes less frequently than in the ICs. The mindset of MNH commonly reflects the continuum of care approach, with more attention to maternal interventions. Some critical MNH components are rarely mentioned across documents (abortion care, respectful maternity or family-centered care, breastfeeding, and small and sick newborn care). Results frameworks in most ICs have standard metrics aligned to ENAP/EPMM coverage targets; however, MNH measures reduce in most PADs (e.g. no newborn health indicators in four PADs). Differing approaches to funding (grant/loan/co-financing) and descriptions prevent meaningful comparisons of MNH-specific allocations. Both quality and enabling health systems environment are investment topics of interest for the GFF and the wider consortium of funders but neither is systematically focused on MNH across countries. Health systems aspects are often mentioned and funded but disconnected from MNH and particularly from continuum of care, therefore reducing potential value for money from investment. This disconnect is most evident in PADs, which often focus on broad structural improvements rather than enabling environment for MNH.

Discussion

Despite being priority areas of the GFF, MNH content fades from mentions to mindset, measures and money and quality is not consistently mentioned. Major gaps exist, particularly for stillbirths and specific programmatic areas. Disconnects between stated priorities for MNH in ICs and allocated resources in PADs suggest the need for further investigation into the political economy of document development and priority setting. Improved alignment of global health initiatives like the GFF with domestic priorities could enable health improvements rather than fragment resourcing and attention.

Inclusive up to a Point: Political Economy Analysis of Global Financing Facility Planning Documents in Burkina Faso

PRESENTER: **Joël Arthur Kiendrébéogo**, University Joseph Ki-Zerbo

Background

Despite substantial progress in recent years, reproductive, maternal, newborn, child, and adolescent health and nutrition (RMNCAH-N) indicators in Burkina Faso are still alarming. The country has joined the Global Financing Facility for Women, Children and Adolescents (GFF) in 2017 to mobilise more resources and prioritise RMNCAH-N targets to better address this situation. Little is known about how global funding mechanisms support national resource mobilisation for health in low- and middle-income countries Using the Health Policy Triangle framework, this study describes the enabling and constraining factors that marked the development of GFF planning documents in Burkina Faso.

Methods

We conducted a descriptive, exploratory qualitative case study to understand the policy processes that developed and implemented the PAD and the IC in Burkina Faso. Data collection included review of 74 documents and 23 in-depth individual semi-structured interviews. Data from these sources were coded based on predefined themes aligned with the components of the health policy triangle – content, context, process, actors, and interactions between them. We examined data primarily using a deductive approach with some additional codes added as new themes emerged.

Results

There was strong national political support to RMNCAH-N interventions, and Burkina Faso even co-hosted the GFF replenishment event on November 6, 2018, in Oslo, Norway. The process of drawing up the PAD and the IC was inclusive and multisectoral, with the development of a roadmap and use of evidence-based data to prioritize RMNCAH-N interventions. However, despite many meetings and briefings, some stakeholders had poor understanding of the GFF mechanism and there was little alignment of donors behind the IC, resulting in the development of several other national policies and strategies related to RMNCAH-N. This can be explained by a high turnover of national and international players, combined with a weak institutional base for the IC, which has led to its relative disuse over time. Administrative bottlenecks in the PAD's implementation were also present due to differing procedures or perspectives between the World Bank and national players, leading to poor incentives and difficulties in recruiting and/or maintaining staff to manage the project. Moreover, conflicts between players over implementing the PAD activities existed. Lastly, insecurity and COVID-19, and above all the weak leadership of the MOH over these two documents, explain the delays and difficulties in implementing them.

Conclusion

Few studies examined countries' national policy processes linked to the GFF, or with global health initiatives more broadly. Yet, this kind of research is needed to better understand the range of challenges encountered across diverse health systems context, to better align and sustain such efforts. This study is part of this drive and hopefully could stimulate others in other countries to ensure that the GFF and other global funding mechanisms deliver on their promises.

The Political Economy of Developing the GFF Documents in Uganda: Priorities of Those with the Power Drive Investment

PRESENTER: **Phillip Wanduru**, Makerere University School of Public Health

Background

The Global Financing Facility (GFF) is a World Bank-hosted financing mechanism aimed at closing the financing gap in the implementation of Reproductive, Maternal, Newborn, Child, and Adolescent Health (RMNCAH) programs in selected high-burden countries. Uganda was chosen as a GFF beneficiary and as a condition, the country developed a RMNCAH Investment Case (IC) for the period 2016-2021, which highlighted and costed key RMNCAH priorities. In total, the agreement resulted in 165 million dollars being given to the nation (110 million as an IDA loan, 30 million as a GFF grant and 25 million as a SIDA grant). In this study, we sought to understand the policy process and contextual factors that influenced the content of the national IC and, as a result, what was prioritized for investment in the corresponding World Bank Project Appraisal Document (PAD).

Methods

A desk review and Key informant interviews were used to conduct our political economy study. During the desk review, we performed content analysis of the IC, the PAD and reports evaluating the IC development process (N=11). Key informant interviews were conducted with relevant Ministry of Health (MoH) officials, development partners, implementation partners, and civil society actors involved in the development and implementation of these documents (N=15). Thematic analysis approaches were used, which included descriptive summaries of findings first, then further synthesis to illustrate relationships, for example between what is seen in document review versus the KII, as well as comparing what KIIs said in relation to their positionality.

Results

The RMNCAH IC was completed in April 2016 and the associated PAD in July 2016. The development of the IC was participatory, under leadership of the MoH, and included evidence gathering by in-country academic partners, as well as multiple engagements with stakeholders at sub-national and national levels. Stakeholders were included based on their financial power (current funding of RMNCAH work), political power, implementing power and technical knowledge. These included the GFF, UN agencies (WHO, UNICEF, UNFPA), USAID, political actors, government agencies, civil society organizations and academia. Despite widespread participation, there was an inequitable participation of CSOs and private-sector actors.

This engagement entailed negotiating areas where stakeholders appeared to have contradictory agendas, such as global versus national priorities, political versus evidence-based priorities, and donor versus local priorities.

Overall, biggest portion of funds, particularly those from the IDA loan, were allocated to infrastructure and equipment hardware investments, which were national political priorities. The SIDA and RBF funds were mainly allocated to service delivery (software) and the improvement of civil registration systems, which would seem to be a priority for the World Bank and GFF. Despite being emphasized in the IC as a priority, no explicit investments were made in interventions that specifically target vulnerable populations like newborns or adolescents, both of which are GFF priorities.

Conclusion

Our study shows that both financial (donors) and political (politicians) power had a significant influence on the financing priorities reflected in the PAD. The health system's persistent infrastructure deficiencies may have hindered directing financing to high burden populations.

8:30 AM –10:00 AM   MONDAY   [Economic Evaluation Of Health And Care Interventions]

Cape Town International Convention Centre | CTICC 2 – Protea

Costing and Budgeting for Vaccine-Preventable Disease Surveillance: Case Studies from Ethiopia, Nepal, the State of Karnataka of India, and Sudan [IMMUNIZATION ECONOMICS SIG]

MODERATOR: **Sarah Pallas**, U.S. Centers for Disease Control and Prevention

ORGANIZER: **Nelly Mejia**, U.S. Centers for Disease Control and Prevention

DISCUSSANT: **Politi Claudio**, World Health Organization (WHO)

Cost of Vaccine-Preventable Disease Surveillance in Ethiopia, 2018-19
PRESENTER: **Nelly Mejia**, Centers for Disease Control and Prevention
AUTHORS: Aschalew Abayeneh, Eden Dagnachew Zeleke, Senait Alemayehu, Roopa Darwar, Mesfin Wossen, Mikias Alayu, Leuel Lisanework, Getnet Yimer, Kassech Sintayehu Molla, Eshetu Wassie Asemahaegne, Zewdu Assefa, Yohannes Dugassa, Esete Assefa, Frehywot Eshetu, Benjamin Dahl, Anagha Loharikar, Jason M. Mwenda, Shu-Hua Wang, Anindya Sekhar Bose, Ebba Abate Waktola, Sarah Elizabeth Pallas
Background

Despite the critical role of vaccine-preventable disease (VPD) surveillance in detecting and responding to disease outbreaks, cost estimates of such surveillance systems are understudied in low- and middle-income country contexts. This study aimed to evaluate VPD surveillance system costs in Ethiopia. Understanding these costs will contribute to future planning and budgeting, allowing national programs to include sufficient resources for VPD surveillance activities, especially in the context of decreasing donor funding.

Methods

This cross-sectional retrospective costing study collected primary and secondary data on resource utilization to conduct VPD surveillance during one fiscal year (2018-2019) in Ethiopia. The study covered 16 VPDs in the surveillance system, including costs from all involved government and partner offices at the federal level; a purposive sample of three regions (Addis Ababa, Amhara, Somali); and a stratified random sample of zones, woredas, and hospitals/health centers (with purposive selection of sentinel sites) within the regions. The sampled

regions were selected based on urbanization rates and presence of regional laboratories. At least two health centers/hospitals per woreda were sampled to capture variability in costs at these levels. Data were collected between March and May 2022 from 47 sites across levels. Data from sampled sites were weighted at each administrative level and extrapolated to other regions based on similarities in wealth quintiles. Public health response and vaccination costs were excluded from the study. This study reported both economic (direct expenditures plus opportunity costs) and financial (direct expenditures) costs. All costs were converted from Ethiopian Birr to U.S. Dollars (US$) and inflated to March 2023 US$.

Results

The estimated economic costs of VPD surveillance activities in Ethiopia over the fiscal year 2018-19 were US$67.87 million or US$0.69 per capita, while financial costs were US$19.14 million or US$0.19 per capita. Country-wide, major drivers of economic costs by resource input included labor (41.3%), vehicles (22.8%), and supplies (14.6%), while major drivers of financial costs included vehicles (30.5%), per diem (28.2%), and supplies (20.1%). The main drivers of economic costs by support function included workforce capacity (24.8%), supervision (20.7%), and field logistics and communication (19.1%); and for financial costs, field logistics and communication (33.2%), supervision (25.4%), and program management (22.6%). By VPD, resources were mostly allocated to general VPD surveillance (not specific to one VPD; economic: 55.5%; financial: 58.9%), measles and rubella surveillance (economic: 16.1%; financial: 11.2%) and polio surveillance (economic: 11.0%; financial: 18.7%). Costs varied substantially across levels, regions, and facility types. The main funders were the Ethiopian Ministry of Health (economic: 71.1%; financial 58.2%) and the World Health Organization (economic 15.9%; financial 29.8%).

Conclusion

These VPD surveillance cost estimates show that human resources were major drivers of economic costs, followed by mobility support and supplies. Although the Ethiopian VPD surveillance system uses shared resources across multiple VPDs, resulting in scale efficiencies, and the Ethiopian government covers most of its economic costs, a portion of those costs still relies on external donor support. Such estimates may aid Ethiopia in planning for donor funding transition and investments in surveillance system strengthening.

Methods for Costing Vaccine-Preventable Disease Surveillance: Lessons Learned from Country Studies in Ethiopia and Nepal and Recommendations for Future Studies

PRESENTER: **Roopa Darwar**, U.S. Centers for Disease Control and Prevention

AUTHORS: Xiaoxian Huang, Aschalew Abayeneh, Senait Alemayehu, Minal K Patel, Eden Dagnachew Zeleke, Mesfin Wossen, Mikias Alayu, Leuel Lisanework, Benjamin Dahl, Eshetu Wassie Asemahaegne, Shu-Hua Wang, Sarah Pallas, Ebba Abate Waktola, Jason M. Mwenda, Anindya Sekhar Bose, Nelly Mejia

Introduction: Anticipated future reductions in donor funding make it important to understand the resource needs for vaccine-preventable disease (VPD) surveillance to allow national programs to include sufficient funds for surveillance activities and facilitate their planning and budgeting. Despite the critical role of VPD surveillance to inform public health decisions, there is limited information about its cost.

To address this gap, costing studies of pre-COVID VPD surveillance were conducted in Nepal in 2018 (fiscal year 2016-17) and Ethiopia in 2022 (fiscal year 2018-19). Based on the experiences from these two evaluations, this presentation provides considerations and recommendations for other countries planning to conduct VPD surveillance costing studies in the context of external donor funding transition. Although there are established methods for costing health service delivery, there are no conventional methods for costing surveillance and similar public health system investments. This presentation highlights novel methods for costing surveillance.

Methods: The methods used for the Nepal and Ethiopia studies were systematically compared by key themes: perspective, costing activities, sampling criteria, extrapolation strategies, data collection modalities, and allocation of shared costs. For each theme, investigators from each study identified methodologic challenges and potential strategies to address these challenges, and recommended practices for future such studies.

Results: The two studies differed in several aspects, including surveillance activity categories and sampling strategies. Costs in Nepal were collected and analyzed by study-specific categories including a subset of surveillance core and support functions, whereas the Ethiopia study used all surveillance support functions from the *Global Strategy on Comprehensive VPD Surveillance*. Surveillance support functions (e.g., workforce capacity, field logistics and communications) support the core functions (e.g., case investigation). However, in Ethiopia, these support function categories posed some challenges for respondents and stakeholders to understand during cost data collection and analysis. The ease of collecting and using costs by VPD surveillance support function for program budgeting should be explored in future studies.

A mix of random and purposive sampling of surveillance sites was used in both studies. Surveillance sites were selected considering the strata of interest (e.g., rural-urban, ecological zones, health facility type) at each administrative level (e.g., region, zone). In Nepal, sites from all seven provinces and three ecological zones were included, while in Ethiopia, only three of 11 regions were sampled due to budget constraints and security concerns. Results from both studies were extrapolated country-wide using sampling weights and assumptions about the representativeness of purposively sampled units. The Nepal study included a larger proportion of sites (n=48 of 1536, 3.1%) compared to that for Ethiopia (n=47 of 5129, 0.9%). To ensure representative results, if budget allows, those conducting future VPD surveillance cost studies should randomly sample surveillance sites in each administrative level and stratum of interest; sampling strategies should be developed with consideration for the precision needed for the intended use of costing results.

Discussion: The review highlighted potential methodologic tradeoffs in utility and precision of results to assist those conducting and interpreting VPD surveillance costing studies. The recommendations from these evaluations can improve and standardize future studies.

WHO Planning and Budgeting Tool for Vaccine-Preventable Disease Surveillance: Results from Country Pilots in Sudan and State of Karnataka of India

PRESENTER: **Politi Claudio**, World Health Organization (WHO)

AUTHOR: David Sulaberidze

Many low and middle-income countries are undergoing a transition from external sources of financing (e.g. organizations such as GPEI, Gavi and GFTAM) to domestic sources of financing for their health system. In many countries, GPEI has been the main funding source for disease surveillance, and countries transitioning out of GPEI support have developed national polio transition plans to prepare for the reduction of external financing, while sustaining critical functions like vaccine-preventable disease (VPD) surveillance. To implement these plans, countries must quantify the domestic resources required to sustain the scale and the quality of VPD surveillance.

Responding to requests from countries, WHO has developed *a Planning and Budgeting Tool for VPD Surveillance in Priority Countries for Polio Transition* https://www.who.int/teams/polio-transition-programme/tools-and-guidance to provide technical guidance to health authorities to plan and implement this transition smoothly, underpinned by a feasible operational and financial plan.

The methodology is based on analysis of current diversified surveillance systems, building on lessons learned from other budgeting tools. It is suitable for use by national staff and comprises a user-friendly Excel tool accompanied by a user guide and online tutorials. The methodology is flexible and can be custom tailored to countries aiming to integrate surveillance functions and move towards domestic financing. The methodology facilitates the process of planning and budgeting the activities to strengthen the surveillance function.

The methodology has been piloted in Sudan and Karnataka State of India to test whether it can be used with ease by national staff; and to identify constraints, gaps or required improvements to the tool and methods.

Representatives of the Ministries of Health, immunization programme managers and surveillance officers participated in the piloting. They identified the various inputs required for each activity of each disease under surveillance and provided the unit costs. The use of the tool was judged by the representatives to be extremely user-friendly and intuitive.

The outcome of the piloting includes the calculation of the total resource requirements for the implementation of VPD surveillance activities, the expected share of domestic and external funding in the total budget for VPD surveillance, as well as per capita indicators. The budget figures are presented with breakdown by disease under surveillance, by function and by main input required.

The results of the piloting in the two countries will be compared to highlight similarities and differences, by focusing on the organization of the surveillance systems and the degree of dependency on external funding.

The use of the methodology for scenario building and facilitating the process of planning and developing a national VPD surveillance budget funded by domestic resources will be discussed in the light of the implementation of polio transition plans and national immunization strategies.

8:30 AM –10:00 AM   MONDAY   [Health Care Financing & Expenditures]

Cape Town International Convention Centre | CTICC 1 – Room 2.61-2.62

Social Health Protection and Non-Communicable Disease Care in Low- and Middle- Income Countries [FINANCING FOR UHC SIG]

MODERATOR: **Manuela De Allegri**, University of Heidelberg

DISCUSSANT: **Owen O'Donnell**, Erasmus University Rotterdam; **Rajeev Sadanandan**, Health Systems Transformation Platform; **Bruno Meessen**, World Health Organization; **Swati Srivastava**, Heidelberg Institute of Global Health, Medical Faculty and University Hospital, Heidelberg University

Out-of-Pocket Expenditure on Chronic Non-Communicable Diseases in Sub-Saharan Africa: The Case of Burkina-Faso

PRESENTER: **Manuela De Allegri**, University of Heidelberg

AUTHOR: Jan Kohler

Background: Chronic non-communicable diseases (CNCD) pose a major challenge in the 21st century. Worldwide, over 40 million people pass away due to a CNCD each year, whereas more than 75% of the deaths occur in low- and middle-income countries (LMICs). National health systems in LMICs are particularly struggling to provide full coverage of health services. Therefore, some burden of healthcare costs related to CNCDs are shifted to the individuals through out-of-pocket expenditures (OOPE). In LMICs, OOPE accounts for 93% of private spending and

over 60% of total health spending. In this paper, we identify individuals' determinants of incurring OOPE as well as specify those individuals at risk of a relatively higher expenditure given a reported CNCD in Burkina Faso.

Methods: The data originates from a cross-sectional endline household survey, pursued in the framework of a performance-based impact evaluation. It was conducted in person between March and June 2017 in Burkina Faso and entails a wide range of individual, household and healthcare system characteristics. In the survey, individuals were able to report up to three CNCDs, whether they sought treatment of any kind and their level of OOPE. Overall, the data consists of 7,947 households with 52,562 members. We use a two-part model to estimate what explains OOPE for individuals with CNCDs: The model accounts for the zero healthcare expenditures first and then, conditional on a non-zero value, the absolute level of OOPE of an individual is estimated. The model is estimated both with a logit model as well as a generalised linear model with an inverse Gaussian family and a log link specification.

Results: We observe 1107 individuals who report a CNCD, 363 thereof seek medical treatment of some kind, and 214 of those incur positive OOPE. We identify low-risk, high-frequency cost drivers such as medication as expenditure drivers. The two-part model finds that being young, living in a relatively smaller household and reporting more than one chronic condition decreases the odds of incurring OOPE. Considering the expenditure magnitude, being female, living close to a hospital and not being Christian or Muslim is negatively associated with expenditure. Being the household head and perceiving a chronic condition as highly severe is positively associated.

Conclusions: OOPE remains a significant issue in Burkina Faso, calling for adequate social protection systems given the prevalence of chronic non-communicable diseases. By identifying the current composition of OOPEs and their determinants for individuals, we point out subgroups which may benefit most from an effective social health protection in Burkina Faso.

Does Health Insurance Status Contribute to Differences in Health Care Utilization and Care Quality Among People with Chronic Conditions in South Asia?

PRESENTER: **Kavita Singh**, Heidelberg University

Background: Chronic non-communicable diseases (NCDs) are the leading causes of death in low- and middle-income countries (LMICs). Treatment for NCDs, such as heart disease, stroke, and diabetes tend to be longstanding and can be costly, and many people in LMICs have limited or no health insurance. The associations between health insurance and the utilization of health care services are not clearly understood although health insurance is frequently identified as a factor promoting utilization of health services among individuals with chronic NCDs. Further, little is known about how health insurance contributes to out-of-pocket expenditures and achievement of care goals among people with chronic conditions in South Asia.

Objectives: To examine the relationship between health insurance status, and care utilization, out-of-pocket expenditures, and achievement of care goals among adults with chronic conditions in India and Pakistan.

Methods: We used baseline data from the population-based representative Centre for Cardiometabolic Risk Reductions in South Asia (CARRS) cohort in Chennai, Delhi, and Karachi, (2010-2011) that included adults with chronic NCDs (diabetes, hypertension, coronary heart disease, stroke, and chronic kidney disease) who reported either outpatient or in-patient care utilization in the previous year. We analyzed the socio-demographics, health status measured using EQ5D-VAS, cardiometabolic risk factors, out-of-pocket expenditures, number of clinic visits in the past 12 months and type of health facility/care providers, and risk factor control defined as blood pressure $\geq 140/90$ mmHg, LDL-cholesterol ≥ 130 mg/dl, glycated hemoglobin (HbA1c) $\geq 8\%$ by health insurance status. Costs were converted from Indian rupees to international dollars (represented herein as "$").

Results: Among 2883 respondents meeting criteria, mean (SD) age was 53.0 years (11.6) and 1628 (56.5%) were women, 1072 (37.2%) had self-reported hypertension, 898 (31.1%) diabetes, 506 (17.5%) hypertension and diabetes, 121 (4.2%) heart disease, and 2783 (96.5%) had no health insurance. Utilization of public health facilities was higher among insured vs uninsured (57.0% vs 25.6%, p-value: <0.001. The total annual median (interquartile range) expenditure among respondents was: $181.6 ($70.1, $462.1), largely driven by medications cost (46%), and nearly 80% was out-of-pocket expense. Compared to uninsured, individuals with health insurance reported slightly lower total expenditures (median (IQR)): $182.2 ($71.1, $462.7) vs. $145.2 ($42.6, $302.7). Individuals with health insurance also reported lower body mass index (25.7 vs. 27.5 Kg/m^2, p-value: 0.002) and mean LDL-cholesterol (103.3 vs. 112.8 mg/dl, p-value: 0.014), and higher number of clinic visits in the past 12 months (≥ 4) (60.0% vs 54.0%). Compared to uninsured, individuals with health insurance had lower poorly controlled LDL cholesterol ≥ 130 mg/dl: 30.1% vs 17.9%, p-value: 0.016, blood pressure $\geq 140/90$ mmHg (76.4% vs 73.0%), glycated hemoglobin (HbA1c $\geq 8\%$: 34.4% vs 26.7%) and improved health status (mean score: 66.4 vs. 68.2).

Conclusions: Our data shows that chronic NCDs carries substantial financial risk for patients with chronic conditions in South Asia. Yet only 3.4% have some form of health insurance. Expansion of social health protection schemes may be an important strategy for financial risk protection, and to improve the NCD care goals in LMICs such as India and Pakistan.

The Impacts of Urban-Rural Integrated Medical Insurance on Mental Health: Evidence from China

PRESENTER: **Qin Zhou**, Renmin University of China

Background: Universal health coverage (UHC) is a key target for many countries, especially for low- and middle-income countries (LMICs). To achieve UHC that ensures all individuals and communities receive quality health services when needed without risk of impoverishment, an important first step is to establish a universal coverage system, often through expanding social health insurance. China is in the process of

establishing a unified urban-rural residents' health insurance system nationwide by pooling the New Rural Cooperative Medical Scheme (NRCMS, for the rural population) and the Urban Resident Basic Medical Insurance (URBMI for the non-working urban residents).

Objectives: Few studies have examined the psychological effects of health insurance integration. This study aimed to examine the effects of urban-rural health insurance integration on depressive symptoms among middle-aged and older rural adults in China.

Methods: Linking to local policy documents, we leverage the staggered local implementation of the national policy to study its impacts with data from the China Health and Retirement Longitudinal Study (CHARLS), a nationally representative survey conducted by the National School of Development at Peking University. We constructed and analyzed balanced panel data across a broad range of jurisdictions from four rounds of CHARLS survey data between 2011and 2018. The key independent variable is the integration treatment variable, and the main outcome variable of interest is mental health as measured by the ten-question version of the Center for Epidemiological Studies Depression (CES-D) metric. Considering that different jurisdictions launched the integration policy at different times, we employ difference-in difference (DID) with variation in treatment timing to estimate the impact of integration on mental health, while checking for parallel pre-trends. We hypothesize that the benefits are likely most concentrated on the population with the least comprehensive coverage before integration—rural residents formerly covered by NRCMS—and those otherwise facing the largest financial risks from health treatments and/or inefficient underuse from stigma, behavioral hazard and liquidity constraints, especially rural low-income and older adults.

Results: The average CES-D score of rural older adults decreased by 0.441 and the likelihood of depressive symptoms decreased by 3.5% after the implementation of the urban-rural health insurance integration policy. The positive effects may be due to the improved insurance reimbursement rates, health satisfaction, and the likelihood of social interaction and physical activity. However, the impact of the integration reform may be limited for certain groups of rural older adults.

Conclusions: This study found a positive psychological effect of urban-rural health insurance integration. It is necessary to further expand the coverage of the new URRBMI. Meanwhile, more targeted solutions to improve equity should be considered.

Role of Purchasing Agreements for Quality of Chronic Disease Care: Systematic Scoping Review

PRESENTER: **Stephen Jan**, The George Institute for Global Health

Background: There has been significant interest in strategic purchasing as a means of optimizing the social and health impact of health services and achieving universal health coverage. Such purchasing involves health care payers such as national governments and insurers using their market power to incentivize providers to improve performance. Given the growing burden of chronic diseases worldwide and the costs they are likely to impose on health systems, it is imperative that services are delivered to achieve optimal quality and improved health outcomes. Although the term strategic purchasing is largely used in the context of low- and middle-income countries (LMICs), the concept is not new and has been deployed under different monikers such as 'commissioning', 'value-based health care' and 'managed competition'. As such there are potential lessons gained from the global experience, particularly in chronic disease prevention and management in LMICs.

Aims and objectives: The aim of the study is to understand the role of purchasing agreements in improving quality of chronic disease care. The specific objectives are to provide an overview of the types of purchasing arrangements and their effectiveness in improving quality.

Methods: We conducted a systematic scoping review of purchasing arrangements focused on improving the quality of chronic disease care including English, French, Spanish and Chinese language studies.

Main findings: Almost all the included studies were conducted in high income country settings except for a small number from China, with most initiatives tied to a pay for performance arrangement. There was some evidence that strategic purchasing was effective in improving quality of chronic disease care, particularly when attached to a pay for performance payment model. These purchasing arrangements were generally tied to the implementation of chronic disease programs operated by large insurers or national governments requiring significant investment in information technology, financial management systems and staff. Quality tended to be measured in terms of intermediate health outcomes (e.g., reductions in blood pressure and cholesterol) and/or process (guidelines recommended tests, reporting requirements). Although the focus of many of the service models was in co-ordination and integration of chronic disease care, we found no evidence of the use of indicators that specifically measured these dimensions of quality. There was very limited account of equity in these studies. The one issue that was explored particularly in relation to pay for performance was the potential for adverse selection - providers excluding high risk groups (e.g., poor and those with multi-morbidity) for whom it may be more challenging to deliver improvements in quality.

Conclusions: The lessons from strategic purchasing initiatives in chronic disease worldwide, mainly from high income countries, suggest that it can be used to promote quality of care. However, translating this widely across LMIC settings may be problematic since the success of many initiatives are based on well-established and potentially resource intensive service models as well as advanced levels of infrastructure that may not be available in resource poor settings.

Cape Town International Convention Centre | CTICC 2 – Orchid
Economic Evaluation of Diabetes

MODERATOR: **Patrick Tenywa**, MRC/UVRI and LSHTM Uganda Research Unit

Estimating Cross-Model Variability in Estimates of Cost-Effectiveness for Eleven Diabetes Health Economic Models: A Mass Replication Exercise

PRESENTER: **James Altunkaya**, Health Economics Research Centre (HERC), University of Oxford
AUTHORS: Mi Jun Keng, Xinyu Li, Talitha Feenstra, Mark Lamotte, Phil McEwan, Jianchao Quan, Harry Smolen, William Valentine, Michael Willis, Jose Leal, Philip Clarke

Introduction: In economic evaluation, typically only one decision model is used to estimate an intervention's cost-effectiveness. Even with generous sensitivity analysis, the impact of model structural uncertainty is typically unexamined. Whilst replication is championed across social sciences, a replication of cost-effectiveness analyses using a range of decision models has rarely been undertaken. This is despite structural uncertainty being a major contributor to health economic decision uncertainty. In 2022, the Mount Hood Diabetes Challenge Network undertook a mass-replication exercise to assess the impact of model structural uncertainty on cost-effectiveness results of three interventions for type 2 diabetes (T2D).

Methods: Eleven T2D health economic models developed in Asia, Europe and North America participated in the mass replication. A standard set of model inputs (baseline population characteristics, treatment effects, unit costs, and utility values) were applied within each model, relating to a United Kingdom decision context. Three standard intervention scenarios were designed to reflect representative treatments for T2D: (A) a sustained 0.5% reduction in HbA1c at £12 per annum; (B) a sustained 0.9% reduction in HbA1c and 1kg/m^2 increase in BMI at £320 per annum; and (C) 1.5% and 1kg/m^2 reductions in HbA1c and BMI, respectively, at £3,810 per annum. Lifetime costs and quality-adjusted life-years (QALYs) were calculated and discounted at 3.5% per year. Each group was blinded to other groups' results. A cost-effectiveness threshold of £20,000 per QALY was used to compute net monetary benefits (NMB).

Results: There was substantial variation between model predictions of absolute lifetime costs and QALYs in the absence of any intervention. Mean lifetime costs and QALYs were £59,499 (interquartile range £36,571 to £55,598) and 8.39 QALYs (IQR 7.29 to 9.44 QALYs), respectively. One model predicted outlying estimates (>1.5x IQR from median) of absolute lifetime costs (£220,140), and predicted a negative NMB for all interventions. The remaining models all produced generally similar predictions of NMB. The mean predicted NMB was £1,341 (IQR £693 to £1,822) for intervention A, -£2,488 (IQR -£2,492 to £1,971) for intervention B, and -£39,732 (IQR -£42,804 to -£35,773) for intervention C. Based on NMB, these models all found that intervention A would be considered cost-effective, and that interventions B and C would not be considered cost-effective. The number of health states within each simulation model varied from 12 to 26, with each additional health state predicted to increase the mean NMB by £194 (p=.05). A common set of risk equations used by 8 models was also predictive of a higher mean NMB of £3,252 (p=.05).

Conclusions: Replicability is a fundamental scientific principle, with health economists aiming for consistency in healthcare decision making across different decision models. This analysis indicated that despite differences in absolute costs, predicted net benefits and cost-effectiveness conclusions were similar regardless of the model used. This exercise provides a blueprint for undertaking mass replication of cost-effectiveness analyses using decision models. Ensuring replicability of cost-effectiveness judgements across multiple decision models within other disease areas is an ongoing challenge. The expansion of model registries with publicly available results is vital to improve decision-making.

Comparing the Effectiveness and Cost-Effectiveness of Alternative Type 2 Diabetes Monitoring Strategies in Resource Limited Settings: A Modelling Analysis.

PRESENTER: **Elton Mukonda**, University of Cape Town
Introduction: Type 2 Diabetes (T2D) represents a high and growing disease burden in South Africa and similar settings. HbA1c testing is regarded as the gold standard for long-term blood glucose management. Due to a paucity of studies investigating the impact of monitoring frequency on clinical outcomes, the recommendations for HbA1c monitoring are largely based on expert opinion with monitoring at least two times a year as current clinical practice in South Africa. This choice has key resource implications to the South African public health system where monitoring and treatment for T2D is free at the point of use. The aim of this study is to investigate the long-term effectiveness and cost-effectiveness of alternative HbA1c monitoring intervals in the management of T2D.

Methods: A Markov model was used to estimate lifetime costs and quality adjusted life years (QALYs) of alternative monitoring strategies among T2D patients, using a provider's perspective and a 3% discount rate. HbA1c monitoring strategies (once, twice, 3 times or 4 times per year) were evaluated with respect to the incremental cost-effectiveness ratio (ICER) assessing each comparator against a less costly undominated alternative. The scope of costs included the full costs of HbA1C monitoring (test plus consultation) in addition to ongoing treatment/medication. We considered potential cost offsets in terms of hospitalizations, emergency room visits, outpatient visits and management of diabetes related complications. The Markov model consisted of three health states (HbA1c <7%, HbA1c ≥ 7%, Dead), with the states representing different conditions of blood glucose control. Transition probabilities were obtained from routinely collected public sector HbA1c data, while health service utilization and health related quality of life data were obtained from a local cluster randomized controlled trial

including n=623 diabetic patients followed over 24 months. Other parameters were obtained from published studies. The robustness of findings was evaluated using one-way and probabilistic sensitivity analyses. A South African indicative cost-effectiveness threshold of ZAR 38,465 was adopted.

Results: Preliminary results suggest that testing 3 times a year leads to superior health outcomes (14.54 discounted QALYs) when compared to testing once (14,46), twice (14,49) or 4 times a year (14,52). Testing 4 times a year is the most costly strategy (ZAR261,640 discounted lifetime costs). The incremental cost effectiveness ratio for testing 3 times compared to once per year is R104,871 per QALY gained, which is higher than the cost effectiveness threshold, while 2 times and 4 times per year were weakly and absolutely dominated, respectively. The sensitivity analysis showed that the ICER is most sensitive to the probability of achieving glycaemic control and the length of hospitalization.

Conclusions: This is the first study from Africa to assess the cost-effectiveness of alternative monitoring strategies in T2D. While the HbA1C test is inexpensive and more frequent monitoring is effective, the costs of associated provider consultations render more frequent monitoring cost-ineffective. If South Africa wishes to continue with current clinical practice of at least 2 per annum, results indicate the importance of exploring alternative mechanisms to convey test results to patients.

Extended Cost-Effectiveness Analysis of Interventions to Improve Uptake of Diabetes Services in South Africa

PRESENTER: **Heather Fraser**, SAMRC Centre for Health Economics and Decision Science - PRICELESS SA
AUTHORS: Isabelle Feldhaus, Alisha Wade, Ciaran Kohli-Lynch, Nicholas Stacey, Ijeoma Edoka, Stephane Verguet
INTRODUCTION:

The rising prevalence of diabetes in South Africa (SA), coupled with significant levels of unmet need for diagnosis and treatment, results in high rates of diabetes-associated complications. Income status is a determinant of utilisation of diagnostic and treatment services, with transport costs and loss of wages being key barriers to care. A conditional cash transfer (CCT) programme, targeted to compensate for such costs, may improve service utilisation. This study models the costs and health benefits of a CCT programme for diabetes services in SA, along with the financial risk protection (FRP) attributes of such a programme, for the poorest 40% of the population.

METHODS:

We built on extended cost-effectiveness analysis (ECEA) methods and used a 17-state Markov model to compare implementation of a CCT programme with the status quo. A population was simulated, drawing from SA-specific data, which transitioned yearly through various health states, based on specific probabilities obtained from local data, over a 45-year time horizon. Costs and disability-adjusted life years (DALYs) were applied to each health state. CCT implementation was modelled to increase diabetes diagnosis and treatment for individuals with diabetes, based on systematic review evidence. Three programme strategies were simulated and compared to a "no programme scenario": 1) CCT for diagnostic services only; 2) CCT for treatment services only; and 3) CCT for both diagnostic and treatment services. Cost-effectiveness outcomes were reported as cost per DALY in the form of an Incremental Cost Effectiveness Ratio (ICER); while FRP outcomes were reported as cases of poverty averted due to the programme. The distributions of the outcomes were reported by income quintile and sex.

RESULTS:

Total incremental costs of the programme amounted to USD 64 million for a CCT programme covering both diagnostic and treatment services for the poorest 20% of the population, increasing to USD 138 million when the poorest 40% were eligible.

The ICERs of strategies 2 and 3 (including treatment services) were approximately USD 1000/DALY averted, and thus fell below SA's cost-effectiveness threshold of USD 3015/DALY. However, the ICER was approximately USD 50000/DALY averted when only diagnostic services were covered by the programme (strategy 1). The programme was slightly more cost-effective when including only those in the poorest 20% of the population, compared to covering the poorest 40%. The programme was also more cost-effective for women than men.

There were 3003, 2019 and 2730 incremental cases of poverty averted for programme strategies 1, 2 and 3, respectively. There were greater financial risk protection benefits for women compared to men, for all strategies.

CONCLUSION:

A Conditional Cash Transfer programme that covers diabetes treatment services was found to be cost-effective in South Africa, when provided to the poorest 40% of the population, with or without diagnostic services included. While the strategy including only diagnostic services (strategy 1) was the least cost-effective in terms of cost per DALY, it resulted in the greatest financial risk protection benefits. ECEAs provide a useful platform for incorporating equity considerations into economic evaluations, with potential for this evidence to inform implementation policies.

Lifetime Impact of Diabetes on Costs and Quality-Adjusted Life Expectancy: A 44-Year Prospective Study

PRESENTER: **Jose Leal**, University of Oxford
AUTHOR: Philip Clarke
Background:

Diabetes places an enormous demand on healthcare systems worldwide. Understanding the lifetime impact of type 2 diabetes on costs and health-related quality of life allows assessing prevention efforts and identifying resources required to meet patient needs. As long-term longitudinal follow-up of patients is rare, such estimates have come from short-term data extrapolations. Long clinical outcomes studies provide a unique opportunity to understand and value patient's experiences from diagnosis to death.

Objectives:

We estimate the lifetime hospital costs and quality-adjusted life years (QALYs) using a UK cohort of type 2 diabetes followed-up from diagnosis up to 44 years. Furthermore, we estimate the value of blood glucose interventions and their legacy effects and contrast it with previous cost-effectiveness evidence based on the same cohort.

Methods:

We use patient-level data from the UK Prospective Diabetes Study (UKPDS), one of the longest clinical outcome studies conducted to date. It comprises a randomised trial of 5102 newly diagnosed type 2 diabetes that ran in the UK from 1977 to 1997, followed by a ten-year post-trial monitoring study (without randomisation) up to 2007. We have now linked UKPDS patients to Hospital Episodes Statistics (HES) and mortality data extending the follow-up to 2021.

Hospital resource use data recorded within trial was combined with HES data between 1997 and 2021. Lifetime costs are reported in 2022 British pounds. We also estimated (quality-adjusted) life expectancy for all UKPDS participants from randomisation to death or censoring. An additive quality-of-life model valued survival years conditional on the occurrence and/or history of events. Utility decrements were obtained from previous UKPDS analyses and complemented, where needed, by literature.

We focus on individuals initially randomised to intensive (metformin or sulfonylurea/insulin) or conventional glucose control and estimate lifetime costs and QALYs by group using the Kaplan-Meier Sample Average estimator. We contrast our findings with UK life expectancy estimates of individuals of the same age and time-period at randomisation. Finally, we compare our estimates with lifetime QALY and cost predictions published in 2005 based on the UKPDS Outcomes model.

Results:

4209 individuals were allocated to intensive or conventional glucose control and 84.4% were dead by 2021. Undiscounted life expectancy was 22.6 years, which was 2.6 years lower than what would be expected in the general population (25.3 years). The diabetes cohort experienced 17.0 QALYs (undiscounted). Lifetime costs and QALYs in the general population will be compared against the findings from the diabetes cohort. Over 44 years of follow-up, individuals initially allocated to metformin lived 2.7 years (95%CI: 1.0, 4.4) more than those randomised to conventional control. The observed gain in QALYs was 2.0 (0.7, 3.2) favouring metformin which was twice as large as the predictions in the cost-effectiveness analysis in 2005 (0.9 QALYs).

Conclusion:

Individuals with diabetes live significantly less years than the general population. We found intensive blood glucose control to increase life expectancy and QALYs more than 25 years after the end of the trial. The original value of low cost interventions such as metformin is considerably higher than previously estimated.

Cape Town International Convention Centre | CTICC 1 – Room 1.42
Analyses of HRQoL

MODERATOR: **Tuba Saygin Avsar**, University College London

Impact of Medicaid Home Care on the Health-Related Quality of Life of Family Caregivers of Individuals with Cognitive Impairment.

PRESENTER: **Emmanuel Fulgence Drabo**, Johns Hopkins University
AUTHOR: Kevin Frick

Cognitive limitations are a hallmark feature and precursor sign of Alzheimer's disease and related dementias, one of the most burdensome conditions in the United States and globally. Individuals with cognitive limitations are significantly more likely than those without to utilize uncompensated care in the United States. Recent studies indicate that such caregiving is associated with adverse mental and physical health outcomes for caregivers. Yet, credible estimates of the population-level health utility and work-related productivity losses associated with such uncompensated care are lacking to inform health economic evaluation studies. In this study, we investigate potential associations between family caregivers' health-related quality of life (HRQoL) outcomes for individuals with and without cognitive impairment. Our central hypothesis is that HRQoL for family caregivers of persons with cognitive impairment would be lower than HRQoL for those without cognitive impairment. Furthermore, we hypothesize that receipt of publicly funded home care, such as Medicaid home care services, would improve

family caregivers' HRQoL outcomes. We used data from multiple waves (2006-2019) of the Medical Expenditures Panel Survey (MEPS), a set of large-scale surveys of families and individuals, their medical providers, and employers across the United States. We used data on all household members in 5 interviews over two years. We first compared SF-12 mental and physical component summary (MCS-12/PCS-12) scores among caregivers of individuals with cognitive limitations and/or Alzheimer's disease and related dementia or cognitive impairment diagnosis (cognitive impairment henceforth) and those without. Next, we used a person-level propensity score matching approach to estimate changes in the MCS-12 and PCS-12 scores associated with a new onset of Medicaid home care among caregivers of individuals with cognitive impairment and those without. The study sample consisted of n=36,878 adult (age ≥18 years) members of households with more than one member. Caregivers of individuals with cognitive impairment had significantly lower average MCS-12 and PCS-12 scores than caregivers of individuals without cognitive impairment. In addition, new-onset Medicaid home care was associated with a 1.41 (SE, 0.622) and 3.93 (SE, 0.693) unit improvements in likely caregivers' MCS-12 and PCS-12 scores, respectively, equivalent to 2.8% and 8.4% improvements over their average pre-onset scores. Our results suggest the need to account for these external health benefits to caregivers when evaluating the social value of home care programs.

Latent Class Clustering of Multimorbidity Patterns and Associated Quality of Life in Australian Adults

PRESENTER: **Kabir Ahmad**, University of Southern Queensland
AUTHORS: Syed Afroz Keramat, Tracy Comans
Background: Multi-morbidity associated with significant disease and economic burdens is increasing in developed countries among the aged, however less is known regarding the pattern in the adult population of all ages.

Objective: The present study aims to identify the chronic disease patterns including multimorbidity in Australian adults of age 15 to 85+ and to assess whether such patterns are associated with particular sociodemographic factors and health-related quality-of-life (HRQoL).

Methods: The multi-morbidity patterns of 15 chronic diseases (diabetes, angina pectoris, anxiety, asthma, blood clot in the heart, blood clot in the brain, cancer, COPD, deep vein Thrombosis, dementia, depression, metabolic disorder, multiple sclerosis, osteoarthritis, Parkinson) were identified deploying the latent class analysis method from the disease profile of an Australia-representative population sample (N=4,544) obtained through cross-sectional online interviews. The survey was delivered to the participants using LimeSurvey, an open-source survey software as a part of a health preference valuation project. Participants completed the EQ-5D-5L questionnaire and answered general demographic questions (age, gender, income, education level and employment) and whether they had any of 15 different comorbid conditions. The associations between multi-morbidity patterns, and sociodemographic factors and health-related quality of life, were subjected to regression analysis.

Results: Four distinct groups of multimorbidity were identified: 1) a healthy group with no morbidity (45.4% of the population); 2) a morbid group with single chronic disease (25.4%); 3) a multi-morbid group with mental chronic diseases only (8.3%); and 4) a multi-morbid group with miscellaneous chronic diseases (20.9%). Individuals aged 65 and over were associated with an increased likelihood of membership of the 'morbid group with single chronic disease' (odds ratio [OR] = 1.69 for 65-74 age group and OR = 2.58 for 75+ age group) and (to a much greater extent) the 'multi-morbid group with miscellaneous chronic disease' (OR = 2.42 for 65-74 age group and OR = 4.40 for 75+ age group). The low-income groups of 'below poverty' and 'poverty to average' were associated with membership of the two multimorbidity classes (ORs are 2.14 and 2.15 for mental health multi-morbid group and ORs are 1.52 and 1.83 for misc. multi-morbid group). The results also showed a linear relationship between HRQoL score and latent class membership. Specifically, individuals being member of morbidity with single chronic disease (b=-0.12, $P<0.001$), multi-morbidity with mental chronic diseases (b=-0.28, $P<0.001$) or multi-morbidity with miscellaneous chronic diseases (b=-0.29, $P<0.001$) compromised the HRQoL scores significantly. Further, it affects the LC group members' employability outcome significantly, for example, being member of more morbid group, they become more likely to be not in the labour force.

Conclusion: The study results confirmed that the co-occurrence of chronic diseases was not attributable to chance, rather followed a pattern. Multimorbidity patterns were associated with sociodemographic factors and quality-of-life. Our results suggest that targeted, integrated public health and clinical strategies dealing with chronic diseases would improve the quality-of-life of vulnerable multi-morbid adults.

Can Pragmatic, Registry-Based Randomised Trials Provide Population-Generalizable Estimates of Effectiveness and Cost-Effectiveness?

PRESENTER: **Rachael Lisa Morton**, University of Sydney
AUTHORS: Lavern Greenham, Karan Ketan Shah, Stephen McDonald
Introduction: Randomized trials are criticized for narrow inclusion criteria, in particular their failure to enroll marginalized or disadvantaged populations. Registry-based trials are a new approach to test interventions among a broadly representative population and may also facilitate comprehensive collection of patient-reported outcomes. Using the ANZDATA registry, Symptom monitoring WIth Feedback Trial (SWIFT) as a case study, we assessed inclusion of harder to reach populations and reflected on the success or failure of specific strategies to facilitate their recruitment.

Methods: SWIFT, a cluster-randomized registry clinical trial (ACTRN 12620001061921) among kidney dialysis patients, was designed to test the effect of a systematic symptom monitoring intervention on health-related quality of life. Trial strategies to facilitate representative recruitment included consumer co-design; broad inclusion criteria; encouragement of >90% of eligible patients in each haemodialysis unit participating; support for smaller research-naïve units to submit trials-related governance and documentation; translation of surveys into 7 languages; finger-sign consent; in-person research support for electronic patient-reported outcomes data collection.

Descriptive statistics including frequencies, means, and standard deviations were reported for enrolled participants at baseline, and compared with characteristics of all dialysis patients in the registry. Associations between socio-demographic characteristics and health-related quality of life (measured by EuroQol-5D-5L questionnaire), transformed to utilities using Australian population tariffs, was assessed in the trial population using linear regression models.

Results: SWIFT recruited 789 participants across 3 Australian states (May 2021-November 2022); mean age 64 years (SD 15), 39% females, 10% were Indigenous. Of 787 with country of birth recorded, 66% were Australian-born, 6% South Pacific Islands, 5% Southern and Eastern Europe, 4% North Western Europe, 2% South East Asia, 17% were born elsewhere. 262 of 789 participants (33%) resided in the most disadvantaged geographic areas (lowest two deciles), and 53 of 789 (7%) resided in the least disadvantaged areas (highest two deciles). Non-English language trial questionnaires for patient reported outcome measures were used among 19 of 789 participants (2%).

National statistics from the ANZDATA registry for all adults receiving facility-based haemodialysis on 31 December 2021 (n=11,368) were similar to trial participants. Mean age 65 years (SD 15); 40% females; 17% Indigenous. Of 11,267 with country of birth recorded, 65% were Australian-born, 8% Southern and Eastern Europe, 5% South East Asia, 5% South Pacific Islands, 4% North Western Europe, and 13% Other. Across the country, 25% resided in the most disadvantaged geographic areas, and 16% in least disadvantaged areas.

Mean EQ-5D-5L for SWIFT participants was 0.64, (95%CI 0.63 to 0.68). Mean visual analogue scale was 65, (95%CI 63.68 to 66.98).

Univariate analyses showed EQ-5D-5L utilities at baseline were not significantly different for SWIFT participants by age, sex, Indigenous status, region or socio-economic index. EQ-5D visual analogue scale scores were significantly lower among people residing in areas of least disadvantage compared with most disadvantage, p=0.019, (95%CI -1.44 to -0.13).

Discussion: The trial population closely mirrors the national dialysis population, with the exception of Indigenous patients. Targeted and appropriate resourcing for recruitment before trial completion, could further improve generalizability of the trial's final effectiveness and cost-effectiveness results.

8:30 AM –10:00 AM   MONDAY   [Demand & Utilization Of Health Care Services]

Cape Town International Convention Centre | CTICC 1 – Room 1.62
Barriers to Access

MODERATOR: **Sachiko Ozawa**, University of North Carolina at Chapel Hill

Using Systems Thinking to Increase Enrollee Use of Nigeria's Pro-Poor Basic Health Care Provision Fund: Because Funding Is Necessary but Not Sufficient.

PRESENTER: **Abdu A Adamu**, Abt Associates
AUTHORS: Bolanle Bukola Olusola-Faleye, Charles Aninweze, Deji Bodunde, Umar Ahmed, Gaza Gwamna, Abdulkadir A Shinkafi, Jemchang Fabong, Benjamin Madaki, Simon Makadi, Nura Musa, Andrew Murphy, Ekpenyong Ekanem, Elaine Baruwa
BACKGROUND

In 2014, the Nigerian Federal Government established the Basic Health Care Provision Fund (BHCPF) to increase pro-poor funding for health. In Nigeria's decentralized healthcare system, federal-level funds are managed by state-level institutions and local government area-based primary healthcare (PHC) facilities. Although funding has flowed through the system since 2021, BHCPF enrollee PHC use remains low. The USAID-funded Local Health System Sustainability (LHSS) project works with BHCPF implementers in Nasarawa, Zamfara, and Plateau states to improve BHCPF effectiveness and increase PHC use. The BHCPF exists in a complex system characterized by multiple interconnected and interdependent elements that change constantly. A systems thinking approach accounting for complexities can inform policy re-designs to address low enrollee health service use.

OBJECTIVE

BHCPF state implementers needed to identify factors that drive enrollee's low PHC use to guide efforts to increase BHCPF effectiveness. LHSS collaborated with BHCPF state implementers to apply a systems thinking perspective to engage a range of BHCPF actors to discuss their roles and experience with the program.

METHODS

Key informant interviews and focus group discussions conducted in August and September 2022 brought together enrollees, PHC facility providers, and BHCPF managers to discuss BHCPF implementation. Data from these discussions were analyzed using the Qualitative Thematic Analysis approach. Themes and sub-themes were generated and used to build a Causal Loop Diagram identifying feedback loops.

RESULTS

Several themes and feedback loops suggest ways in which BHCPF implementation processes can be adapted to increase program effectiveness. Themes identified include confidence in the BHCPF program, convenience of access to BHCPF facilities, service quality, facility payments, and community involvement influence service use. Examples of factors associated with these themes include how delayed facility payments and funding use decisions like commodities purchased, staff hired, etc., affect service quality. Causal loop diagrams suggest that these factors are interconnected and interdependent and drive feedback within the system. Several reinforcing loops were identified. One reinforcing loop showed that enrollee confidence in the BHCPF program influences service use: High confidence leads to high usage. For example, dependable drug availability contributes to service use. Another reinforcing loop showed that facility payments drive quality, so delayed payments (and inappropriate funding use decisions) reduce dependable drug availability lowering BHCPF confidence and use. Another reinforcing loop shows that per enrollee capitation payments, determine the funding a facility receives, which *could* drive quality and subsequent use – in theory. But since facilities receive capitation automatically regardless of subsequent enrollee use, this potentially reinforcing loop doesn't increase service use in practice. Additional reinforcing and balancing loops were identified for the other themes noted above.

CONCLUSION

Applying a systems thinking perspective using a combination of tools like stakeholder engagement, qualitative thematic analysis, and causal loop diagrams identifies the combination of ways that increased financing be managed to increase pro-poor health service use. The LHSS program is creating space for federal, state, LGA and community interaction to use these findings to refine the BHCPF implementation training, strengthen program resource tracking and improve accountability processes.

Self-Reported Unmet Need for Healthcare and Healthcare Utilisation in Finland

PRESENTER: **Lien Nguyen**, Finnish Institute for Health and Welfare

AUTHOR: Unto Häkkinen

The allocations formulas based on need captured by morbidity and socioeconomic factors for wellbeing services counties in Finland are mainly drawn using register-based data on service utilisation, which do not account for unobserved unmet healthcare needs. The aims of this study were to investigate factors associated with self-reported unmet healthcare needs and the association of unmet healthcare needs with primary healthcare utilisation and total healthcare utilisation.

A national FinSote 2017–2018 survey sample that included questions on self-reported unmet needs for services provided by doctors and nurses was matched with register-based data for the calendar year 2017 used in an earlier resource allocations study (n = 13,800). Public primary healthcare (PHC) consisted of outpatient care and duty services in PHC, and total health care (THC) included specialised care, PHC's outpatient care and PHC's ward care. To obtain service costs per person occurred in 2017, the number of services derived from national registers was multiplied by the average national unit costs of services. Self-assessed health and self-rated quality of life available in the survey and register-based variables such as demographic and socioeconomic factors, morbidity variables, living arrangement, the costs of prescribed medicines, private healthcare and examination services, and 22 regions were used in the analysis. Three logit regressions were used to study the association of different factors with the probability of reporting unmet needs for services from doctors and nurses. To model healthcare utilisation by service group, measured as the total costs of primary healthcare and the total costs of total healthcare, eight two-part models (a logit model in the first part and a generalised linear model with gamma family and 0.25 power link in the second part) were applied. To make the sample representative of the general population, analysis weights that were developed by raking method were used.

12.6% of the respondents reported unmet needs for the services of doctors and nurses. Those reporting healthcare unmet needs were more likely to be female and unemployed and to have morbidities, non-Finland as the country of origin, and poor self-assessed health. The highest income quintile and self-rated good quality of life were negatively associated with reporting unmet healthcare needs. An individual with unmet healthcare needs spent €30–180 more on primary healthcare and €270–960 more on total healthcare compared to an individual with no unmet healthcare needs, ceteris paribus.

To better account for unmet needs in the allocation of funding, data on self-reported unmet healthcare needs and self-rated quality of life should be collected more extensively and routinely in the future. Reducing unmet healthcare needs does not necessarily increase the costs of primary healthcare or those of total healthcare. However, to confirm this conclusion, follow-up studies are needed.

Costs and Utilization Patterns of Molecular Testing Among Privately Insured Cancer Patients in the US

PRESENTER: **Xuanzi Qin**, University of Maryland College Park

AUTHORS: Amy Plotkin, Stacie Dusetzina

Background:

Despite increased molecular testing for cancers with actionable biomarkers, the NCCN guidelines only recommend comprehensive molecular testing for newly diagnosed patients with metastatic non-small cell lung cancer (NSCLC).

Methods:

We used IBM MarketScan Claims to examine molecular test use and costs of the tests among privately insured patients (median age=53). We identified 101,456 patients with new colorectal, lung, breast, ovary, or prostate cancers or melanoma between 2017-2019. We used procedure codes to identify the receipt of molecular tests within 6 months after the cancer diagnosis. We divided molecular tests into single-gene or panel tests. We used two-part models with a logit in the first part and a GLM with the log link and gamma distribution in the second part to compare

the total costs of molecular testing among patients who received single-gene tests only vs. panel tests only vs. both types of tests for each type of cancer among fee-for-service patients (N=12,816). We controlled for age, sex, comorbidity, region, relationship with the employee, and insurance plan type.

Results:

Among 101,456 patients, 14,657 (14.4%) received molecular tests. Use patterns varied across cancers. The percentage of cancer patients who received any molecular tests was 21.4% (breast), 16.8% (colorectal), 22.3% (lung), 6.2% (melanoma), 22.5% (ovary), and 2.4% (prostate). Patients with lung cancer were most likely to receive panel tests (16.97% among those received any tests). Patients with breast cancer were most likely to receive single-gene tests (99.45% among those received any tests). Median days from diagnosis to the first molecular test were the shortest for lung cancer and the longest for prostate cancer. Median days from diagnosis to targeted therapy were the shortest for lung cancer and the longest for ovary cancer. Among all the 12,816 fee-for-service cancer patients who received any molecular tests, receiving panel tests and receiving both single-gene and panel tests were associated with $497 and $1920 more costs than receiving single-gene tests (p<0.001). Receiving panel tests was $731 (p=0.039) and $720 (p=0.002) more expensive than receiving single-gene tests for colorectal and lung cancer patients, respectively. Receiving both single-gene and panel tests was $1,194 (p=0.020) and $2,563 (p<0.001) more expensive than receiving only single-gene tests for colorectal and lung cancer patients, respectively. We did not find significant differences in costs for other cancer types due to the low use of panel tests.

Conclusions:

We observed higher uptake of panel tests among lung cancer patients, consistent with the NCCN's strong recommendation for panel tests for NSCLC. However, the use of both single-gene and panel tests might suggest poor quality of care. Although receiving panel tests was more expensive than receiving a series of single-gene tests, when patients received both single-gene and panel tests, it was the most expensive. Starting from single-gene tests may eventually cost more if panel tests are needed. Moreover, despite multiple actionable biomarkers, the uptake of molecular testing was low in cancers other than lung cancer. Patients with other cancers might not benefit from the advances of cancer precision medicine due to the lack of clear guidelines.

8:30 AM –10:00 AM   MONDAY   [Health Beyond Health Care Services: Social And Related Determinants]

Cape Town International Convention Centre | CTICC 1 – Room 1.43
Social Determinants of Health Among Older Adults

MODERATOR: **Zhuo Chen**, University of Georgia

DISCUSSANT: **Wei Zhang**, University of British Columbia; **Donglan Zhang**, New York University; **Min Hu**, Fudan University; **Wei Yang**, King's College London

Neighborhood Social Determinants of Health and Disparities in Mortality Risk after Dementia Diagnosis
PRESENTER: **Donglan Zhang**, New York University
AUTHORS: Yucheng Wang, Zhuo Chen, Sheng Li, Tianming Liu, Lu Shi
Background:

In the United States, racial and ethnic minority groups have a higher prevalence of Alzheimer's disease and related dementias (ADRDs), and they are more likely underdiagnosed for ADRDs than non-Hispanic Whites. It is less certain that after diagnosis if there is a racial and ethnic difference in mortality risk or length of survival. In addition, social determinants of health (SDOH), defined as the social, economic, environmental, political, and health care factors in places where people live and work, may predict higher mortality risk among racial and ethnic minorities and populations with lower socioeconomic status. Understanding and tackling the key SDOH that contribute to the higher mortality risks may reduce the burden of disease among populations experiencing health disparities.

Objectives: This study aims to assess the racial and ethnic disparities in 5-year mortality rate after dementia diagnosis and identify key SDOH factors driving differences across racial and ethnic groups.

Methods: Patient-level data were obtained from the ADRD Registry in the state of South Carolina, U.S. Established in 1988, South Carolina ADRD Registry data were collected from: inpatient records, emergency department encounter, mental health care utilizations, memory clinic visits, chart abstracts, vital records, Medicaid documentation, and other sources such as long-term care assessments. The Registry included the following variables for each incident ADRD case: type of ADRD (diagnoses by ICD 9/10), death records, sources of ADRD data collection (hospital, emergency departments, etc.), patient's physical location (community vs. facility), age of diagnosis, current age, length of time being included in the Registry, sex, race/ethnicity, and ZIP-code (as long as there are 10 or more ADRD cases in the ZIP-code). We linked patient-level data with a large amount of area-level SDOH data from multiple sources based on Zip-codes. Based on the Minority Health and Health Disparities Research Framework,

the selected SDOH indicators included measures on access to health care, segregation, built

environment, air quality, poverty rate, income inequality, among many others. An important methodological challenge in analyzing SDOH data is these data are hierarchical, multidimensional, and multicollinear. We plan to apply advanced variable selection methods, machine learning approaches, combined with causal inference methods to elucidate the associations and clustering patterns between SDOH risk factors and disparities in ADRD mortality risk.

Results: By November 2022, we have merged the Registry data with more than 300 neighborhood SDOH indicators. We applied Least-angle regression, least absolute shrinkage and selection operator and the elastic net regression models to identify the most important factors. The preliminary results showed that there were racial and ethnic differences in mortality risk, and the type of ADRDs, neighborhood racial segregation and economic inequity were important drivers of disparities in mortality risk.

Conclusion: This analysis contributes to the literature on the equity of ADRD outcomes across different racial and ethnic minority groups, and potential SDOH that drive such disparities. This study provides important policy implications as to which subpopulation suffer the most from the ADRD disease burden, and what neighborhood SDOH factors could potentially increase or alleviate the disparities in ADRD mortality risk.

Cognitive Decline and Social Health Insurance Among Older People: Evidence from Longitudinal Surveys in South Korea and China

PRESENTER: **Chengxu Long**, King's College London
AUTHORS: Wei Yang, Karen Glaser
Objectives To examine socioeconomic inequalities in the influence of different types of social health insurance (SHI) on cognition trajectories and survival of older South Koreans and Chinese people with cognitive impairments (CI).

Methods Data are drawn from the Korean Longitudinal Study of Aging (N=1,812) and the China Health and Retirement Longitudinal Study (N=1,168) from 2008 to 2018. We built growth mixture models to identify cognition trajectories and performed logistic regression and Cox proportional hazards models to identify baseline predictors.

Results SHI may contribute to improving cognitive function among older people with CI, but socioeconomic inequalities were observed in its protection influence. Uneducated South Korean respondents with Medical Aid (MA), a public financing scheme for the poorest, had a 6.4% lower likelihood of being in the rapidly declining cognition trajectory category, compared to their employed insured counterparts. Similarly, in China, the uneducated individuals without SHI had a 7.5% higher likelihood of belonging to the declining cognition category than those BHI recipients. In additional, among Chinese respondents without SHI, low-income individuals were 8.1% more likely to be in the declining cognition trajectory group than high-income participants. The mortality risk among Chinese individuals with public free medical services was 51% lower (HR= 0·49, P<0.05) compared to their uninsured counterparts.

Conclusion The MA in South Korea and BHI in China demonstrated positive influences on cognition trajectories among older people with CI and lower educational levels. In addition, in China, older adults with CI and higher incomes benefitted more from SHI. We urge governments to consider expanding healthcare provisions to protect older people with CI, especially those from low socioeconomic backgrounds.

Racial Differences in Cognition Ageing Among Older People in England

PRESENTER: **Wei Yang**

Cognitive impairment contributes to a significant proportion of disabilities among older people. The consequences of cognitive impairments are likely to be highly unequal for individuals and families from different socioeconomic groups. Drawing data from the English Longitudinal Study of Ageing, this study uses the growth mixture models (GMM) and panel data regression to understand and address racial inequities in cognitive decline, as well as access to treatment and care among older people with cognitive impairments in the U.K. The findings suggest that older people of African or Caribbean origins have worse cognition compared to their white counterparts at baseline. They also have higher unmet needs when needing to access treatment and care. This study identifies disadvantaged racial groups and argues that understanding barriers to access are essential for delivering equitable care for older people with cognitive impairments in England.

Improving Prediction of Medical Costs Among Medicare Beneficiaries By Incorporating Social Determinants of Health Indicators

PRESENTER: **Zhuo Chen**, University of Georgia
AUTHORS: Daniel Jung, Donglan Zhang, Ye Shen, Sai Ma, Lan Mu, Juliet Nabbuye Sekandi, Henry Young, Mahmud M Khan
Background: An important feature of the US healthcare system is the risk prediction and adjustment of payments to managed care organizations or accountable care organizations. Public payers (e.g., the Centers for Medicare & Medicaid Services, CMS) and private insurers use risk adjustment to prevent adverse selection. Risk adjustment models use patients' demographic characteristics and health status, and provider-related factors to adjust the risks not due to the quality of care provided. These models allow care management services to identify high-risk patients and compensate providers for the additional costs associated with high-risk patients.

Recent literature provided strong support for the inclusion of Social Determinants of Health (SDoHs) in risk prediction and adjustment. The current risk prediction and adjustment method does not adequately control underlying SDoH-related risks; thus, providers serving high-risk patients are often penalized. Incorporating SDoHs in risk and payment adjustment can improve health outcomes and reduce health disparities by supplying healthcare providers with proper incentives to serve high-risk patients.

Objective: This study aims to assess the impact of SDoHs on providers' Hierarchical Conditions Categories (HCC) scores and added predictive power of HCC scores on medical cost after incorporating SDoHs.

Methods: We will link beneficiary-level HCC scores with area-level SDoHs indicators to estimate the improvements in model accuracy after incorporating SDoH variables. Beneficiary-level HCC scores will be acquired from the CMS through RESDAC (Research Data Center, University of Minnesota). SDoH data will be assembled through multiple sources including the Agency for Healthcare Research and Quality SDoH database, Area Health Resource Files, and various waves of the American Community Surveys.

Preliminary results: While we are in the process of acquiring data from RESDAC, we conducted preliminary analyses using publicly available data from CMS. We find providers in counties with a higher proportion of older adults tend to have higher HCC scores. However, providers in rural counties have lower HCC scores, which contradicts to the common wisdom that rural residents are less healthy. Additional analyses are in process to understand the observed peculiarities.

Conclusion: Our proposed research has critical policy implications for Medicare, the largest health security program in the world for older adults. Incorporating SDoH in risk prediction and adjustment may improve model accuracy and reduce health disparities.

8:30 AM –10:00 AM   MONDAY   [Demand & Utilization Of Health Care Services]

Cape Town International Convention Centre | CTICC 1 – Room 1.61

Health Inequity and Care Disparities By Gender and Geography: Evidence from India, China, and the US

MODERATOR: **Jeonghoon Ahn**, Ewha Woman's University

ORGANIZER: **Karen Eggleston**, Stanford University

DISCUSSANT: **Mylene Lagarde**, London School of Economics and Political Science; **Manoj Mohanan**, Duke University; **Victoria Fan**, University of Hawaii; **Abe Dunn**, Bureau of Economic Analysis

Women Left Behind: Gender Disparities in Utilization of Government Health Insurance in India
PRESENTER: **Radhika Jain**
AUTHOR: Pascaline Dupas
Using administrative data on over 4 million hospital visits, we document striking gender disparities within a government health insurance program that entitles 46 million poor individuals to free hospital care in Rajasthan, India. Females account for only 33% of insurance claims among young children and 42% among the elderly. These shares are lower for more expensive types of care, and far lower than sex differences in illness prevalence can explain. Almost two-thirds of non-childbirth spending is on males. We combine these data with patient survey, census, and electoral data to show that 1) households are willing to allocate more resources to male than female health, which results in disparities in hospital utilization because the program is unable to fully offset the costs of care-seeking; 2) lowering costs does not reduce disparities, because males benefit as much as females do; and 3) long-term exposure to village-level female leaders reduces the gender gap in utilization, but effects are modest and limited to girls and young women. In the presence of gender bias, increasing access to and subsidizing social services may increase levels of female utilization but fail to reduce gender inequalities without actions that specifically target females

Drug Affordability, Utilization, and Adherence: Evidence from a Prescription Drug Price Reduction in China
PRESENTER: **Jianan Yang**, Stanford University
AUTHOR: Daixin He
Globally high and rising pharmaceutical prices are challenges faced by both governments and patients. Pharmaceuticals are often priced well above the marginal cost, both for on- and off-patent drugs, and both for developed and developing countries. While there is a trade-off between improving affordability and preserving innovation incentives, on the patient's side, the response of drug utilization to price reductions needs to be understood both for policy-making and welfare evaluations. Yet evidence from developing country settings is elusive.

In developing countries, drug affordability is a bigger challenge due to lower income levels and insufficient insurance coverage. Despite that, the existence of non-price barriers to healthcare utilization makes the effect of improving affordability ambiguous. This paper studies the effect of drug affordability on utilization and adherence in the context of China, where a drug procurement reform initiated in early 2019 brought down the prices of several chronic condition drugs by nearly 80%, affecting around 130 million people. In particular, we will examine the effect on *insured* and *uninsured* patients separately to evaluate the distributional implications of the reform. In China, urban residents with formal sector jobs have the most generous coverage, our "insured" sample. The uninsured not only pay the full cost out-of-pocket, but are also more likely to be migrant workers without formal sector jobs and earning low wages.

Data and Research Method:

We use patient visiting records from over 300 primary care facilities in Beijing, with a total of 1.4 million patients. This data not only allows us to measure total drug purchases, but because we are able to track patients' drug purchases over time, we can measure their drug adherence by

whether they refill their prescriptions on time.

We use a difference-in-differences design with a set of comparable drugs as controls. We group drugs into therapeutic classes based on the ATC classification system to address the potential substitution across drugs. We use the Medication Possession Ratio (MPR) to measure drug adherence, which could be interpreted as the percentage of days covered by medication between two drug purchases.

Findings:

We find that this improvement in affordability led to a significant increase in drug utilization of *uninsured* patients, whose purchases of treated drugs increased by 40%. This response came both from new and existing medication takers. Drug adherence was improved for the *uninsured* who had poorer adherence at baseline. The reduction in underuse among the *uninsured* closed 19.9% of the baseline gap in drug adherence between the *insured* and *uninsured*. The response from the *insured* is insignificant.

Implications:

Our findings confirm the importance of price as a key barrier to the take-up of effective healthcare and suggest that drug price responsiveness could be much higher among the low-income population and in LMIC. This implies that welfare benefits from such drug price reductions could be large in developing countries, especially when there is a large share of uninsured in the population and when chronic conditions increasingly account for a large share of the disease burden.

Tailored Local Social Inequity Composite Indices: Using AI and Data Science to Advance Health Equity

PRESENTER: **Anupa Bir**, RTI International

Social risk adjustment is a relatively new field focused on adjusting payments to healthcare providers based on the social risks faced by their populations. Existing composite indices of social risk, such as the Area Deprivation Index (ADI) and the Social Vulnerability Index (SVI), are widely used to attempt to control for such risks. However, we have found that existing indices do not explain much of the variance in important health outcomes at the neighborhood or individual levels.

The RTI Rarity™ approach (RTI.org/Rarity) is a novel method for accounting for neighborhood-level risks and protective factors that strongly influence population health. We have developed an "artificially intelligent" approach to social risk composite indices that uses data science to advance health equity. Our tailored scores have been produced for the entire US at the Census tract and ZIP levels and are highly predictive and accurate in explaining health outcomes, such as cancer mortality, drug overdose mortality, reproductive health outcomes, and diabetes prevalence, among others. Available for every state and DC, the scores have been used in projects funded by multiple US Federal agencies, including the CDC, NCI, NIDA/SAMHSA, CMMI, and more.

Drawing on a data library of more than 200 measures, based on neighborhood data collected from 1978 through 2022—organized in 10 domains of social determinants of health—improves the accuracy of our predictions. For example, across the US, we can explain 95% of the variance in cancer mortality, 97% of variance in diabetes prevalence, and 99% of variance in drug overdose mortality. In comparison, the ADI explains only 31% of the variance in cancer mortality and just 7% of the variance in drug overdose mortality at the tract level, and the SVI performs even more poorly. The identified limitations in these widely available indices show that an alternative approach is needed. RTI Rarity, developed by an independent, nonprofit research institute to meet the needs of the current era, is a proven, scalable, next-generation approach to tailored, equity-focused social risk adjustment.

8:30 AM –10:00 AM   MONDAY   [Health System Performance]

Cape Town International Convention Centre | CTICC 1 – Room 2.44-2.45

Systems Modelling for Health Systems Performance Towards Universal Health Coverage.

MODERATOR: **Josephine Borghi**, London School of Hygiene & Tropical Medicine (LSHTM)

DISCUSSANT: **Gemini Mtei**, Abt Associates; **Dominic Nkhoma**, Kamuzu University of Health Sciences

The 'Holy Grail' for Health Systems Modelling: Hybrid Simulation for Strengthened Evaluation of Complex Interventions and Policy Making

PRESENTER: **Josephine Borghi**, London School of Hygiene & Tropical Medicine (LSHTM)

AUTHORS: Rachel Cassidy, Abdullah Alibrahim, Anna Foss, Agnes Semwanga, Nicholaus Mziray, Peter Binyaruka

BACKGROUND: Use of complexity science for health systems and policy evaluation is on the rise, with increased application of system dynamics modelling (SDM) and agent-based modelling (ABM) to evaluate macro- and micro/meso-level system behaviour, respectively. Hybrid models that combine SDM and ABM present a unique opportunity to combine the strengths of different simulation approaches and counter their respective individual limitations, however, there is limited evidence on such models in the literature. SDM-ABM hybrid models are defined here as integration of SDM structures (causal links, stocks, flows) into an ABM (which functions with autonomous agents capable of evolutionary behaviour). SDM-ABM hybrid models have the potential to capture both the intricate level decision-making and interactions

between system agents (patients, health workers etc.) as well as the high-level, aggregate processes and structures that exist in the wider health system (funding allocation and supply chain dynamics etc.) that influence agent decision-making and overall system performance. In this study, we developed a novel hybrid SDM-ABM to evaluate a strategic purchasing reform, payment for performance (P4P), and explore the effect of programme design alterations.

METHODS: This work builds on prior research by the study team using individual SDM and ABM to explore P4P programme pathways to impact. Development of the hybrid model development involved: a (i) comparison of models to explore and exploit the respective strengths of each, (ii) theoretical exploration of SDM integration within the ABM environment, (iii) physical integration of SDM structure within the ABM environment (iv) verification of suitability and capabilities of model integration, (v) validation to ensure output is still resonant of real health system behaviour and, (vi) using the model to explore various policy simulations.

RESULTS: In this presentation, we discuss hybrid model development and results, including comparison with results from the silo models, and reflection on the added value of using complexity science for health systems research. For example, the SDM in silo is well placed to capture health provider medical commodities and facility funding pipelines, aggregate level system behaviour which is difficult to replicate in the ABM. Likewise, the SDM is less capable of emulating heterogenous drivers for patient care seeking behaviour, which is well established in the ABM. In pursuing model integration, we are minimising the limitations each model type has when operating in silo. Exploration of programme effect and programme design changes (such as allocation and use of incentive payments) on key outcomes (such as provider readiness for service delivery and percentage of women who have a facility-based delivery) will be simulated in the model, with recommendations for future implementation.

CONCLUSION: In this study, we combine the strengths of two modelling approaches to create a policy evaluation tool with a truly holistic health systems lens. By illustrating application, we hope to demonstrate the benefit of such an evaluation approach to the wider research and policy community. This approach can be used for both ex-post and prospective policy evaluation, to identify pathways to effect for health system programmes and implementation bottlenecks and unintended outcomes.

The Thanzi La Onse All-Disease Whole-Healthcare System Model

PRESENTER: **Paul Revill**, University of York
AUTHOR: Timothy Hallett

In lower-income settings in sub-Saharan Africa there are fundamental questions which have potentially enormous consequences for the health and wellbeing of populations: How should a country decide which effective interventions to offer as part of its health service provision? How should available resources be deployed and configured to achieve this? What health benefit would accrue if more funding were to be made available? What would be the benefit of strengthening specific parts of the healthcare system and which should be prioritised? What future changes in the need for healthcare must be planned for? Traditional approaches to disease and health-economic modelling have tended to consider individual areas of health separately, and so have struggled to represent interactions between them and the health opportunity costs of alternative policy options. To address this need, we have taken the novel approach of constructing an internally consistent model representation of the whole healthcare system and the demands placed upon it by the population served: the *Thanzi La Onse* Model. This include linked, interacting, sub-models that represent: (i) the means by which resources for health generate capabilities to deliver services; (ii) the need for healthcare, as it arises from the multiple causes of ill-health that affect each person individually over their lifetime; (iii) decisions that are taken to manage mismatches between demand and supply for healthcare services; (iv) the effectiveness of the care as delivered, accounting for gaps in quality and gaps in availability. We will present the initial version of the model for Malawi. We will describe how each of these sub-models has been theorised, represented in this framework, and informed by available data. We will discuss how the model has been designed to be responsive to specific policy questions posed by government planners and describe the new insights that have arisen, including the value of robust supplies of medicines, the implications of resource constraints on the achievement of targets for HIV/Tb and the health consequences of reduced services during the COVID-19 pandemic. The opportunities and challenges of this kind of modelling approach will be reflected upon.

International Trade, Dietary Change, and TB Control in India: Application of a Fully-Integrated Macroeconomic-Epidemiological Model Framework.

PRESENTER: **Anna Vassall**, London School of Hygiene & Tropical Medicine (LSHTM)
AUTHORS: Henning Tarp-Jensen, Marcus Keogh-Brown, Tom Sumner, Susmita Chatterjee, Sedona Sweeney

Macroeconomic Computable General Equilibrium (CGE) models are widely applied to analyse the macroeconomic impact of health policy interventions and (pandemic) health system shocks. More recently, the increasing availability of fully integrated macroeconomic-demographic-health models means that applications to analyse impacts of macroeconomic policies and shocks on health system outcomes have started to emerge as well. This presentation will illustrate the scope of the full macroeconomic-demographic-health model integration methodology, for the purposes of whole-system modelling of health systems, by presenting a fully integrated model for analysing Tuberculosis (TB) in India. The whole system workings of this fully integrated model framework will be illustrated by analysing how a change in India's foreign trade policies may affect clinical TB outcomes among the Indian population, via their impact on nutritional intakes and nutritional risk factors for clinical TB outcomes. Broader applications of this integrated modelling tool, including the scope for analysing economic impacts of treatment and prevention interventions, via modelling of risk factors and health pathways, will also be outlined and contextualized within a whole system modelling context.

Cape Town International Convention Centre | CTICC 1 – Auditorium 2
Reproductive, Maternal and Child Health

MODERATOR: **Tommy Wilkinson**, Health Economics Unit, School of Public Health, University of Cape Town

The Effect of Fee Exemption Policies on Postpartum Health Outcomes; Evidence from the Ghana Free Maternal Health Care Policy.

PRESENTER: **Dr. Doreen Nyarko Anyamesem Odame, MA, PhD**, University of Ghana
Background

To date, there exist persistent maternal health challenges, most of which are as a result of delayed or poor management of complications that come up during pregnancy, delivery or the postpartum period. Strategies that seek to increase access and utilisation of maternal health services therefore are a major step in improving overall postpartum outcomes. Using data from the Ghana Demographic and Health Survey (GDHS), this study sought to assess the effect of the Free Maternal Health Care Policy (FMHCP) on postpartum health outcomes in Ghana.

Method

The GDHS data is a National representative survey data on women of reproductive ages (15 – 49 years). The various rounds of the survey that were selected for this study were those taken in 2003 and 2014, with 2003 serving as the baseline. With the help of the logit regression technique, the study examined the relationship between access to the FMHCP and postpartum outcomes in Ghana. Complaints and complications reported by pregnant women during ANC were adopted to measure postpartum health outcomes.

The sample selected for the study consisted of women who had given birth and utilized ANC services in the last five years preceding the survey. There was a total sample size of 2156 and 4145 from the 2003 and 2014 datasets respectively.

Results

The study findings showed overall improvements in postpartum health outcomes over the period as the odds of a woman encountering adverse postpartum outcomes was 1.3068 times higher in 2003 than in 2014. The findings however highlight the existence of inequalities as women of certain demographic characteristics were at an advantaged of having improved postpartum outcomes. Again, the outcome of the study revealed that there are still some 21.42% women who deliver at home without skilled care in 2014. This is an indication of the existence of latent factors that influence access and utilization of maternal health services that goes beyond cost of care.

Conclusion

The outcome of this study shows that maternal health interventions must be comprehensive and holistic, and targeted at addressing maternal health challenges at all levels. The findings also bring to awareness the need to look beyond the policy variable in health policy evaluations as there are many other variables that affect health care utilisation and health care habits that go beyond financial demands.

Can Health Insurance Coverage Improve Quality of Reproductive and Maternity Care in Low- and Middle-Income Countries? A Multi-Country Propensity Score Matching Study

PRESENTER: **Tiara Marthias**, Universitas Gadjah Mada
AUTHORS: Kanya Anindya, Sukumar Vellakkal, Nawi Ng, Thomas Hone, Dennis La, Yang Zhao, Huan Wang, Reza Pandu Aji, John Tayu Lee, Barbara McPake
Background

Poor maternal and child health afflicts millions of women and children, particularly in low-and middle-income countries (LMICs). This study assessed the impact of social health insurance programs on the continuum of care for reproductive and maternal health in nine LMICs.

Methods

We used the latest two waves of the Demographic and Health Survey (DHS) collected between 2012–2017 from nine LMICs with different social health insurance scheme and coverage (Cambodia, Dominican Republic, Ghana, Guatemala, India, Indonesia, Jordan, Kyrgyz Republic, and Peru), constituting around 25% of the global population. Using the effective coverage care cascade that is defined as the proportion of individuals experiencing health gains from a service among those who need the service, we estimated the association between health insurance and quality of care for family planning, antenatal care (ANC), maternal delivery service, and postnatal care (PNC). We estimated the difference-in-difference models combined with coarsened exact matching method (may replace with PSM if you still prefer) to address the selection bias arising from the voluntary nature of insurance program participation and reported the average treatment effect on the treated (ATT).

Findings

In seven out of nine LMICs investigated, health insurance coverage was linked to significant improvements in most of the reproductive and maternity care quality metrics, even among those with already high coverage levels. For example, social health insurance coverage was associated with significant improvement in family planning (ATT for service contact=8.2 percentage points [pp, 95% CI=4.7, 11.7], crude coverage=5.1 pp [95% CI=2.3, 8.0], quality-adjusted coverage= 2.8 pp [95% CI=0.9, 4.6]); antenatal care (ATT for service contact=2.3 pp [95% CI=1.0, 3.5], crude coverage=4.9 pp [95% CI=2.7, 7.1], quality-adjusted coverage=6.5 pp [95% CI=4.1, 9.0] and user-adherence-adjusted coverage=4.6 pp [95% CI=1.8 ,7.3]); delivery care (ATT for service contact=3.0 pp [95% CI=1.4, 4.6], crude coverage=3.6 pp [95% CI=1.8, 5.4]) and postnatal care (ATT for service contact=2.1 pp [95% CI 0.9, 3.2], and quality-adjusted coverage=1.8 pp [95% CI=0.3, 4.0]). The magnitude of the effects, however, varied significantly across metrics and countries.

Interpretation

Using the most recent wave of a nationally representative survey of nine LMICs, our findings show that health insurance coverage is associated with significant improvements in the quality of care for maternal health services. These findings provide important evidence in support of accelerating the coverage of universal health insurance (including both public and private health insurance) in order to close the inequality gaps in maternal and child burdens in LMICs.

How Much Is Too Much? A Cost Analysis of an Emergency Obstetric Care Mentoring Intervention Package for Skilled Birth Attendants in Rural Zambia.

PRESENTER: **Olatubosun Akinnola Akinola**, Ministry of Health
AUTHORS: Lumbwe Chola, Hilda Shakwelele, Lungiswa Nkonki
Introduction

Zambia, like many sub-Saharan Africa countries, has a high maternal mortality ratio of 252 per 100,000 liver births which is far from the sustainability development goal target of 70 per 100,000 live births. Emergency Obstetric Care (EmOC) signal functions, which are a combination of critical medical interventions used to treat the direct obstetric complications responsible for most maternal deaths, are known to be effective hence their global adoption. Existing literature recommends that EmOC trainings are implemented along with other interventions such as referral services. Knowing how much these interventions cost as a "package" will be helpful in making decisions on replicating them. Unfortunately, in Zambia there is inadequate evidence on the cost of implementing an EmOC intervention package thus limiting decision making ability.

Aim: (i) Determine the average cost of implementing an EmOC intervention package (ii) determine the main cost drivers of implementation (iii) determine the cost of an integrated implementation scenario in which the project is integrated into government systems and processes rather than as a stand-alone project

Methods

This study was a cost analysis conducted for an EmOC mentoring project implemented by a non-governmental organization (NGO) in a rural setting within Zambia across 112 health centers. All project sites were included in the study sample. Cost data was collected using a macro costing approach and it involved reviewing the project financial and activity records from the implementing NGO. The costs were considered from the provider perspective with a time horizon of three-years from 2016 to 2018. Data was collected and analyzed in Microsoft excel. A "one-way" sensitivity analysis was used to address uncertainty concerns and a scenario analysis was done for an integrated implementation scenario.

Findings

Using a discount rate of 9%, the total economic cost of implementing the program was US$1,471,741. The average cost of implementation in one health facility per year was US$9,314. The average cost per trainee per day was US$51. The top three cost drivers on the program were allowances and per diem paid to mentors during mentoring sessions, personnel, and overhead cost. Scenario analysis showed that in a scenario where the program is integrated into the government system and mentors work in the same facilities as their mentees, the economic cost of implementation reduced by approximately 71% and at facility level by 62%. This was due mainly to eliminating some travel, overhead and personnel costs.

Conclusion

About 56% of Zambians live in rural areas, with the closest health facilities being health centers and health posts. Implementing this intervention package across all the health centers and health posts in the country, based on both scenarios explored in the study will require between 3.42% to 6.95% of the annual Zambian health budget, thus making the package worthy of consideration for inclusion in the national health budget. Additionally, given that it is cheaper for projects to be integrated into government systems, it is important to fully understand how public sector health financial systems can become more attractive for direct donor funded health projects.

Effect of Early Age of Marriage on India's Integrated Child Development Service Utilization

PRESENTER: **Rajesh Kumar Rai**, Society for Health and Demographic Surveillance, India

Using a nationally representative 2019-2021 National Family Health Survey dataset for India, this study set-up a quasi-experimental study design using an instrumental variable (IV) approach, to estimate the causal effect of early age of marriage among young mothers (aged 15-24 years) on utilization of various child welfare services provided under the Integrated Child Development Service (ICDS) programme. ICDS is a national program and the largest maternal and child welfare services in the world. Age of menarche was used as an IV to isolate the effect of age of marriage on five components in the ICDS – if the children born in 2013 or after to a woman received (i) food, (ii) health check-up, (iii) immunization, (iv) early childhood care or pre-schooling, and (v) weight measurement services from ICDS, in the 12 months preceding the survey date. Findings suggest that a one-year increase in age of marriage of young mothers could yield 9 percentage points increase (β: 0.09; 95% confidence interval: 0.04, 0.13; p <0.001) in availing immunization services. Although postponement of marriage by one year showed an increased utilization of other services from ICDS - receipt of food, health check-up, early childhood care or pre-schooling, and weight measurement service, the effect did not attain a statistically significant threshold of p <0.10. We explored potential mechanism through which age of marriage of young mothers could affect utilization of ICDS for welfare of their children. The analytical approaches and study findings were verified with various robustness checks.

Intergenerational Transmission of Health: Evidence from India

PRESENTER: **Santosh Kumar**, University of Houston

AUTHOR: Bernard Nahlen

One of the most topical and urgent public health challenges in low- and middle-income countries (LMICs) is micronutrient deficiencies (MND) among children and women. High levels of MND among women and children may signify the existence of intergenerational transmission of poor health from mother to children. Existing work on intergenerational transmission has focused on the labor market and educational outcomes, however, intergenerational transmission of health is understudied and little is known about the independent effect of maternal health on child health after accounting for genetic factors and unobserved omitted factors.

The objective of this study is twofold: to estimate the intergenerational correlation in anemia between mother and child, and explore heterogeneity in this correlation by the economic status of the household after controlling for genetic factors. I accomplish these objectives by using the instrumental variable (IV) method to estimate the causal association between the mother's anemic status and the children's anemic status. I employ a leave-out-one instrument at the district level and include the mother's height to further control for the genetic factor.

Using nationally representative data, I estimate intergenerational health persistence in anemia in India. Results from the instrumental variable method show that mothers' anemic status is strongly associated with the anemic status of their children. I find an intergenerational health correlation of 0.26, implying that children of anemic mothers are 26 percentage points higher likelihood of being anemic. Results are robust to the inclusion of confounding factors including the mother's height.

I use micro-level data from the fourth round of the National Family Health Survey (NFHS) conducted in 2015-16 (IIPS & ICF, 2017). The NFHS is a nationally representative health survey gathering information on population, health, and nutrition from a sample covering 601,509 households and 699,686 women.

The main dependent variable is the Hb level and anemic status of children born in the last five years before the survey. Children are categorized as anemic if the Hb < 11.0 g/dL while the cutoff for pregnant and non-pregnant women is 11/0 g/dL and 12.0 g/dL, respectively. The control variables include gender, age, and birth order of the child and household-level control includes the mother's education, mother's height, religion, social group of the household (caste), and rural dummy. We exclude outliers with Hb<6 g/dL. The analytical sample has 198,315 observations.

Analyzing large and nationally representative data from India, I find a high degree of intergenerational correlation between mother and child health, particularly in reference to anemia. The study contributes to limited evidence on IHA in a LMIC setting and in the context of anemia which is not self-reported and less likely to suffer from measurement errors. The results highlight the importance of economic factors over genetic factors in explaining the high degree of persistence in health across generations in LMICs. Government programs designed to improve the economic status of populations may break the intergenerational transmission of poor health across generations.

8:30 AM –10:00 AM   MONDAY   [Health System Performance]

Cape Town International Convention Centre | CTICC 1 – Room 2.41-2.42

Equity in Financing

MODERATOR: **Josue Mbonigaba**, University of KwaZulu-Natal

Horizontal and Vertical Equity and Public Subsidies for Private Health Insurance in the United States

PRESENTER: **Paul D Jacobs**, Agency for Healthcare Research and Quality

AUTHOR: Steven Hill

The U.S. healthcare system is fragmented with an uncoordinated array of programs and subsidies that has been connected to inequities in household financing for healthcare, including the regressive incidence of costs for private health coverage. Depending on how private health insurance is purchased, federal and state policies offer two markedly different subsidy structures. Employees and their dependents can benefit

from the long-standing exclusion from taxable income of the premiums and some out-of-pocket spending for care when covered through employer-sponsored insurance (ESI). Individuals without access to employer coverage may obtain subsidies for private, nongroup Marketplace coverage established under the Affordable Care Act (ACA) and enhanced by subsequent laws.

Studies assessing the equity of different types of healthcare subsidies in the United States have been infrequent and do not incorporate recent legislative developments. Our paper is the first we are aware of to directly compare the structure of the ESI and Marketplace subsidy regimes for a nationally representative population and examine the recent implications for the equity of financing both premiums and out-of-pocket (OOP) costs for medical care.

We compare these parallel approaches to subsidizing private coverage and quantify horizontal and vertical equity. Using the Household Component of the Medical Expenditure Panel Survey (MEPS) for the 2018-19 period and Marketplace premium data for 2020, we calculated public subsidies for and expected family spending under each coverage source and expressed these as percentages of premiums and family income. By linking premiums to individuals in the MEPS and simulating out-of-pocket spending and tax payments, we constructed a comprehensive measure of health care spending.

Our simulations showed a marked horizontal inequity for lower-income families. Families with income between 150-200% of the federal poverty line (FPL) paid 23.4% of family income to finance employer coverage, but with enhanced tax credits available after 2020 these families would have paid only 3.2% for Marketplace coverage, on average. These enhanced credits for Marketplace coverage made the original ACA subsidy structure more progressive across the income distribution. Families with income between 400-600 percent of the FPL, who were not eligible for federal subsidies before 2020, saw their average expected payments drop 6.0 percentage points from 16.8% of their income to 10.8% of income. Average expected payments by families with income between 150-200 percent of the FPL fell from 7.5% to 3.2% of their incomes.

The presence of ESI and Marketplace subsidy structures raises important questions about the equity of these two approaches to providing incentives for coverage and highlights the factors that should be considered in their design. Tax subsidies for ESI coverage impose steep costs for federal and state budgets and provide the most benefit to higher-income families who are most able to afford insurance on their own. Our results can serve as a baseline for understanding the impact of current subsidies across the income distribution and the magnitude of the changes that may be required to address existing inequities. These results may also inform low- and middle-income countries considering subsidies for private insurance.

Long-Run Measurement of Income-Related Inequalities in Health Care Under Universal Coverage: Evidence from Longitudinal Analysis in Korea

PRESENTER: **Yuichi Watanabe**, Waseda University

1. Background

Many countries seek to promote well-being for their entire populations through the implementation of universal health coverage (UHC). Health financing that influences the level of people's direct payments for the use of health services may be a key policy instrument for providing a population with equal access to needed services. To identify the extent to which UHC has been attained, it is necessary to evaluate equity of access to use of needed care and the cost burden of health services for the country's entire population.

2. Objective

This study considers income-related inequalities in health care utilization and spending in a long-term perspective for the case of the Republic of Korea. Specifically, it aims to investigate how income-related inequalities in health care use and spending in Korea have varied over time and examine the extent to which different factors have contributed to those inequalities by using an in−depth decomposition analysis allowing for heterogeneity.

3. Data and Methodology

This study exploits individual-level longitudinal data from a nationally representative health survey (Korea Health Panel Survey) from 2008 to 2018. I use short-run and long-run concentration indices as measures of the degree of inequality, with an index of health-related income mobility defined as the difference between two concentration indices. Moreover, I employ an extended decomposition method that allows for variation in individual responses to need and non-need determinants across income groups. This study adds to the literature by expanding the standard methods of the concentration index and decomposition analysis with the use of the panel data to take into account medium- to long-term inequalities and heterogeneous responses to factor contributions.

4. Results

Empirical results show that overall health care utilization is disproportionately concentrated among the poor over both the short and long run. Income-group differences and household characteristics, such as marital status, make larger pro-poor contributions to inequality in inpatient care use, while chronic disease prevalence greatly pushes outpatient care utilization in a pro-poor direction. Inpatient care expenses are biased toward the poor, where the direct effect of income-group differences and non-need determinants account for most of pro-poor inequality. Long-run inequality favors the better-off in terms of outpatient care expenses, where the contribution of income-group differences has the largest impact. However, total amount of medical care expenses is almost equal across the population, regardless of income level.

5. Discussion

The pro-poor concentration of health care utilization and its decomposition results suggest that it is important for health care policy in Korea to focus more on improvement in the health status and well-being of low-income groups, as poor people are likely to be in physically worse condition. The results regarding health care expenses imply that higher spending on inpatient care may be a heavy financial burden to low-income people for whom additional financially supportive measures should be provided to prevent them from suffering economic hardship. On the other hand, people in high-income groups may spend most on costly services in outpatient care, including uninsured services with the help of voluntary private health insurance.

Jampersal Funding and Birth Waiting Homes in Reducing Maternal Deaths: An Ecological Study in Indonesia

PRESENTER: **Teti Tejayanti**, Indonesian Ministry of Health

AUTHORS: Nadhila Adani, Rahmawati ., Suparmi Suparmi, Ika Saptarini, Trihono Trihono, Siti Kulsum, Rizki Ekananda, Harimat Hendrawan, Dony Suryatmo Priyandono, Iin Afriani, Waloya -, Ari Rachmawati Ismaya, Sri Hasti, Manumpak Sinaga

Maternity Insurance Program Funding and Maternity Waiting Homes in Reducing Maternal Deaths: an Ecological Study in Indonesia

Background: Indonesia has a high maternal mortality rate (MMR) at 305 per 100,000 livebirths in 2015 compared to neighbouring countries and is estimated not to reach the SDGs target in 2030. As an effort to reduce MMR, the Government of Indonesia implements a maternity insurance program (Jampersal) and Maternity Waiting Home (BWH). Jampersal is given to pregnant women who do not have insurance, because not all pregnant women are covered by the national health insurance (JKN). MWH is to facilitate pregnant women who lives far from health facilities. This policy is motivated by the geographical status of Indonesia which has 17 thousand islands. Health facilities outside the islands of Java and Bali are not as developed. Studies on Jampersal and MWH are limited. Therefore, it is necessary to analyze the effectiveness of Jampersal and MWH.

Method: Routine data from the Ministry of Health was used to obtain MMR in 2021. While annual report from the Ministry of Finance was used to obtain data on Jampersal and MWH fund in 2021. JKN coverage at the district level were obtained from the National Socio-Economic Survey. Districts' budget was obtained from the Ministry of Home Affairs. The outcome was MMR, while the independent variables consist of Jampersal sub-menu; cost of delivery, referrals, consumption, operational and maternity home's rental costs. In addition, the multivariate linear regression analysis was conducted adjusting by remote area, region of Java-Bali or Outer Java-Bali, JKN and Districts' budget.

Results: The realization of Jampersal in non-remote area was 60,3%, while in remote areas only 61.6%. MWH is more utilized outside Java-Bali 87%, and only 13% in Java-Bali. The bivariate analysis showed that Jampersal (r= -0,146; p=0,001) significantly correlates with MMR. On the contrary, MWH do not. The multivariate linear regression showed the model had (R0.122). The Jampersal for cost of delivery (ß =-0.104; p-value=0,040), remote area (ß =4.332.; p-value=0,000), JKN (ß=-0.243; p-value=0,000), Outer Java Bali (ß=-0.243; p-value=0,000), Districts' health budget (ß =2.556, p-value =0,011) is associated with reduced MMR. Yet, consumption, operational and maternity home's rental costs are not significantly associated with MMR.

Conclusion: Jampersal is significantly associated with reduced MMR. The impact of reducing MMR requires support from districts' health budget and through increasing JKN coverage. The Indonesian government has revised the policy that the fund to cover the cost of delivery within Jampersal will be carried out by BPJS-K as the administrator of JKN, but other submenus; referral, waiting homes rental cost, operational and consumption costs should still be given to districts, because there are still many remote areas outside of Java-Bali that do not have sufficient healthcare facilities. Low absorption of Jampersal fundings suggest a need to improve its effectiveness.

8:30 AM –10:00 AM   MONDAY   [Health Care Financing & Expenditures]

Cape Town International Convention Centre | CTICC 1 – Room 2.66

Tracking Healthcare Expenditure By Disease – Novel Methods, Results, and International Comparisons

MODERATOR: **Simon Wieser**, University of Zurich

ORGANIZER: **Joseph Dieleman**, University of Washington

Estimating US Healthcare Spending By Disease and County

PRESENTER: **Joseph Dieleman**, University of Washington

Background: Some US states spend half as much per capita as in other US states. To understand this variation in spending and assess drivers of this variation, this project estimates healthcare utilization and spending by health condition for 3,110 US counties from 2010-2019.

Methods: We extracted age, sex, diagnosis, payer, and spending information from 58 billion health insurance claims. These data include utilization and spending in hospital inpatient care, ambulatory care, emergency department care, home health care, nursing facility care, dental care, and prescribed pharmaceuticals. We aggregated these data into healthcare encounters, assigned diagnoses to one of 154 health condition categories, adjusted for diagnoses that do not map one for one to a single health condition category, and adjusted the aggregated spending

estimates to account for excess spending associated with comorbidities. We used a small area mixed-effects model to estimate spending for each health condition, age and sex group, payer, year, and type of care. We adjusted these estimates upward to be reflective of the entire US population and scale the estimates to reflect spending reported in the US National Health Expenditure Accounts. To explore variation in spending across the US counties, we adjusted for economy-wide inflation and compared age-standardized spending per prevalent case. For each county we identify the health conditions categories that are furthest from the US mean, and use DasGupta decomposition to assess if the variation is due to differences in utilization or price and intensity of care.

Results: We found that in 2019 spending on low-back and neck pain, joint pain, and diabetes had the largest amount of health spending, although spending patterns varied dramatically across US counties. Several counties with the highest per capita spending had spending that was over three times higher than in the counties that spent the least amount. While utilization patterns and age-standardized disease prevalence account for some of the variation, age and variation in price and intensity explain the majority of the spending variation. For the health conditions where spending variation across geography was especially due to differences in utilization, the differences were due variation in use inpatient and ambulatory care, as well as prescribed pharmaceuticals, while the counties that spent the most had higher price and intensity in all types of care. More than 70% of the US counties had low-back and neck pain, joint pain, or diabetes as the health condition category with the most spending. These three diseases also had the greatest increases in spending between 2010 and 2019, all growing more than 5% annually for most US counties, even after adjusting for economy-wide inflation and age patterns. Between 2010 and 2019, the range of age-standardized spending across the US states increased by more than 50%.

Conclusion: Healthcare spending continues to grow in the US; yet there is substantial variation across US counties. Adjusting for age and disease prevalence can allow new exploration of drivers of healthcare spending increases, as well as help identify states where increases in spending on specific health conditions is less than elsewhere.

Disease Specific Health Spending By Age, Sex and Type of Care in Norway

PRESENTER: **Jonas Minet Kinge**, University of Oslo/Norwegian Institute for Public Health

Background

Norway is a high-income nation with universal tax-financed health care and among the highest per capita health spending in the world. This study estimates Norwegian health expenditures by health condition, age, and sex, and compares with disability-adjusted life-years (DALYs).

Methods

Government budgets, reimbursement databases, patient registries and prescription databases were combined to estimate spending for 144 health conditions, 38 age and sex groups, and eight types of care (GPs; physiotherapists & chiropractors; specialized outpatient; day patient; inpatient; prescribed medicines; homebased care; and nursing homes). Diagnoses were in accordance with the Global Burden of Disease study (GBD). The spending estimates were adjusted, by redistributing excess spending associated with each comorbidity. Disease specific DALYs were gathered from GBD 2019.

Findings

The top 5 aggregate causes of Norwegian health spending in 2019 were mental and substance use disorders 20·7% (95% CI 19·9-21·6), neurological disorders (15·3%, 14·9-15·7), cardiovascular diseases (10·2%, 9·9-10·5), diabetes, kidney, and urinary diseases (8·6%, 8·4-8·9), and Neoplasms (7·4%, 7·1-7·7). Spending increased sharply with age. Among 144 health conditions, dementias had the highest health spending, with 10·0% (9·8-10·1) of total spending, and 78% of this spending was at nursing homes. The second largest was Falls estimated at 4·6% (4·5-4·7) of total spending. Spending in younger age groups was dominated by mental and substance use disorders, with 46·0% of total spending in those aged 15-49. Spending per female was greater than spending per male, particularly for musculoskeletal disorders, dementias, injuries, and diabetes. Spending correlated well with DALYs (Correlation r=0·77, 0·67-0·87), and the correlation of spending with non-fatal disease burden (r=0·83, 0·76-0·90) was more pronounced than with mortality (r=0·58, 0·43-0·72).

Interpretation

Health spending was high for conditions with few curable treatment options available. The prevalence of high-cost conditions like, dementias and falls, is likely to increase as more people live into old age, potentially substantially increasing spending.

Comparison of Health Care Spending By Medical Conditions and Other Dimensions in the United States and Switzerland

PRESENTER: **Michael Stucki**, University of Zurich

Background

The United States (US) and Switzerland top the list of countries with the highest per capita health care spending. Health care systems in both countries are characterized by a high degree of provider fragmentation, a multitude of payers and elements of free market competition. The main difference to the US system is the universal health coverage in Switzerland with a uniform and relatively generous basket of health services. A comparison of spending by medical conditions and other dimensions reveals potential future changes in US health care spending as coverage increases and population ages.

Methods

This study compares health care spending by medical conditions and other dimensions in the US and Switzerland. In both countries health care spending has been disaggregated into comprehensive and comparable disease classifications based on the Global Burden of Disease project in previous studies. The US study disaggregated personal health care spending in 2016 by 155 diseases, five types of care, and by age and sex. The Swiss study disaggregated total health care spending in 2017 by 48 conditions, 20 types of care, and by age and sex. We compare spending shares of specific diseases, spending per prevalent patient with a specific disease, as well as the shares of types of care and age groups in disease-specific spending.

Results

US and Swiss health care spending by disease was surprisingly similar in 2016/2017. The six most expensive disease groups were the same in both countries, although the ranking differed slightly. We found that chronic diseases dominated spending in both countries. Switzerland spent a higher share on mental disorders (14.5% vs. 7.0% in the US). Musculoskeletal disorders topped the list of the most expensive diseases in the US (14.7%), while it ranked second in Switzerland (14.2%). Swiss spending on neoplasms, oral, and neurological disorders was significantly higher than in the US. The US spent more on Diabetes (4.3% vs. 1.3%). Spending per prevalent patient was very similar for cardiovascular, neurological, and digestive disorders, and much higher in Switzerland for mental disorders, oral disorders, and congenital birth defects. For many diseases, a higher share of disease-specific spending was spent on those aged 45-64 in the US compared to Switzerland.

Discussion/Conclusion

Some of the differences in disease-specific spending between the two countries can be explained by differences in disease prevalence (e.g., diabetes), access to care (e.g., mental disorders) and differences in type of insurance coverage (e.g., Medicare coverage from the age of 65). Differences in total age-specific spending can be explained by higher life expectancy in Switzerland. Our results suggest that the US health care spending is likely to increase as the US population continues to age and if health insurance coverage is increased.

Health System Spending per Case of Disease and for Certain Risk Factors

PRESENTER: **Emily Bourke**, Australian Institute of Health and Welfare

Background: Estimates of health system spending for diseases, disease burden, and burden attributed to risk factors using comparable disease classifications have been produced by the Australian Institute of Health and Welfare (AIHW) for several years. These data sources provide different lenses through which to view population health, and while burden estimates measure the human cost of disease in terms of quality of life, and years of life lost, this does not necessarily mean that a high burden condition will have a high financial cost. To better understand how population health and risk factors influence health system spending, this project brings together these data sources to estimate the cost per case of disease, and the cost of diseases due to risk factors.

Methods: The disease expenditure study estimated health spending estimates by Australian Burden of Disease Study (ABDS) condition, age group, and sex for admitted patient, emergency department, and outpatient hospital services, out-of-hospital medical services, and prescription pharmaceuticals. To estimate the cost per prevalent case of disease, prevalence estimates from the ABDS were reviewed to determine which condition and sequela combinations would have individuals being counted across two or more sequela. Sequela were in scope if there would not be double counting of individuals for a condition. Where health loss durations had been applied (for acute conditions) this duration was removed. These mutually exclusive, person level estimates were combined with disease expenditure estimates to calculate the cost per case of disease. To estimate risk factor costs, the population attributable fractions derived in the ABDS for risk factor and condition combinations (by age and sex), after adjusting for mediation, were applied to spending estimates for those conditions.

Results: Around 72% ($134 billion) of recurrent expenditure in 2018-19 could be attributed to specific disease groups. Of all disease groups, cancers and other neoplasms was the most expensive at around $10,000 per case. Schizophrenia was the most expensive mental health and substance use disorder with spending around $22,000 per case. Over 100 burden of disease conditions had some health system cost attributable to risk factors in 2018-19. Spending on conditions due to obesity was the highest of all risk factors at $4.3 billion, representing 18% of health spending due to risk factors, with much of this relating to osteoarthritis ($1.1 billion), type 2 diabetes ($568 million) and chronic kidney disease ($564 million). This differs from burden estimates, where tobacco use was the highest ranked risk factor.

Conclusion: Quantifying the impact of risk factors and the cost per case of disease allows us to assist evidence-based decisions about where to direct efforts to prevent disease and injury and to improve population health. As the magnitude of costs associated with conditions can be quite different to the burden, this additional context provides valuable additional information about the impact to the health system due to health status and potentially avoidable health risks.

Cape Town International Convention Centre | CTICC 1 – Room 2.46
Competition and Financial Incentives

MODERATOR: **Luigi Siciliani**, University of York

The Feasibility of Managed Competition for Hospital Services in the United States

PRESENTER: **Kevin Griffith**, Vanderbilt University
AUTHOR: Monica Aswani

Importance: Policies to promote competition are often touted as mechanisms to address rising concerns about consolidation in healthcare markets. However, it is unclear whether sufficient competition for hospital services in feasible in many United States due to demographic limitations.

Objective: To determine if healthcare markets have sufficient populations to support a minimum level of competition for primary/specialty care services, community hospitals, and tertiary referral hospitals, with a secondary objective to investigate whether population sufficiency for competition predicts observed market concentration.

Design: Population estimates for 2020 were obtained from the U.S. Census Bureau, and patient flows to individual hospitals were identified using the Centers for Medicare & Medicaid Services' Hospital Service Area and Hospital General Information Files. These estimates were mapped to geographic markets for hospital care from the Dartmouth Health Atlas, which is based on historical patterns of Medicare hospitalizations. These include hospital service areas (HSAs, for physician organizations and community hospitals) and hospital referral regions (HRRs, for tertiary referral hospitals). Previously published estimates of the population thresholds required to support a minimum of three competing organizations were used to identify spatial challenges in the market provision of health care.

Setting: United States.

Participants: All U.S. residents and Medicare-certified hospitals.

Exposure: Population sufficiency, as defined by the minimum population threshold based on prior research, to support competition across different types of healthcare organizations: 1) 180,000 for 3 or more physician organizations with shared inpatient services, 2) 360,000 for 3 or more general hospitals, and 3) 1.2 million for 3 or more tertiary referral hospitals.

Main Outcomes and Measures: We identified whether HSAs and HRRs met the population sufficiency requirements for adequate competition, the proportion of U.S. residents in these areas, and Herfindahl-Hirschman Indices (a measure of market concentration) based on the proportion of Medicare inpatient discharges attributable to each hospital.

Results: In 2020, roughly 39.3% and 60.6% of the U.S. population resided in HSAs that were too sparsely populated to support at least three physician organizations or general hospitals, respectively. Approximately 35.6% of the U.S. population resided in HRRs with insufficient populations to support three or more tertiary referral hospitals. Population sufficiency was also strongly correlated with observed market structure; less populated markets were characterized by greater market concentration. For instance, HSAs with <180,000 residents had a mean HHI of 9,777 while HSAs with >360,000 residents had a mean HHI of 4,069.

Conclusions and Relevance: Policies and efforts to promote competition for hospital services may only be feasible for medium or large-sized urban centers. Hospital markets in much of the country, particularly in the Midwest and Great Plains, may lack the population densities necessary to support adequate hospital competition.

The Effect of Introducing Competition Mechanism in the Context of Contracted Family Doctor Services on Physicians' Behaviors: Experimental Study

PRESENTER: **Xinyan Li**, school of Public Health, Capital Medical University, Beijing, China
AUTHOR: Youli Han

Background: In the last two decades many countries have introduced competitive reforms, especially in the delivery of health care, promoting the patient choice of provider. China is now implementing the free choice of patients to contract with a family doctor and introducing competition mechanism. Despite these pro-competitive trends, the policy debate on competition in health care is still ongoing. There is still lack of rigorous empirical evidence on causal effects of exposing health care providers to competition, and the existing evidence on impact of competition is generally mixed.

Objective: Exploring the impact of the "dual mechanism" of payment system and competition on physicians' medical service and altruism, providing experimental economic evidence for the improvement of the family doctor contract system in China.

Methods: Based on the context of contracted services, we designed a controlled laboratory experiment on Fee-for-Service (FFS) versus Capitation (CAP), distinguishing between non-competitive and competitive scenarios, treating patients with different severities.

The parameters of physicians' profit and patients' benefit were kept consistent across both scenarios (NC/C) for the same payment system. Four experimental conditions (NC-NC/C-C/NC-C/C-NC) was formed by crossover design of experimental scenarios in each payment system, which was divided into two parts, with a total of 15 rounds of experiments in each part. A total of 162 medical students were recruited and randomly assigned to eight groups. In contrast to non-competitive scenario in which doctors made independent decisions that affected their personal profits and patients' benefits, the competition scenario was designed for two doctors competing for limited four patients in their jurisdiction simultaneously, each doctor's decisions affected not only their own earnings and patients' benefits, but also the number of patients, the doctor with the higher patients' benefit rating received more patients.

The impact on medical treatment and patients' benefit was analyzed by nonparametric tests and random effects model. Fisher's Permutation test was used to explore the differences in the impact of competition mechanism to different payment systems. Furthermore, physicians' altruism was quantified by random utility model, sobel test and bootstrap test was used to analyze the mediating effect of altruism.

Results: Introducing competition mechanism can reduce under-provision under CAP and overprovision under FFS respectively. For patients in poor (good) health condition, the competition mechanism changed doctors' behavior more apparently under CAP (FFS). The comparison of the intergroup coefficients for the competition mechanism showed that, compared with "FFS + competition", the loss of patients' health benefit was less under "CAP + competition" mechanism. Compared with non-competition to competition scenario, the deviation from patient optimal treatment increased in the competition to no-competition scenario. Compared with the altruism in non-competitive scenario, the altruism in competitive increased significantly. The altruism played a significant mediating role in the relationship between competition mechanism and patient benefit.

Conclusions: The quality of family doctors' medical service is improved by introducing competition mechanism, and the dual mechanism design of CAP combined with competition is more advantageous. Altruism can promote the effectiveness of competition mechanism to enhance the treatment quality.

Can Financial Incentives Shift Health Care from an Inpatient to an Outpatient Setting?

PRESENTER: **Luigi Siciliani**, University of York
AUTHOR: Katja Grasic

Motivation

Driven by the rapid growth of healthcare spending, policymakers across OECD countries are under renewed pressure to develop policies that contain costs while preserving quality of care. One policy lever to induce healthcare providers to reduce costs and increase efficiency is the use of financial incentives.

For hospital care, which accounts for about half of health spending, one area that has been targeted to reduce costs is the substitution of the more expensive inpatient care with the less expensive outpatient (ambulatory) care.

Aim

We study the effects of a financial incentive scheme that encourages the shift from a high-cost to a low-cost setting. We examine the effect of the Best Practice Tariff (BPT) for outpatient activity that rewards providers for treating patients in an office-based outpatient setting, rather than a theatre-based inpatient setting. The scheme, introduced across English hospitals in 2012, focuses on three treatments, of which two are high-volume diagnostic procedures (diagnostic cystoscopy, diagnostic hyteroscopy) and the third is a form of sterilisation for women (hysteroscopic sterilisation). The scheme operates by increasing the price paid for the office-based outpatient procedure and, in the case of two diagnostic procedures, by also lowering the price paid for the procedures performed in the inpatient setting.

Methods

We employ difference-in-difference analysis in which we compare the changes in the proportion of patients treated in an outpatient setting for the incentivised conditions relative to the selected control conditions. For cystoscopy and hysteroscopy we further study effects of the BPT on patient benefit, measured by the probability of having the same procedure repeated within 60/90 days, and volume.

Data

We employ data from the Hospital Episode Statistics, which collects information on inpatient and outpatient care. Our study period is from April 2009 to March 2016, with the pre-policy period running from April 2009 to March 2012. Our sample across the three BPTs and the corresponding control groups consists of 5,973,539 observations.

Results

Our results show that a targeted incentive scheme can result in a swift and substantial change in the choice of the treatment setting. We find a positive and significant effect of the policy on the probability to have the procedure performed in the outpatient setting for all three incentivised conditions, with the largest effect observed for cystoscopy and hysteroscopy (35.0 percentage points (pp) and 9.0-16.4 pp, respectively). The observed effect is smaller for sterilisation (3.7 pp). We do not observe a significant effect of the BPT policy on total volume of the incentivised procedures nor on quality of care, as measured by the probability of having the same procedure repeated within 60/90 days. We further show

that the policy had a positive and significant (spillover) effect on shifting the setting from inpatient to outpatient for closely related, but non-incentivised conditions.

Conclusion

Our study shows that a financial incentive can be successful in shifting patients from inpatient to outpatient setting, without negative consequences on some dimensions of quality. There is therefore scope for financial incentives to improve the sustainability of health system financing.

Do Conditional Financial Incentives Improve Access to Care? Evidence from a French Experiment on Specialist Physicians

PRESENTER: **Aimée Kingsada**, Université Paris Dauphine - PSL

The issue of balance billing in France has raised concerns regarding equal access to care for patients and equity. To address this issue, two programs of balance billing regulation were introduced, namely the "Contrat d'accès aux soins - CAS" (2014) and the "Option Pratique Tarifaire Maîtrisée - OPTAM" (2017).

The main objective of these programs was to improve access to care through financial incentives, which encourage physicians to charge less extra fees and increase their activity set at regulated prices. This study focuses on two groups of self-employed physicians: surgical specialists and medical specialists. Using a panel administrative dataset on all self-employed specialists, the study assessed the impact of the CAS and the OPTAM on several outcomes relative to physicians' activity and income. The "Coarsened Exact Matching" method was used to construct a control group.

My results show that the CAS did not have an impact on the activity or fees of Surgical specialists, but the OPTAM program did lead to an increase in patient visits and procedures performed, as well as an increase in fees due to a higher workload and monetary rewards. Medical specialists also saw an increase in patient visits due to both the CAS and OPTAM programs, but this was associated with a rise in overall expenditures for the National Health Insurance system.

The CAS didn't affect Surgical specialists, but OPTAM increased patient (including low-income patients) visits, procedures, and fees due to higher workload and rewards. CAS and OPTAM led to more Medical specialist visits but increased NHI expenditures.

Balance billing regulations improved patient access to care, but it's costly for NHI. The financial incentives transferred extra fees from patients to NHI. Overall, more studies are needed to fully understand the long-term impacts of these programs.

Cape Town International Convention Centre | CTICC 2 – Nerina
Point-of-Care and Innovative Testing and Treatment for Infectious Diseases in Key Populations

MODERATOR: **Virginia Wiseman**, Department of Global Health and Development, London School of Hygiene & Tropical Medicine

ORGANIZER: **Sophy Ting-Fang Shih**, Kirby Institute, UNSW Sydney

DISCUSSANT: **Fern Terris-Prestholt**, UNAIDS; **Jason Ong**, Monash University

The Cost-Effectiveness of Molecular Point of Care Testing for Chlamydia and Gonorrhoea and Trichomonas in Remote Australian Aboriginal and Torres Strait Islander Communities

PRESENTER: **Caroline Watts**, UNSW Sydney

Background: Molecular point of care (POC) tests provide rapid diagnosis at the time of consultation and offer opportunities to improve the provision of health care. Sexually transmitted infections (STIs) such as chlamydia, gonorrhoea and trichomoniasis are major contributors to adverse reproductive and maternal outcomes, such as pelvic inflammatory disease (PID), ectopic pregnancies and tubal infertility, and preterm births. In remote areas of Australia where there are delays in receipt of diagnostic results from centralised laboratories and a high prevalence of STIs, molecular POC testing is a strategy that facilitates efficiencies in uptake and timeliness of treatment. However, provision of such a service has higher costs. The purpose of this study was to evaluate the cost-effectiveness of using molecular POC testing for chlamydia, gonorrhoea and trichomoniasis for men and women in a remote health service compared to standard laboratory testing.

Methods: A Markov probabilistic model was constructed to simulate the patient clinical pathway using molecular POC tests for chlamydia, gonorrhoea and trichomoniasis for attendees of a hypothetical remote health service, compared to sending specimens to a laboratory. Time to treatment data from the TTANGO trial were used and additional data were obtained from published clinical guidelines, quality of life measures, government health service cost data, clinical experts and interviews with staff related to patient workflow and follow-up in remote health services. Outcomes were calculated from 10,000 Monte Carlo simulations, and one-way and probabilistic sensitivity analyses and reported as incremental cost per quality adjusted life year (QALY) gained from the health system perspective using a ten-year time horizon.

Results: The mean total cost per person tested/managed over 10 years was AU$5,313.50 for molecular POC testing and AU$4,818.11 for laboratory-based testing. The mean QALYs gained were 8.289 and 8.276, respectively, based on current testing uptake. The incremental cost effectiveness ratio of AU$38,398 per QALY indicates molecular POC testing is cost-effective at a willingness-to-pay threshold of AU$50 000 per QALY (the threshold for public funding of new health technologies in the Australian healthcare system), compared to laboratory testing. The net monetary benefit for molecular POC testing was AU$409,174 and for laboratory testing was AU$409,025. The main drivers of reduced costs for molecular POC testing were decreased staff time required for follow-up of patients for treatment and decreased incidence of PID and sequelae including ectopic pregnancy. On scale-up, for every additional AU$1 spent by the government on molecular POC testing for STIs, there is the potential to save AU$1.93.

Conclusions: Findings from our modelling suggest that molecular POC testing for chlamydia, gonorrhoea and trichomoniasis is likely to be cost-effective in remote communities compared to laboratory testing. Molecular POC tests can contribute to addressing inequities in reproductive health outcomes in settings with poor access to or delayed results from laboratory testing facilities.

Cost-Effectiveness of HCV Point-of-Care Testing Among Men Who Have Sex with Men in Taiwan

PRESENTER: **Joyce Huei-Jiuan Wu**, University of New South Wales

Background: There is an increasing Hepatitis C virus (HCV) epidemic among men who have sex with men (MSM) in Taiwan despite universal access and free-of-charge direct-acting antiviral (DAA) treatment for HCV in Taiwan. Current complex diagnosis pathways remain a barrier to treatment and care for HCV. Point-of-care (POC) HCV testing has shown high efficacy to improve HCV diagnosis and treatment uptake in the trial settings across multiple HCV key populations such as people who inject drugs, prisoners, and MSM. However, its cost-effectiveness in these key populations is unknown. This study aimed to estimate the cost-effectiveness of HCV POC testing on the HCV epidemic among MSM in Taiwan.

Methods: We developed a compartmental deterministic model incorporating the natural history of HCV disease progression and the care cascade among MSM in Taiwan. The model was calibrated to available data for HCV and HIV epidemiology and population demographics. We projected the impact of POC testing strategies on the HCV epidemic among MSM to the end of 2030. Further, we evaluated the cost-effectiveness of these scenarios over a 8-year implementation period using a health care perspective, a lifetime time horizon, and 3% annual discounting. We estimated the costs using an ingredients-based costing approach for POC scenarios in 2021 US Dollars (US$, converting New Taiwan Dollar using Purchasing Power Parity). Cost assessment considered the cost of antibody testing, RNA testing, pre-treatment assessment, first time treatment initiation, and the costs associated with ongoing follow-up for chronic HCV and treatment for cirrhosis, decompensated cirrhosis, hepatocellular carcinoma and liver transplant. The cost data were obtained from published literature, Taiwan National Health Insurance fee schedule and through personal communication with local experts. We calculated incremental cost-effectiveness ratios (ICERs) per HCV infection averted for three scenarios using POC HCV antibody testing, reflex RNA testing, and POC RNA testing (scaled up from 2022-2024 then remained at the level of 2024 to 2030.

Results: Under current testing and treatment levels, new HCV infections in MSM would increase from 1740 in 2022 to 2561 by 2030 and 65.2% of people living with HCV would be cured by 2030. The three POC testing strategies reduced 10.5% to 32.1% in new HCV infections between 2022 and 2030 compared to the status quo (corresponding to 5432 to 8497 infections averted). Total cost per one HCV case treated was US$26,632 in the status quo; US$24,397 in POC antibody testing scenario; US$24,339 in reflex RNA testing scenario and US$23,691 in POC RNA scenario.

Compared to the status quo, the ICERs per HCV infection averted were US$1,170 in the POC antibody testing scenario; US$3,613 in the Reflex RNA testing scenario and US$1,385 in the POC RNA scenario.

Conclusion: POC testing could potentially prevent additional HCV infections among Taiwanese MSM. All POC scenarios are cost-effective compared to the status quo. POC antibody testing scenario is likely to be the most cost-effective strategy despite its limited impact on HCV epidemic among MSM in Taiwan.

Optimizing Hepatitis C Testing Strategy in High Priority Populations: A Cost-Effectiveness Analysis

PRESENTER: **Sophy Ting-Fang Shih**, University of New South Wales

AUTHORS: Qinglu Cheng, Joanne Carson, Heather Valerio, Yumi Sheehan, Richard Gray, Evan Cunningham, Jisoo A Kwon, Andrew Lloyd, Gregory Dore, Virginia Wiseman, Jason Grebely

Background: Direct Acting Antivirals (DAAs) for hepatitis C virus (HCV) infection with 95% cure rate have potential to achieve the WHO elimination goals. However, detection of HCV and linkage to timely treatment in standard of care by conventional venous blood testing is hampered by current diagnostic pathways requiring multiple visits. Alternative effective and efficient testing strategies are needed for the community high-risk populations such as prisoners and people who inject drug (PWID). This study evaluated the cost-effectiveness of point-of-care testing strategies for hepatitis C virus (HCV) compared to laboratory-based testing (standard of care).

Methods: Cost-effectiveness analyses were undertaken from the perspective of Australian Governments as funders by modelling point-of-care testing strategies compared to standard of care in needle and syringe programs, drug treatment clinics, and prisons. Point-of-care testing strategies included immediate point-of-care HCV RNA testing and combined point-of-care HCV antibody and reflex RNA testing for HCV antibody positive people (with and without consideration of previous treatment). Sensitivity analyses were performed to investigate the cost per treatment initiation with different testing strategies at different HCV antibody prevalence levels.

Results: The average costs per HCV treatment initiation by point-of-care testing were up to 35% lower (A\$890–A\$1,406) compared to standard of care (A\$1,248–A\$1,632) depending on settings. The average costs of point-of-care testing were A\$1,080–A\$1,406 for RNA, A\$960–A\$1,310 for combined antibody/RNA without treatment history consideration, and A\$890– A\$1,189 for combined antibody/RNA with treatment history consideration. When HCV antibody prevalence was <74%, combined point-of-care HCV antibody and point-of-care RNA testing (with and without consideration of treatment history) were the most cost-effective strategies. Modest increases in treatment uptake by 8%-31% were required for immediate point-of-care HCV RNA testing to achieve equivalent cost per treatment initiation compared to standard of care.

Conclusion: Point-of-care testing is more cost-effective than standard of care for populations at risk of HCV. Testing strategies combining point-of-care HCV antibody and RNA testing are likely to be cost-effective in most settings.

Cost Effectiveness of Point-of-Care Resistance-Guided Therapy of Mycoplasma Genitalium Infections in Women in Australia

PRESENTER: **Rabiah Adawiyah**, University of New South Wales

Background: Mycoplasma genitalium (MG) is a sexually transmitted infection that is often asymptomatic, with an incidence rate was 1.3 per 100 person-years in woman in Australia. MG infections in women has been associated with female cervicitis, pelvic inflammatory disease (PID), infertility and pre-term delivery. The recommended first line treatment for MG infections has been azithromycin, however, in Australia, the prevalence of macrolide resistance has significantly increased from 19% in 2010, to more than 50% in 2022. This study aims to evaluate the cost-effectiveness of using resistance guided therapy compared to standard-of-care to treat MG infections in women in Australia.

Methods: We used a dynamic transmission model of MG for women aged 15 to 45 years in Australia to evaluate the cost-effectiveness of using resistance guided therapy compared to standard-of-care from a healthcare perspective. We used clinical and outcomes data from previous published studies and modelled the incremental costs, effectiveness and number of complications related to MG over a 10-year time horizon. Costs were derived from the literature, Medicare Benefits Schedule, and Pharmaceutical Benefits Scheme and reported in Australian dollars (2022).

Results: The total cost for a cohort of 100,000 women was AU\$ 9,141,813 for resistance guided therapy compared to AU\$ 10,041,215 for standard-of-care. The number of complications was higher for standard-of-care with cumulative events over a 10-year time horizon of 1623 compared to 1576 for resistance guided therapy. In this model, resistance guided therapy was the dominant strategy: AU\$ 899,403 less costly and gained 1146 more QALYs than the standard-of-care.

Conclusion: From a health care perspective, managing MG-infections with resistance guided therapy for women aged 15 – 45 years old is cost-saving compared to standard-of-care, especially with rising macrolide resistance globally. With the development of point-of-care assays for MG with resistance profile outputs, combined point-of-care testing for chlamydia, gonorrhea, and MG has the potential to shift the existing syndromic management to resistance-guided etiologic management.

10:00 AM –10:30 AM   MONDAY   [Cross-Cutting Themes And Other Issues]

Cape Town International Convention Centre | CTICC 1 – Jasminum conservatory
POSTERS: Field 9. Cross-Cutting Themes and Other Issues

9.1 Microsimulation Models on Mental Health: A Critical Review of the Literature

PRESENTER: **Claire de Oliveira**, Centre for Addiction and Mental Health
AUTHORS: Maria Ana Matias, Rowena Jacobs

Background: In a time of limited health care resources, it is crucial to make informed decisions around resource allocation. Microsimulation models are computer-based models that can be used to simulate the behaviour of micro-entities such as individuals and are commonly employed to estimate the potential behavioural and economic effects of interventions and/or health policies, and to help guide decision-making. Furthermore, microsimulation models can be used to examine scenarios, which cannot be tested in the context of a trial. However, it is not clear how many microsimulation models have been developed specifically for mental health, how these have been developed and the quality of these models.

Aims of the study: The objectives of this critical review were to retrieve and synthesise the literature on existing microsimulation models focused on mental health or microsimulation models used to examine mental health and to critically appraise them.

Methods: A critical review was undertaken to identify papers on microsimulation models (only) applied to mental health, following the Preferred Reporting Items for Systematic Reviews and Meta-Analyses Statement. All studies on microsimulation and mental health published in English in MEDLINE, Embase, PsycINFO, and EconLit between January 1, 2010, and September 30, 2022, were considered. Snowballing, Google searches and searches on specific journal websites were also undertaken. Data extraction was done on all relevant studies retrieved and the reporting and methodological quality of each microsimulation model was assessed using the 2014 International Society for

Pharmacoeconomics and Outcomes Research and the 2016 Assessment of the Validation Status of Health-Economic Decision Models checklists, respectively. A narrative synthesis approach was used to synthesise the evidence.

Results: Among 230 potential hits, only 19 studies were found to be relevant. Some studies were solely focused on mental health and included models that were developed to examine the impact of specific policies and/or interventions on specific mental disorders (e.g., to understand the impact of social media on PTSD or to examine the impact of smoking cessation initiatives among individuals with severe mental illness). Other studies covered existing economic-demographic models, which included a component on mental health, such as the Care&WorkMOD, the Health&WealthMOD, the Health&WealthMOD2030, and the Future Americans Model, and used to answer mental health-related research questions. Most models examined were of medium to high quality in terms of reporting and methodological quality.

Discussion: This review found few microsimulation models on mental health. In particular, there were very few models that were developed to solely examine mental health or the interaction between mental and physical health; most were generic economic-demographic models, which included a component on mental health. Microsimulation models developed specifically for people with mental health problems are important to guide future health care delivery and service planning. The findings from this review will be relevant for researchers and decision makers looking to build mental health-specific microsimulation models to inform policy. Future research should focus on developing mental health-specific microsimulation models with wide applicability and multiple functionalities.

10:00 AM –10:30 AM   MONDAY   [Social Events]

Cape Town International Convention Centre | CTICC 1 – Clivia, Jasminum & Strelitzia conservatories
Refreshment Break and Poster Viewing

10:00 AM –10:30 AM   MONDAY   [Economic Evaluation Of Health And Care Interventions]

Cape Town International Convention Centre | CTICC 1 – Jasminum conservatory
POSTERS: Field 7. Economic Evaluation of Health and Care Interventions

7.1 A Cost Effectiveness Analysis of Maternal Multiple Micronutrient Supplementation in South Africa
PRESENTER: **Winfrida Tombe-Mdewa**, SAMRC Centre for Health Economics and Decision Science - PRICELESS SA
AUTHORS: Heather Fraser, Ciaran Kohli-Lynch, Ijeoma Edoka
Background

South African pregnant women are particularly vulnerable to micronutrient deficiencies as they experience higher levels of poverty and food insecurity. Compared to other women of reproductive age, they are 45.6 % less likely to have an income and 25% of them live in a household that suffers from food inadequacy. Recent evidence has demonstrated that multiple micronutrient supplementation in pregnancy has greater benefits than iron and folate supplementation with recommendations being made to the South African government to consider switching from the current iron and folate regimen to multiple micronutrients.

Objective

The objective of the study was to evaluate the cost-effectiveness of replacing iron and folate supplementation with multiple micronutrient supplementation in antenatal care in the South African public health care system.

Methods

A cost-utility analysis was conducted using a decision analytical model from a public healthcare payers perspective. The target population for the analysis was pregnant women attending antenatal clinics in the public health sector. Health outcomes considered in the analysis were obtained from a systematic review and include low birth weight, small for gestational age, still births and diarrhoea in children under 1 year. Direct medical costs considered in the analysis were incurred in one year and benefits accrued over a person's lifetime. Resource utilisation, cost estimates, length of hospitalisation, probabilities of health outcomes, and measures of effectiveness were sourced from literature. Costs were expressed in South African rand and effectiveness was measured in DALYs. One way and probabilistic sensitivity analysis were conducted to explore key model assumptions and parameters.

Results

Multiple micronutrient supplementation was the dominant strategy being more effective and less costly than iron and folate supplementation. Sensitivity analysis showed that base-case results were robust to variations of key model parameters.

Conclusion

Switching to multiple micronutrient supplementation has a greater return on investment than current practice.

Advocacy message

As we move towards achieving universal health coverage in South Africa, the government needs to invest in interventions that are cost-effective to maximise health with the limited resources available.

Keywords: Multiple-micronutrient supplementation, Cost-effectiveness analysis

7.2 Epidemiological Impact and Cost-Effectiveness Analysis of COVID-19 Vaccination in Kenya

PRESENTER: **Stacey Orangi**, Kemri-Wellcome Trust Research Programme

AUTHORS: John Ojal, Samuel P.C Brand, Cameline Orlendo, Angela Kairu, Rabia Aziza, Morris Ogero, Ambrose Agweyu, George Warimwe, Sophie Uyoga, Edward Otieno, Lynette I Ochola-Oyier, Charles N Agoti, Kadondi Kasera, Patrick Amoth, Mercy Mwangangi, Rashid Aman, Wangari Ng'ang'a, Ifedayo MO Adetifa, J Anthony G Scott, Phillip Bejon, Matt J Keeling, Stefan Flasche, D James Nokes, Edwine Barasa

Background: A few studies have assessed the epidemiological impact and cost-effectiveness of COVID-19 vaccines in settings where most of the population had been exposed to SARS-CoV-2 infection.

Methods: We conducted a cost-effectiveness analysis of COVID-19 vaccine in Kenya from a societal perspective over a 1.5-year time frame. An age-structured transmission model assumed at least 80% of the population to have prior natural immunity when an immune escape variant was introduced. We examine the effect of slow (18 months) or rapid (6 months) vaccine roll-out with vaccine coverage of 30%, 50% or 70% of the adult (>18 years) population prioritizing roll-out in those over 50-years (80% uptake in all scenarios). Cost data were obtained from primary analyses. We assumed vaccine procurement at US$7 per dose and vaccine delivery costs of US$3.90-US$6.11 per dose. The cost-effective threshold was US$919.11.

Results: Slow roll-out at 30% coverage largely targets those over 50 years and resulted in 54% fewer deaths (8132(7914-8373)) than no vaccination and was cost-saving (incremental cost-effectiveness ratio, ICER=US$-1343 (US$-1345 to US$-1341) per disability-adjusted life-year, DALY averted). Increasing coverage to 50% and 70%, further reduced deaths by 12% (810 (757-872)) and 5% (282 (251-317)) but was not cost-effective, using Kenya's cost-effectiveness threshold (US$919.11). Rapid roll-out with 30% coverage averted 63% more deaths and was more cost-saving (ICER=US$-1607 (US$-1609 to US$-1604) per DALY averted) compared with slow roll-out at the same coverage level, but 50% and 70% coverage scenarios were not cost-effective.

Conclusions: With prior exposure partially protecting much of the Kenyan population, vaccination of young adults may no longer be cost-effective

7.3 Returning Additional Findings to Participants in the Genomics England 100,000 Genomes Project: Exploring Outcomes and Healthcare Utilisation

PRESENTER: **James Buchanan**, University of Oxford

AUTHORS: Joshua Nolan, Elizabeth Ormondroyd

The past decade has seen a rapid increase in the number of countries around the world undertaking large-scale genome sequencing initiatives. The most well-known of these studies are the Genomics England 100,000 Genomes Project (100KGP), the All Of Us programme (USA), and the 1 million Genomes Initiative (EU). Similar studies are underway in Australia, China and Singapore. These initiatives aim to transform understanding of genetic disease, leading to improvements in diagnostic rates and clinical management for patients with cancer or rare diseases and their families.

In England, 100,000 genomes were sequenced between 2015-2018 from 89,235 individuals with a rare disease or cancer as part of the 100KGP. Initial analyses revealed that sequencing led to a genetic diagnosis for 25% of participants. However, the potential outcomes of genome sequencing are not limited to making a diagnosis for a condition a patient is already experiencing. Several national sequencing initiatives are also returning additional findings (AFs, sometimes called Secondary Findings) to participants. These are genetic changes – separate from a family's original reason for joining a sequencing programme – that might predict risk of serious disease that may not present clinically until later life. If these changes are identified in an individual, actions can be taken to manage or mitigate these risks.

In the 100KGP, Genomics England defined specific genes associated with cancer predisposition and familial hypercholesterolemia in which AFs would be offered for return. In 2022, the process of returning these results to participants began. However, the clinical utility and cost-effectiveness of returning such results when an individual has been sequenced to look for causes of a different health condition is currently unclear.

The aim of this study was to quantify the healthcare resource use and costs accrued during the processes of confirming, reporting and disclosing AFs. Adult participants who received an AF in the Central and South Genomic Medicine Service Alliance (C&S GMSA) in England were included in this study (n=89). Linked data were available for participants, including clinical and genomic data, personal and family history and secondary care resource use (hospital episode statistics). Secondary care resource use was processed using the National Health Service (NHS) Reference Costs Grouper. NHS Reference Costs were attached to this resource use data and the total cost to the NHS of healthcare resource use during the AF disclosure period was calculated. Mean costs were also calculated for the whole cohort and by type of AF.

The mean cost of disclosure-related hospital care was £555 per recipient in the study cohort. Participants with a cancer-related AF accrued greater hospital costs than those with an FH-associated AF. The total cost of generating and disclosing AFs in the C&S GMSA was £1.4m. This represents a cost of £79 per participant in whose sample an AF panel was applied, £3,615 per participant with a putative AF, and £8,680 per disclosed AF. Future work should investigate costs and outcomes beyond the AF disclosure period.

7.4 Modelling the Cost-Effectiveness of Using the First-Line, Second Line and Third-Line Drugs As the Initial Management of Maternal Infections in Sub-Saharan Africa

PRESENTER: **Chikondi Chapuma**, University of Liverpool
AUTHORS: Wala Kamchedzera, Stephanie Wheeler, David Lissauer

Introduction: Two-thirds of the world's 300,000 maternal deaths occur yearly in Sub-Saharan Africa (SSA); infection contributes 50%. Due to limited access to diagnostic microbiology in SSA, the World-Health- Organisation's empirical treatment guidelines are used based on historical microbiological data. These guidelines have stayed the same >8 years despite rapidly evolving antimicrobial resistance (AMR). Recently, we showed that the most common causes of maternal infections in SSA are *E. coli*, *S. aureus*, and *Klebsiella* spp. We also identified that the resistance of *E. coli*, *S. aureus*, and *Klebsiella* spp to gentamicin, ciprofloxacin and ceftriaxone is between 20-40%. There are four different antibiotics which were commonly and thoroughly reported currently in the papers reported in SSA for treated of maternal infections but with little evidence of their comparative cost-effectiveness. This decision modelling and cost-effectiveness analysis aims to supplement the above results for the decision-makers by exploring the cost of different treatment guideline strategies as the initial management for maternal infections.

Method: Using Malawi as a case study and decision tree models, we determined the cost-effectiveness of using the second-line drugs (ciprofloxacillin and ceftriaxone) compared to the first-line drugs (amoxicillin and gentamicin & ampicillin) to manage maternal infection (Health system's perspective). We could not pool data on the third-line drugs due to insufficient data. We used a *urinary tract infection (UTI) scenario* as an example of an outpatient infection and *chorioamnionitis as an example* of an inpatient infection. All model inputs, included costs and health outcomes, were derived from existing literature. We performed the analysis in (R Core Team, 2022). We determined the incremental-cost-effectiveness-ratio (ICER) by comparing the cost per infection resolved between the treatment strategies.

Results: For the UTI, a complete amoxicillin dosage and ciprofloxacin were USD 0.69 and USD 0.52 per patient, respectively. 77% of the patients were treated in the amoxicillin pathway and 76% in the the ciprofloxacin pathway. The ICER for this model is 0.157 cents/ infection resolved. For the Chorioamnionitis, a complete dosage of gentamicin & ampicillin is more expensive than the ceftriaxone, at USD 9.0 and USD 2.13, respectively. More patients are treated in the first-line pathway compared to the second-line pathway at 78% and 64%, respectively. The ICER for this model is 0.673 cents/ infection resolved.

Discussion: We show that, in Malawi (with a daily minimum wage of 0.67 cents), prescribing the second line-drugs compared to the first-line drugs in the initial management of pregnant and recently pregnant women with UTI and chorioamnionitis is more cost-effective (especially for outpatient UTI). These findings should be considered with the clinical consequences for the mother, if she progresses to more severe infection and the consequences to the unborn child (if exposed to the maternal infection for a long time). For example, in UTI the most common causes, *E-coli* and *Klebsiella* spp, are inherently resistant to the first-line, amoxicillin. Therefore, other countries in SSA may apply the same methodology to assess the incremental cost-effectiveness ratio of using different treatment strategies as the initial management of maternal infections in their context.

7.5 Cost Savings in Male Circumcision Post-Operative Care Continuum in Rural and Urban South Africa: Evidence on the Importance of Initial Counselling and Daily SMS

PRESENTER: **Rachel Mukora**, The Aurum Institute, Johannesburg, South Africa
AUTHORS: Yanfang Su, Felex Ndebele, Jacqueline Pienaar, Calsile Khumalo, Xinpeng Xu, Hannock Tweya, Maria Sardini, Geoffrey Setswe, Caryl Feldacker

Introduction

Voluntary medical male circumcision (VMMC) clients are required to attend multiple post-operative follow-up visits in South Africa (SA). However, up to 98% of VMMC clients heal without adverse events (AEs). With demonstrated VMMC safety across global programs, stretched clinic staff in SA may conduct more than 400,000 unnecessary reviews for males without complications per year. Embedded into a randomized controlled trial (RCT) to test two-way texting (2wT) follow-up as compared to routine in-person visits for adult VMMC clients, the objective of this study was to compare costs of 2wT to routine post-VMMC care in rural and urban SA settings.

Methods

We used an activity-based costing (ABC) approach to estimate the costs of post-VMMC care, including counselling, follow-ups, and tracing. All costs were estimated in $US dollars. Data were collected from routine National Department of Health VMMC forms, the RCT database, and time-and-motion surveys.

Sensitivity analysis presents different routine scenarios. We hypothesized that 2wT follow-up would result in per-client cost savings at the program level.

Results

VMMC program costs were estimated from 1,084 RCT clients: 537 in routine care and 547 in 2wT. On average, 2wT follow-up saved $3.56 per client as compared to routine care. 2wT cost savings were high in rural settings (-$7.73). 2wT increased costs slightly in urban settings ($0.59). At program level, 2wT would save $2.16, $3.56, and $7.02, respectively, if all men attended one visit; men attended visits in similar proportions to those observed in the RCT; and, all men attended two visits.

Conclusion

2wT reduces post-VMMC care costs by supporting most men to heal at home and using mHealth to triage clients with potential AEs to timely, in-person care. 2wT overall savings are attributed to distinct advantages in rural areas. Scale-up of 2wT-based follow-up could significantly reduce overall VMMC costs while maintaining service quality.

7.6 A Systematic Review on Health Economic Evaluation of Colorectal Cancer Screening

PRESENTER: **Haoran Zhan**, Capital Medical University
AUTHORS: Yu Su, Yuxin Sun, Qing Xia, Xin Sun, Yu Tian, Tingting Xu

【**Abstract**】**Objective** To systematically review the evidence of health economic evaluation on colorectal cancer screening **Methods** A systematic review was performed based on a systematic search of literature published before November 1, 2021, conducted in China National Knowledge Infrastructure (CNKI), Wan-fang databases, VIP Chinese science and technology journal, PubMed, Embase, Cochrane and Web of Science. The basic information of included studies, contents of health economic evaluation on colorectal cancer screening, and their results were extracted and analyzed. **Results** In this study, 100 health economics evaluation studies on colorectal cancer screening were finally included, and the report quality of 83% of the studies was higher than 70 scores. The screening methods covered mainly include colonoscopy, flexible sigmoidoscopy, guaiacol fecal occult blood test, and fecal immunochemical test, among which fecal immunochemical test is the most cost-effective. The study found that more frequent screening and wider age coverage had better health economics effects, and the findings are consistent. Cost-effectiveness and utility analysis was the highest proportion of economic evaluation methods in colorectal cancer screening. However, the present findings lack comparability and robustness since unified norms in model settings, perspectives, cost range, and discount rates. **Conclusion** From the perspective of health economics, it is suggested to increase the frequency of colorectal cancer screening and appropriately expand the range of screening age based on compliance of the population and regional health resources. More comparable health economics evaluation studies or better synthesis/meta-analysis methods of health evaluation should be encouraged for colorectal cancer screening, and provide robust evidence for the prevention and control of colorectal cancer in China.

【**Key words**】 Colorectal cancer; Population screening; Economic evaluation; Systematic Review

7.7 Economics Pandemic Models

PRESENTER: **Allen Goodman**, Wayne State University
Economics Pandemic Models

The COVID-19 pandemic caught economists off-guard in measuring its severity and its costs, and evaluating potential methods for fighting it. Traditional models did not characterize the massive dislocations brought about by the novel coronavirus as it moved around the world.

This work compares and contrasts the traditional "epidemic as a tax" model with two newer ones. The first recognizes contagious viruses as economic models of pollution, with means of fighting the pandemics related to familiar ways of addressing pollution. The second new model characterizes the epidemic as a war, only without the spoils of war.

Standard economic epidemiology (Philipson, 1995) characterizes an epidemic as a tax. People spend money, time, and effort in reducing the risk faced from the disease. Treating the disease like a tax implies that efforts at illness avoidance are costs. Activities undertaken to avoid taxes are treated as welfare losses, so illness avoidance costs should be treated likewise.

With the pandemic onset, the "epidemic as a tax" model was partial equilibrium characterization of a general equilibrium problem. While intellectually elegant, it did not address the issues of the profound externalities generated by the infectiousness of the virus.

Epidemics constitute economic externalities, where collective actions of a large enough number of people influence others outside the market system. With contagious diseases, sneezing people produce germs, and those germs can infect others. The epidemic or pandemic occurs due to collective action or inaction. Externality models provide valuable input into the theory and the policy implications of epidemics.

Notably, even if society attains an economic optimum, with marginal social cost equaling marginal private benefit, some pollution or contagion may remain. We have not yet eradicated polio, tuberculosis still kills thousands annually, and there is still no cure for the common cold.

Pandemics are bigger than epidemics, and they are not self-limiting. The COVID-19 pandemic provided a seismic shock to the world economy. The tax model applies to individual behaviors, but the totality of the COVID-19 pandemic shock arguably affected most of the larger countries and advanced economies far more. Consider the attributes of a nation's wartime footing, affecting all residents:

1. Wide-ranging nature of the disease;

2. Mandated service in the health care sector as well as the presence of "essential workers";

3. Nationwide restrictions on freedom to engage in commerce or travel;

4. Mandated regulations on prevention and treatment activities;

5. Supply chain breakdowns;

6. Loss of productive capacity.

The large temporary fall in employment (and commensurate GDP decrease), the much longer-lasting uprooting of the educational system, and the extraordinary costs of caring for the ill, all constituted major shocks to the society, and substantial indirect costs.

This work elaborates on the models and provides estimates of the economic impacts. It also addresses the issue as to whether certain policies went "too far" in addressing the impacts of the (yet ongoing) pandemic.

Philipson, Tomas, "The Welfare Loss of Disease and the Theory of Taxation," *Journal of Health Economics* 14 (1995): 387-395

7.8 Cost Analysis of Proactive and Passive Community Case Management Modalities: Results from a Cluster Randomized Control Trial in Rural Mali.

PRESENTER: **David C Boettiger**, The University of New South Wales

AUTHORS: Tracy Kuo Lin, Saibou Doumbia, Coumba Traore, Kassoum Kayentao, Caroline Whidden, Amadou Cissé, Emily Treleaven, Greg LeClaire, Jenny Liu, Ari Johnson, Sergio Bautista-Arredondo

Evaluations of national scale community health programs have produced mixed results, highlighting the importance of delivery design. This study examines the cost of Proactive Community Case Management, a package of interventions designed to improve early access to care that includes user fees removal, professional community health workers, and expanded primary care clinics. In the context of a randomized control trial in rural Mali, two modalities of ProCCM – one in which CHWs conducted proactive case detection home visits, versus a passive, site-based workflow – were provided.

We calculated the total costs of ProCCM modalities during the trial period – from health system and household perspectives. For the health system perspective, the costs included personnel, supplies, equipment and buildings, medicines, and other recurrent costs. We conducted a time motion study to identify the human resources costs, including the costs for administrative staff, supervisors, community health workers, and clinic providers. For the societal perspective, we additionally collected healthcare-related out-of-pocket expenditures from a household survey. We compared the impact of the interventions on health system and household costs, using the Kruskal-Wallis H test.

Preliminary results suggests that the total health system cost is approximately $1,037,000 for the proactive modality and $962,000 USD for the passive modality – with estimated mean cost per household (paid by the health system) covered being approximately $215 for the proactive modality and $204 for the passive modality. The total OPP for participants in the proactive modality is $0.58 per household and for the passive modality is $0.41 per household. ProCCM modalities have no impact of clinic human resource cost. CHWs in the proactive modality worked an average of 2.1 hours less per week than CHWs in the passive modality (22.4h versus 24.5h) when waiting time is included. However, CHWs in the proactive modality spent substantially less time waiting (6.5 hours per week versus 17.5 hours), more time travelling (6.1 hours versus 1.4 hours) and more time caring for patients (5.0 hours versus 3.3 hours).

This study found that proactive case detection modality resulted in higher administrative and supplies cost as well as higher medication costs, as compared to the modality with a passive workflow. There is no significant difference in OPP between modality type, but during the intervention period both ProCCM modalities are associated with reduced amount of healthcare-related household OPP and clinic medication cost, as compared to the baseline period. Proactive CHWs spent more time caring for patients. The findings suggest that the removal of user fees, paid CHWs, and redesigned clinics together have the potential of reducing healthcare-related financial burden for households being cared for by CHWs.

7.9 Return-on-Investment for National Immunization Program Vaccines in Ecuador for Children Under One: A Sub-National Extension of the DOVE Model

PRESENTER: **Ruth Jimbo-Sotomayor**, Centro de Investigación para la Salud en América Latina (CISeAL). Pontificia Universidad Católica del Ecuador.

AUTHORS: Salin Sriudomporn, Xavier Sánchez, Luciana Armijos, Joshua Mak, Bryan Patenaude

Background:

As Ecuador's national government works towards establishing a new vision and strategy for its national immunization program (NIP), estimating the economic returns on NIP investments is critical to help decision makers plan, mobilize, and allocate resources to realize the full benefits of immunization. As part of the Decade of Vaccine Economics (DOVE) project, we assessed the return-on-investment (ROI) of 10-valent pneumococcal conjugate vaccine (PCV10) in Ecuador. Using a cost-of-illness (COI) approach, we estimated that every United States dollar (USD) invested in 2021-2030 in PCV10 vaccination would yield on average an return of $0.37 USD. Ecuador's government has utilized these results to justify continued investment in PCV10 vaccine. The present study aims to expand the scope of ROI analysis to include all vaccines in Ecuador's NIP targeting children under 1 year of age from 2021-2030.

Methods:

Our scope includes 8 vaccines: Bacille Calmette-Guérin (BCG,) Hepatitis B, Rotavirus, Inactivated poliovirus (IPV), Oral poliovirus (OPV), Pentavalent, Pneumococcal conjugate (PCV), and Influenza. We will obtain the vaccine-specific economic benefits and costing data via both literature reviews and key informant interviews. Data quality checks will be conducted to identify vaccines that suffer from the greatest degree of missing data. We will examine the impact of missing data along with the uncertainty in the country's vaccine-specific estimates for both economic benefits and programmatic costs of the NIP. A data hierarchy will be established to prioritize data sources for model inputs to minimize uncertainty. To fill data gaps, we will use publicly available data from comparable settings. The COI approach adopted takes a societal perspective and combines treatment costs averted from averted infections with a human capital approach to estimating the value of lost caregiver wages due to illness and lifelong economic impact due to premature mortality or extended morbidity of the chilld. The ROI for all NIP vaccines for children under 1 year of age will be calculated by taking the net economic benefits, defined as the difference between the cost-of-illness averted and the immunization costs incurred, and dividing the difference by the total immunization program costs incurred. This model will also be expanded to allow for the calculation of sub-national ROIs for four regions within Ecuador.

Results:

There exists a small degree of missing data based upon the data extracted from Ecuador's governmental data for vaccine-specific treatment costs, at the regional level. The imputed data and national-level average estimates account the most for uncertainty in the data in both costs and benefits. Benefits and costs calculations for the ROI expansion study will be generated upon further data extraction and receipt in Q1 of 2023.

Conclusions:

Expanding the country specific ROI model to all vaccines in the NIP will help inform country policy makers on the economic impacts of pediatric vaccination and aid vaccine decision-making to mobilize resources for sustained routine immunization systems.

7.10 Examining the Value of Investment for the Implementation of Self-Management Programmes for People Living with a Brain Tumour.

PRESENTER: **Kristian Paul Mallon**, Atlantic Technological University, Sligo
AUTHORS: Richéal M Burns, Matthew Skerritt, Ben Rimmer, Linda Sharp

Introduction

There is a growing range of evidence for the benefits of self-management programmes for patients. These programmes can improve patient literacy, enable more access routes to support, assist with articulating needs, reduce health-related resource utilisation, improve stress levels, promote confidence, and boost health-related quality of life (HRQoL). The costs of delivering and monitoring self-management programmes are minimal and can be delivered in-person, online, via software applications or a hybrid approach. In chronic diseases like asthma and chronic obstructive pulmonary disease (COPD), evidence suggests self-management programmes providing education and ongoing support are cost-effective and can potentially be cost-saving over time, resulting in significant increases in HRQoL. However, the implementation of self-management programmes to assist cancer survivors have a limited evidence base with uncertainty around the clinical, HRQoL and cost-effectiveness impacts. The Ways Ahead Study seeks to employ a co-design approach to develop a prototype self-management programme to meet the needs of people living with a low-grade glioma (LGG). The purpose of this analysis is to examine if a self-management programme for patients with an LGG can improve outcomes and reduce healthcare resource utilisation.

Methods

A series of systematic literature reviews were undertaken, assessing the extent of the evidence base on self-management programmes and associated outcomes in cancer survivors, specifically focusing on LGG patients. Qualitative interviews were conducted with LGG patients, their informal carers, and healthcare professionals (Phase 1 of the study) which provided further understanding of the variation of disease-related, economic, and psycho-social impacts of LGG patients and their informal carers. Epidemiological, resource use and HRQoL data associated with brain tumour patients were identified across the literature. Finally, the co-design workshops in Phase 2 of the study, provided the working prototype of the self-management programme. The combined pooled evidence was used to generate a value of investment framework which employed a cost-consequence analysis. Disaggregated benefits and costs across the care pathway associated with the implementation of a self-management programme for LIGG patients' post-treatment were compared with the standard of care. A series of scenario analyses with varying impacts were incorporated into the economic value assessment.

Results

The proposed self-management intervention incorporates online features to assist with the clinical and non-clinical needs identified. LGG patients require interaction with healthcare professionals' post-diagnosis across several specialists. Clinical symptoms vary with the uncertainty around survival having a huge psychological burden on both patients and informal carers. Assistance with managing reprioritising home life and returning to employment was highlighted by patients as an unmet need and these themes were included in the self-management programme.

Conclusion

The implementation of self-management programmes into routine care for patients with LGG has the potential to improve disease management, HRQoL and reduce the psycho-social impact of the disease burden on both patients and their informal carers. Depending on the extent of the improvements and the configuration of the self-management programme delivery strategy, there is also the potential for cost-shifting which can result in a reduction of the overall cost of delivering care to this patient group.

7.11 'Get Three for the Price of One': Evaluating the Cost-Effectiveness of Multi-Outcome Interventions

PRESENTER: **William Edward Rudgard**, University of Oxford
AUTHORS: Hernando Grueso, Chris Desmond, Lucie Cluver, Sopuruchukwu Obiesie

There is an inconclusive debate in the health economics literature on economic-evaluation methods for interventions with multiple outcomes across sectors such as health, education, and child protection. Some of the available evaluations focus on outcomes within a single sector at a time, which is likely to underestimate the cost-effectiveness of these interventions. Other evaluations rely on cost-utility analyses, which require deciding on weighting structures that are difficult to agree on. In this paper, we propose a new method to conduct cost-effectiveness analysis (CEA) with multiple outcomes. This method calculates individual cost-effectiveness ratios and discounts them according to changes across multiple outcomes. It also gives policymakers the freedom to choose which key outcomes to include in their economic evaluation and to rank them according to their policy priorities. We include two case studies to show the potential of this methodology. The first one is a parenting programme from South Africa where we show that once we adjust for having multiple outcomes, the cost-effectiveness ratio of decreasing by 10% the levels of *physical and emotional abuse* among children goes from USD 59.1 to USD 4.7. This boost in cost-effectiveness accounts for improvements in other outcomes such as *alcohol and substance abuse*, *depression*, and *family financial management*. The second case is a cash transfers programme from Uganda, where we show that once we adjust for having multiple outcomes, the cost-effectiveness ratio of increasing by 10% *HIV knowledge* goes from USD 226.1 to USD 23.6. This enhance in cost-effectiveness takes into consideration improvements in other outcomes such as *depression* and *school attendance*. Our proposed methodology brings new possibilities to understand the cost-effectiveness of multi-outcome interventions. It also has the potential to inform cross-sectoral planning in times of reduced resources such as the post-COVID19 era or global recessions.

7.12 Return on Investment for RTS,S Vaccination in Sub-Saharan African GAVI Countries

PRESENTER: **Joshua Mak**, Johns Hopkins University
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Background:

Recent recommendation of the RTS,S vaccine has equipped the global public health community with a valuable tool for malaria prevention. We conduct a return-on-investment (ROI) analysis of the introduction and continuation of the four-dose RTS,S vaccine in the routine immunization systems of 49 Gavi-supported countries in sub-Saharan Africa from 2021-2030.

Methods:

The ROI model consists of two sub-models, which calculate the economic benefits and programmatic costs of routine RTS,S introduction and continuation within Gavi-supported countries in sub-Saharan Africa. Benefits are estimated using a cost-of-illness (COI) approach with malaria case and death data provided by Swiss Tropical and Public Health Institute (STPH) and Imperial College London (ICL). Costs are calculated from Gavi vaccine and vaccination material prices, Gavi dose demand forecasting data, and delivery costs per dose estimated by PATH and the Johns Hopkins University Decade of Vaccine Economics (DoVE) project. Cost-of-illness averted is assessed following the methodology laid out in computing the ROI for other Gavi-supported vaccines conducted under the DoVE project. Four vaccine dose cost scenarios are considered: a base case of 7 USD per dose, a minimum price of 2 USD per dose, a median price of 5 USD per dose, and a maximum price of 10 USD per dose. Additionally, we consider the inclusion of a fifth seasonal RTS,S dose delivered via supplementary immunization activities for the 10 sub-Saharan African countries that experience high seasonal malaria transmission.

Results:

Using STPH impact estimates, RTS,S programs can avert 4.04 billion (3.92–4.18 billion) USD in COI under the STPH scenario whereas that of the ICL scenario is 9.41 billion (9.14–9.69) USD. Among uncomplicated malaria costs, 84.5% (STPH) and 83.7% (ICL) are owed to productivity loss due to disability. For severe malaria, 90.8% (STPH) and 83.7% (ICL) of costs are attributed to productivity loss due to death.

The base case vaccine price using STPH impact data yields an ROI of 0.42 (0.28–0.53) for 2021-2030. Under the minimum price scenario, the ROI increases to 2.36 (1.76–3.05) while the ROI decreases to 0.05 (-0.03–0.12) for a maximum vaccine price of 10 USD. The base case ROI from the ICL impact model is estimated to be 2.30 (2.00–2.57) for 2021-2030. For, the minimum vaccine price of 2 USD, the ROI increases to 6.83 (5.39 – 8.46) while the ROI decreases to 1.45 (1.28–1.60) for a maximum vaccine price of 10 USD. When incorporating the seasonal 5th dose, the base case ROI increases by 142.9% to 1.02 (0.85–1.18) for the STPH model and by 24.5% to 2.84 (2.50–3.14) for the ICL model.

Conclusion:

Our results suggest that integration of RTS,S vaccines into the immunization systems of sub-Saharan African Gavi-supported countries yield substantial ROIs, assuming mid- and low- vaccination price per dose estimates. Despite higher costs, ROIs are higher when including a seasonal 5th dose in high seasonal transmission settings when compared to a 4-dose schedule. Estimates from this study can inform policymakers to develop effective strategies for resource mobilization to ensure sustainable immunization programs.

7.13 Diagnosing Tuberculosis: Evidence on Cost of Diagnostic Tests from Low-and-Middle-Income Countries (LMICs)

PRESENTER: **Maninder Pal Singh**, London School of Hygiene & Tropical Medicine
AUTHORS: Pitchaya Indravudh, Francesca Basille, Theodore Cohen, Nicolas Menzies, Anna Vassall, Sedona Sweeney

A Scoping Review on the Cost of Tuberculosis Diagnostics in Low and Middle-income Countries (LMICs)

Introduction

Timely and accurate diagnosis of tuberculosis (TB) has a profound impact on the patient as well as the health system. Cost information provides empirical evidence for policymakers and researchers to design the most appropriate and effective strategy for TB diagnosis. This scoping review was undertaken to assess the availability of published literature on the cost of TB diagnostics in LMICs and to report the mean cost and input-wise distribution for each TB diagnostic test.

Methods

We searched PubMed for articles published from January 2011 to May 2022 with keywords related to Tuberculosis, TB diagnostic tests and cost of the diagnostics. Inclusion was restricted to diagnostics approved by the WHO for pulmonary TB.

Based on the search strategy, we found 2,728 studies for our review. Following the title and abstract review, 286 studies were shortlisted for the full-text review. Finally, 31 studies were included for data extraction. A standardized Excel sheet was used to extract cost information for each diagnostic test. If disaggregated data was available for multi-centric studies, it was extracted separately to capture wider heterogeneity.

All costs were adjusted for inflation and converted to USD for the year 2020 using a mixed approach. Input resources were classified as tradeable (including equipment and consumables) and non-tradable resources (including human resources, buildings, and operational costs). Tradeable resources were adjusted using US inflation rates, and non-tradeable resources were adjusted using a country-specific inflation rate obtained from the World Bank database for country-specific Consumer Price Index (CPI). The mean and median unit cost for each TB diagnostic technology was reported along with the 95% confidence interval (CI) and standard error (SE). The unit costs were reported in US dollars ($).

Results

Out of the initial 2728 records identified, we retained 31 studies for inclusion in the study representing 13 unique countries. Value TB provides the largest cost database for 5 countries. The most common diagnostic included in studies was GeneXpert (n=29) followed by smear microscopy (n=18). There was heterogeneity in the unit cost of diagnostics from $2.84 for bleach smear microscopy to 44.30 (SE 10.4) for DST MGIT. Similarly, the share of input resources varied based on the type of technology used. Digital chest X-ray was primarily driven by human resources (92% of total cost). Capital resources and equipment were the primary drivers of chest X-ray computer-aided (57%), while consumables were the primary driver of Gene Xpert (70%) costs. Finally, a mobile chest x-ray was primarily driven by operational costs (66%).

Conclusion

The cost of TB diagnostics is a primary requirement for budgeting, planning & implementation of TB programs, and economic evaluations in LMICs. There is heterogeneity in the unit costs of different tests and the classification of input resources. This requires future research on standardizing methodology while considering the limited capacity of LMICs and the development of cost models to predict the cost of TB diagnostics.

7.14 Effective Planning and Budgeting for Primary Healthcare Services in Eswatini: Using Evidence from Primary Health Costing Conducted at the Clinic Level

PRESENTER: **Babatunde Akomolafe**, Clinton Health Access Initiative (CHAI)
AUTHORS: Bongiwe Malinga, Nomfundo Mncina, Zanele Nxumalo
Background

The Kingdom of Eswatini has shown commitment towards achieving Universal Health Coverage, but faces challenges in reaching this goal. Eswatini suffers high burdens of disease such as Non-Communicable Diseases, Maternal, Neonatal and Child Health which needs to be addressed from the Primary Health Care (PHC) level. The Ministry of Health (MoH) has made a concerted effort in the past decades to allocate more resources to PHC, resulting in some improvements in health outcomes; however, these gains have been disrupted by the COVID-19 pandemic. There has been limited data on the cost of providing PHC services in the country to systematically inform policy decisions and efficient resource allocation and planning. This study aims to address this gap by estimating the cost of providing PHC services in Eswatini. The evidence produced will be used to inform effective resource allocation and planning.

Methodology

The study applied a mixed-method approach which purposively sampled eight facilities from the 4 regions of the country: including urban and rural clinics, as well as high, medium, and low-volume facilities. Primary qualitative data was used to define service inputs needed to provide services outlined by the Essential Health Care Package and Standard Treatment Guideline (STG) at the point of care, while secondary quantitative data informed unit costs of inputs and service utilisation. The data was analysed using the Management Sciences for Health's Primary Health Care Costing, Analysis, and Planning tool. Services were classified into chronic diseases, acute one-time visits, and acute recurrent visits. The cost per service was expanded to estimate for the population using prevalence and incidence data.

Findings

The estimated total cost to provide PHC services at the PHC level to the entire Eswatini population is USD 153.6 million. An estimated USD 102 million is currently allocated to PHC indicating a gap of USD 51.6 million. Over 60% of services provided by volumes at the PHC level are preventative services (screening and testing) and these are the least costly services by unit cost, while the most expensive services provided at the PHC level are curative services. For example, it cost USD 3 to test a client for hypertension against USD 37 to manage and treat it. Drugs are the leading cost drivers in chronic illnesses, while human resources are the largest cost driver in acute illnesses with one-time (46%) and recurrent visits (38%). The most utilised service is child immunisation and growth monitoring which are preventive services.

Conclusion

The costing exercise provides additional data points to inform policy decisions on planning and budgeting for health service delivery in Eswatini. The Clinton Health Access Initiative alongside other partners such as United Nations International Children's Emergency Fund, will support the planning unit and the Regional Health Management Team to use the costing evidence to inform operational planning and budgeting at the subnational level. Evidence will also be used to develop an investment case to advocate for increased resources to PHC to strengthen the delivery of preventive services.

7.15 Costing of a Novel Sequencing Panel Diagnostic for Childhood Burkitt Lymphoma in Sub-Saharan Africa

PRESENTER: **George Mugambage Ruhago**, Muhimbili university of health and allied sciences
AUTHORS: Liz Morrell, Malale Tungu, Sarah Wordsworth
Background: Childhood lymphomas represent a high disease burden in sub-Saharan Africa, in sharp contrast to the outcomes seen in high-income countries. Partly, this relates to delayed or imprecise diagnosis, due to shortages of both surgeons and pathologists, and technical challenges with high-quality haematopathology. Sequencing circulating tumour DNA from a blood sample has potential to deliver a precise diagnosis by identifying genetic translocations, may be faster, and avoids the need for invasive biopsy. Alongside a clinical validation of a sequencing-based diagnostic for Burkitt lymphoma (AIREAL study) in Tanzania and Uganda, our work aims to cost the new diagnostic relative to current practice, and estimate the budget impact from a third party payer's perspective.

Methods: A micro-costing approach was used for both the novel diagnostic and the current pathology, as there is limited information on the cost of histopathology in sub-Saharan Africa. For current pathology, we costed the quality-enhanced 'gold standard' diagnosis defined by the AIREAL project; costs were collected for three sites in the AIREAL study, in Tanzania and Uganda. For sequencing, we costed diagnostic provision from a university laboratory in Tanzania where AIREAL has developed local sequencing capability. Diagnostic processes were mapped based on laboratory Standard Operating Procedures and expert input, with resource use and unit cost data sourced from interviews with clinicians and laboratory staff, salary scales, purchase records and invoices, and publicly available information. Data on frequencies of current diagnostic procedures were taken from the AIREAL study. Costs were collected during 2021 and 2022, in the currency of purchase, and converted to common year and currency (US$), with a discount rate of 5%. Donated equipment was costed at market price.

Results: Preliminary analysis indicates a cost of $162 per patient for 'gold standard' pathology, including: morphology assessment, the observed 2.4 immunohistochemical stains per patient on average, and review by 3 pathologists using whole-slide scanning technology to share slides between sites. Preliminary per-sample estimate for sequencing is $670 assuming 300 samples per year, with over 70% arising from consumables. The estimate is highly sensitive to throughput, and lower estimates are seen with significant scale-up, and improvements in sequencing technology. Sensitivity analyses will be presented, along with cost estimates for a combined pathology/sequencing diagnostic algorithm, and estimates of budget impact.

Conclusion: With current technology and throughput, DNA sequencing is likely to increase the cost of diagnosis compared to current pathology. However, as these are childhood cancers, every life saved through faster or more precise diagnosis represents a large number of life years, so may yet be cost effective. Costs are expected to reduce with plans for increased scale, and improved sequencing technologies. Further,

a diagnostic protocol based purely on a blood sample could have a dramatic effect on access to diagnostics, with potential to save lives of patients who currently die before being seen by a cancer centre; the gain of life years for these patients could further improve cost effectiveness.

7.16 Assessing Self-Reported Financial Hardship Among Breast Cancer Patients: Role of Increased Consumption Expenditure, Decreased Income and Accumulated Debt

PRESENTER: **Soumendu Sen**, International Institute for Population Sciences
AUTHOR: Sanjay K Mohanty

Aim

Breast cancer accounts for one-seventh of the two million cancer cases in India and is an emerging public health concern. Treatment facilities for breast cancer are limited in the country and are mostly metro-city-centric. The aim of this study is to examine the economic hardship of breast cancer patients seeking treatment at an urban tertiary cancer hospital in Mumbai, India.

Method

The study used primary data from 500 breast cancer patients seeking treatment at the country's largest cancer treatment facility, Tata Memorial Hospital (TMH), Mumbai from June 2019 to July 2021. The study has obtained approval from the institutional ethics committee of the TMH and is registered on the Clinical Trial Registry of India (CTRI/2019/07/020142). The economic profile was assessed with some of the important economic variables such as household income, household consumption, loan for cancer treatment and self-reported financial condition. Descriptive statistics, bivariate and multivariate analysis were used.

Results

Of the 500 patients, three-fifths were under 50 years, with the median age being 46 years. More than half of the patients were from outside of the state and had travelled an average distance of 1,044 kilometers to get treatment. Only 9% of the patients were enrolled in any kind of health insurance scheme at the time of diagnosis. Almost one-third of patients reported a decrease in monthly household income after the cancer diagnosis, while 12% reported that they had lost their income source. The share of per capita travel cost to monthly per-capita expenditure increased from 7% to 21% in the post-diagnosis period while it was from 5% to 19% in case of accommodation cost. Almost 38% of the households with cancer patients had taken loans for treatment which was 36% of the total mean annual income. The financial condition of the households of the majority of the patients (91%) was poor or moderate. Age (Odds ratio:1.64; 95% confidence interval: 1.08-2.48), distance (Odds ratio: 2.23; 95% CI1.32-3.74), health insurance coverage (OR: 0.36, 95% CI: 0.18-0.73), and social group (Odds ratio:1.46, 95% CI: 0.95-2.26) were significant factors associated with the self-reported financial condition of the patients.

Conclusion

Long travel distances to avail treatment, low insurance coverage, and lack of sufficient treatment facilities are the major contributing factors to the economic burden of cancer patients. Hence, it is recommended to make provisioning cancer treatment in all central or state level insurance schemes for all cancer patients. It is also recommended to build affordable and accessible medical infrastructures in remote areas for the poorer sections of Indian society.

7.17 Economic Costs of Providing Maternal and Child Healthcare Services: Evidence from a Micro-Costing Study in Burkina Faso

PRESENTER: **Hoa Thi Nguyen**, Heidelberg Insitute of Global Health, Medical Faculty and University Hospital, Heideiberg University
AUTHORS: Manuela De Allegri, Aleksandra Torbica, Stephan Brenner, Joël Arthur Kiendrébéogo, Ludovic Tapsoba, Thit Thit Aye, Erdene Chuluunkhuu, Valery Ridde
Background:

Securing adequate resources for universal health coverage (UHC) has long been a major challenge in low- and middle-income countries (LMICs). Implementing effective and efficient health financing policies, especially those attempting to reform purchasing structures, requires an accurate understanding of the costs of healthcare services. Such information, however, is largely missing in most LMICs, hampering the capacity of countries to design and implement health financing reforms towards UHC. Our study targets this knowledge gap by estimating economic costs of providing childbirth care for pregnant women and out-patient care for under-five children in Burkina Faso.

Methods

We adopted a health system perspective and followed bottom-up micro-costing approach to estimate capital costs, recurrent costs and overhead costs of childbirth care services and child out-patient care visits. We estimated capital costs (e.g., building and equipment) and overheads using data from a survey of 45 health facilities across all three levels of care (32 primary health centers, CSPSs; 08 district hospitals, CMAs and 05 regional/national hospitals, CHRs/CHUs). We estimated recurrent costs (e.g., human resources, medications, tests and supplies) using individual-level data prospectively collected through structured exit-interviews with birth attendants and direct observations of the child out-patient care visits. Unit costs were obtained from government official documents and price lists of surveyed health facilities. We estimated average costs of childbirth care services disaggregated by three types of delivery (uncomplicated, complicated and C-section) and average cost of a child out-patient care visit for each level of care.

Results:

Individual-level resource consumption data were collected for 465 deliveries (222 uncomplicated, 175 complicated and 68 C-section) and 1.152 child out-patient visits from the aforementioned 45 facilities between March and May in 2018. The estimated recurrent costs per uncomplicated and complicated delivery were 4,459 FCFA and 11,468 FCFA (Central African franc, 1 USD = 603 FCFA) respectively at CSPSs. These corresponding estimates were 1.5 and 1.6 times higher at CMAs and 3.6 and 2.1 times higher at CHRs/CHUs. The average recurrent cost of a C-section delivery was 66,567 FCFA at CMAs and 88,720 FCFA at CHRs/CHU. The average cost of a child out-patient care visit was 2,013 FCFA at CSPSs, with recurrent costs accounting for a major share (70%), capital costs and overheads making up smaller shares (22% and 8% respectively). This estimate was much higher at CMAs (10,656 FCFA) and at CHRs/CHUs (10,815 FCFA) with recurrent costs accounting for a much smaller share (48% at CMAs and 39% at CHRs/CHUs). Recurrent costs are the main cost drivers at CSPSs, while capital costs and overheads drive costs at higher level facilities.

Conclusions

Our study informs the on-going health financing reforms towards UHC by providing accurate cost estimates for childbirth care and child out-patient care services at all three levels of care in Burkina Faso. Budgeting for health financing interventions targeting maternal and child care should consider all costs including capital costs, recurrent costs and overheads. Furthermore, the unbalanced cost structure at higher level facilities suggests the potential to enhance efficiency through improved allocation of capital resources by service volume.

7.18 It Isn't Just a Little Rash! An Evaluation of Policy Options to Improve Uptake of the Second Measles Vaccine Dose in Southern Province of Zambia

PRESENTER: **Phallon Mwaba**, Ministry of Health

AUTHORS: Kutha Banda, John Kachimba, Linda Libingi, Lawrence Mwenge, Nonde Sinyangwe, Sandra Sakala, Rabson Zimba, Olatubosun Akinnola Akinola

Background

Measles is a highly contagious disease resulting from infection with the measles virus and is responsible for more than 100 000 deaths yearly. Each confirmed measles case can spread to about 12 to 18 people. Despite the low numbers, Zambia continues to register measles outbreaks, the most recent (2022) being 82 confirmed cases reported in Chirundu. Other outbreaks were recorded in Pemba and Sinazongwe of Southern Province. Measles is best prevented through two doses of measles-rubella vaccines, but the uptake of the second dose (MR2) remains low (63%) in Southern province. Urgent efforts are needed to increase stagnating coverage with two doses of measles vaccine through advocacy, education, and strengthening routine immunization systems. With funding from the Swedish Government, Clinton Health Access Initiative supported the Ministry of Health (MoH) to develop a policy brief to propose cost-effective interventions to increase the coverage of the MR2. Maintaining a high-level population immunity against measles is required to prevent disease outbreaks; thus, Zambia needs to improve the MR2 coverage. To achieve this, we identified and evaluated two possible policy options for cost-effectiveness: (i) introducing mandatory birth-registration and vaccination tracking in District Health Information System (DHIS2) and (ii) providing incentives for the measles second dose vaccination. The aim of this analysis was to compare the cost-effectiveness of the two policy options compared with the current interventions in Zambia.

Method

Secondary review of HMIS and research studies was conducted from February to October 2022 to establish the magnitude of the burden as well as review interventions implemented in similar settings and to understand their effectiveness. The cost-effectiveness analysis was done using decision tree using the service provider (MoH) perspective. The analytical horizon for the analysis was three years, and the outcome measure was measles cases averted. Micro costing was done for the activities, and further qualitative input was gathered from key stakeholders to inform the inputs for the model.

Results

The analysis showed that by implementing mandatory birth registration and vaccination tracking in DHIS2, Zambia's Southern Province would avert 4,747 cases of measles in a year with an incremental cost per averted measles case of US$ 22.56 compared to the status quo. Furthermore, the budget impact analysis revealed that to design and implement this option, an additional US$230, 282; US$191, 707 and US$205, 298 will be required for year 0, Year 1, and Year 2 respectively (i.e., 1% above the cost of the status quo). We also conducted sensitivity analysis which showed that the results were robust enough to withstand uncertainties as most changes in our ICERs were below Zambia's GDP per capita expenditure on health.

Conclusions and implications for policy and practice

Conducting economic evaluations and modeling health outcomes is key for decision-making. In this policy brief, evidence indicated that implementing the policy option on mandatory electronic birth registration and immunization tracking in DHIS2 is feasible, cost-effective, and sustainable. This policy option presents value for money as it would avert 4,747 measles cases per annum at minimal cost compared to other options.

7.19 Cost Effectiveness Analysis of Congenital Chagas Disease Screening Methods in Bolivia

PRESENTER: **Steffany Vucetich**, Johns Hopkins Bloomberg School of Public Health

Background: Chagas disease affects 6 to 7 million people in the world. Bolivia is one of the countries most affected by this disease with the highest prevalence in the world. One of the routes of transmission of Chagas disease is congenital. The world health organization (WHO) states that congenital Chagas disease must be eliminated by 2030. In this study, we compare different screening methods to identify which one is cost effective for a national screening intervention to diagnose and treat congenital Chagas disease. The objective of this study is to assess whether detecting congenital Chagas disease using qPCR, or Western Blot methods at zero, one and nine months of age of the infant is cost effective compared to using microhematocrit method only which is used as the standard method to diagnose congenital Chagas disease in infants under nine months of age.

Methodology: We created a decision analysis based on a decision tree to compare the cost effectiveness of three screening methods: i) microhematocrit, ii) qPCR, and iii) Western blot, considering microhematocrit method as the standard of care. Transition probabilities were taken out from previous studies or derived as assumptions. Additionally, we took costs' data both from previous studies and primary data collection from Bolivia. We performed one way sensitivity analysis to test the model uncertainty. To represent this Analysis, we developed a tornado diagram. The parameters we included in the sensitivity analysis were the methods respective sensitivities, the probability of being tested at zero, one and nine months, and the qPCR and Western Blot costs of the test itself.

Preliminary Findings: The model indicates that the screening intervention using qPCR is cost effective if we compare with microheamatocrit and considering a willingness to pay (WTP) threshold of three times the GDP per capita of Bolivia. If qPCR is implemented at a national level, we will be able to identify congenital Chagas disease cases early and be able to give infants their respective treatment, which is high effective, and prevent future Chagas disease costs. We are further developing the model to take into account data from the Western Blot method and compare it to both qPCR and microhematocrit. Additionally, we are further analyzing the effectiveness of these interventions using QALYs to take long term effects into account.

Discussion: In Bolivia, microhematocrit method is utilized as the standard way to diagnose congenital Chagas disease. However, this method has very low sensitivity, more than 40% of the infected infants are false negatives and therefore end up being misdiagnosed. Even though qPCR method is used in some facilities, its utilization is less common due to its high costs. In addition, Western Blot is less utilized because the learning curve to implement this method is long. These costs are not too high if we consider the possible future direct and indirect costs for a patient with Chagas Disease.

7.20 Sequencing at Birth. How Can Health Technology Assessment Inform Decisions Regarding Genomic Newborn Screening?

PRESENTER: **Sarah Wordsworth**, University of Oxford

AUTHORS: Sarah Norris, James Buchanan

Next generation sequencing (NGS) technologies such as whole genome sequencing (WGS) have resulted in new genomic-based tests that can inform the diagnosis of rare, genetic diseases and guide treatment decisions in cancer. Such tests are now used in several health systems for patients with suspected or known disease, and attention is turning to their use in 'healthy' populations to identify disorders prior to onset. The All of US Programme in the United States (US) and 'Our Future Health' in the United Kingdom (UK) are two initiatives using sequencing methods in healthy populations.

Newborn bloodspot screening (NBS) programmes can identify life-threatening conditions within days of birth. NBS programmes are well established in several countries and offer a pathway to effective care for rare conditions, such as inborn errors of metabolism, hypothyroidism, and cystic fibrosis. Most NBS programmes apply cheap biochemical tests using mass spectrometry, followed by a specific genetic test if the biochemical test is positive. The number of conditions tested for ranges from nine in the UK, to twenty-five in Australia and around fifty in some US States. However, the use of WGS could allow several hundred genetic conditions (possibly 600 genes) to be screened for simultaneously by sequencing the babies genome. This is a huge clinical and scientific leap, but is associated with significant ethical, legal and equity implications beyond traditional screening. Therefore, it is crucial that introducing genomics into NBS programmes is equitable and socially acceptable as well as cost-effective.

This presentation will highlight the health technology assessment challenges associated with introducing WGS for NBS in the UK and Australia. In Australia, the gEnomics4newborns: integrating Ethics and Equity with Effectiveness and Economics for genomic newborn screening project is developing novel health technology assessment tools that aim to streamline future assessments of the value of genomics in newborn screening, enabling faster public access to screening that is equitable, effective, cost-effective and ethically-informed. The project is also building a reference economic model for newborn screening that incorporates equity, and which will be tested with several clinical case studies (spinal muscular atrophy, SMA; Duchenne muscular dystrophy, DMD; Thalassemia), to explore the impact on modelled cost-effectiveness of different measures of effectiveness for sequencing in newborn screening.

In the UK, the planned health technology assessment for the Newborn Genomes Programme is exploring the challenges of modelling several hundred conditions to assess WGS, and exploring options such as using the treatment for test positive results to structure the economic models, so that those requiring drug treament or transplants, for example, could be placed into manageable groupings for cost-effectiveness modelling. The work is also considering the appropriate health and non-health outcome measures to use to ensure that all relevant benefits of sequencing to both children and their families feed into HTA decision-making. This latter work will leverage the scale of the Programme (100,000 children

will be sequenced) to collect sufficient data to shed light on how well existing and new outcome measures (e.g. the EQ-HWB, PedsQL, EQ-5D-Y, TANDI) meet these objectives.

7.21 Annual Transition Probabilities for Changing Severity Stages of Idiopathic Pulmonary Fibrosis in an Australian Cohort

PRESENTER: **Ingrid A Cox**, University of Tasmania
AUTHORS: Martin Hensher, Qiang Zheng, Barbara de Graaff, Hasnat Ahmad, Andrew Palmer, Nicolas Borchers Arriagada

Background

Idiopathic Pulmonary Fibrosis (IPF) is a progressive lung disease, characterised by increasing fibrosis of the lung tissue. Pharmacological treatments are limited and expensive, and only two medications (antifibrotic medication) which decelerate progression but do not cure the disease, are available for treatment. With better understanding of the disease, numerous clinical trials are ongoing and cost-effectiveness assessment of these novel treatments is essential to ensure access to these treatments. However, transition probabilities for disease severity states, an essential component of the cost-effectiveness assessment, have not previously been estimated in an Australian cohort for IPF.

Aim

To estimate annual transition probabilities for disease severity levels for IPF in an Australian cohort.

Methods

Data for this study was obtained from participants of the Australian IPF registry (AIPFR), a multi-centre, prospective, observational registry of IPF patients across Australia. Given the observational nature of the registry and lung function measurements, there were substantial "missing" data at the precise time intervals required. Joint models which simultaneously modelled survival and lung function trajectories, were used to predict and impute the forced vital capacity percent predicted data (FVC) and this was done using the "JM" package in R. Annual transition probabilities were estimated for mild disease (FVC>75%), moderate disease (FVC-50-75%) and severe disease (FVC<50%), using a validated multistate continuous-time Markov model in the "msm" package in R. Bootstrapping was used to estimate confidence intervals (CI). The effect of select covariates on annual transition probabilities was assessed and included age, sex, disease duration, comorbidities, smoking status, and antifibrotic treatment (AFT) status.

Results

A total of 634 participants were included in the analysis, with 68%, 29% and 3% having mild, moderate and severe diseases at baseline, respectively. Most participants were male, with a mean age of 71 years, 75% had comorbidities, mean disease duration time was 2.4 years, with only 17% of participants on AFT at the baseline, but with 42% who had been on AFT at some point in time.

The annual transition probability was 14% (95% CI:12%, 16%) for transition from mild to moderate disease, 8% (6%, 10%) for moderate to severe and 48% (41%, 56%) for severe to death. When adjusted for age and sex, transition probabilities were 15% (13%, 17%), 7% (5%, 9%) and 50% (43%, 59%) respectively. For individuals with mild disease the probability of remaining in that state was 75% (73%, 77%), for moderate disease, 65% (61%, 67%) and 52% (44%, 59%) for severe disease.

Younger age groups, participants with longer disease duration and males had a higher probability of transitioning to more severe disease states. Females however had a higher probability of dying (moving from severe to death) than males. Participants on AFTs at baseline or who at some point in time were on AFTs, had a lower probability of transitioning to more severe disease states and death. Smoking status and comorbidities did not influence the annual transition probabilities.

Conclusion

Our findings will be helpful in predicting long-term disease outcomes and in health economic evaluations to assist decision making.

7.22 Cost-Effectiveness Analysis of Usage of Different Medical Oxygen Resources like Pressure Swing Adsorption Plants (PSA), Liquid Medical Oxygen (LMO), Oxygen Cylinders, and Oxygen Concentrators (OCs) in a Given Tertiary-Level Facility.

PRESENTER: **Jayendra Yashvant Kasar**, Bill & Melinda Gates Foundation
AUTHORS: Shyamashree Das, Sudhir Maknikar, Aishwarya Kharade

Background:

India has been one of the many countries that scaled up the emergency response to the COVID-19 pandemic on a war footing. A part of this response was the country-wide installation of around 4500 facility site (tertiary level) oxygen-producing pressure swing adsorption (PSA) plants, the largest initiative in the world with millions of investments. Traditionally these hospitals were dependent on Liquid Medical Oxygen (LMO) or Oxygen cylinders. With the introduction of PSA plants, now facilities are having multiple oxygen sources to meet their need. Despite the multiple benefits of the PSA plants over other resources, with decreasing oxygen demand majority of hospitals moving towards traditional

sources (LMO or cylinders) of oxygen which is resulting in the non-utilization of PSA plants. This is mainly because of a lack of evidence around the cost-effectiveness analysis of different oxygen resources (PSA vs LMO Vs Cylinders Vs Oxygen concentrators) in a given tertiary-level facility in a particular geography.

Research Aim:

In this paper, we aim to investigate cost-effective medical oxygen resources in the tertiary facility with multiple resources like PSA, LMO, Oxygen cylinders and OCs in a given geography.

Methodology:

We propose to develop a quantitative cost-effectiveness analysis data collection tool to collect data from four tertiary level facilities representing four different states identified based on the inclusion criteria such as availability of Air separation units (ASUs) producing LMO, facility from a state without ASU, facility with nearby available ASU and facility with distance ASU and all facilities with available PSA, LMO, OCs, and Oxygen Cylinders as different oxygen resources. We plan to collect data around the capacity of oxygen sources, oxygen demand, supply time, capital purchase cost, use of diesel generator, costing data of electricity, repair, spare parts, consumable required over the period of 10 years, human resources, transportation, annual maintenance, and continuous maintenance. We also plan to analyze data from PSA plants with available booster plants to refill cylinders and established a hub and spoke model of the supply chain, and solarized PSA plants.

Key Results:

Our preliminary analysis shows that PSA plants are cost-effective in facilities with no nearby available ASUs, and high demand for oxygen. The cost of a PSA plant running on electricity cost INR 18.64, for PSA with booster INR 26.07, for LMO INR 32.07 and for type D cylinders INR 36.61 for one unit oxygen (Lm3). The Cost-effectiveness of PSA improves with added booster plant for the refilling of cylinders and electricity savings with the Solarization of PSA plants. However, we will be able to get validation results by putting in a cost-effectiveness modeling study by march 2023.

Implications:

The research will be beneficial for the optimal utilization of oxygen resources and bring sustainability to the huge capital investment which has already been made by the Government of India in terms of establishing around 4500 PSA plants. These leanings from India can also be applied globally where PSA plants were installed and not getting utilized appropriately.

7.23 Defining and Assessing Acceptability of the Randomisation Strategy in Trials Targeting Vulnerable Populations: Qualitative Evidence from the POWER Trial in Cameroon

PRESENTER: **Sandie Szawlowski**, UCL

AUTHORS: Fanny Procureur, Emile Nitcheu, Chimène Mangoua Chimsgueya, Laetitia Laure Toukam, Julienne Noo, Eric Deffo, Stephanie Moyoum, Iliassou Mfochive Njindam, Serge Billong, Ubald Tamoufe, Aurelia Lepine

Abstract

Context and objectives: *Important ethical issues have consistently been highlighted in randomised controlled trials (RCTs). While RCTs are common in non-clinical health research, there is very little research on participants' perception of the fairness and transparency of RCTs. This is critical given that these perceptions may undermine the success of an intervention.*

Methods: *Data were collected in the context of a trial targeting vulnerable women in Africa, called 'Protecting women from economic shocks to fight HIV in Africa' (POWER). POWER aims to test the effectiveness of prevention against health shocks to prevent HIV among women engaging in commercial and transactional sex in Cameroon. This study was conducted in 2 phases. For phase 1, we carried out 25 focus groups and 8 in-depth semi-structured interviews before the randomisation to determine the most acceptable randomisation strategy to our study participants. For Phase 2, conducted post-randomisation, 41 in-depth semi-structured interviews with participants were conducted to assess their perception and satisfaction of their group allocation status (e.g., treatment or control). For this phase, participants were selected based on characteristics collected at recruitment (e.g., religiosity, risk preferences, perceived need for the intervention) that may impact their perception regarding the randomisation process.*

Results: *We found that participants understood the rationale for randomising the intervention and were satisfied by the randomisation strategy. This latter result was mainly attributable to the i) the involvement of participants regarding the randomisation method chosen and ii) to the fact that the control group would receive the intervention at the end of the study. Participants opted for participatory randomisation since they did not consider the computer-based randomisation strategy to be fair and transparent. There were however some differences in the acceptance of the randomisation result and method, depending on individual characteristics such as fatalism and risk preferences.*

Conclusion: *It is important that researchers undertake similar research before designing RCTs in order to minimise ethical issues related to the implementation of RCTs. Pre- and post-randomisation qualitative research is an effective method to improve the design of RCTs and to assess and address potential issues of RCTs. This is particularly important when research focuses on vulnerable groups.*

7.24 Systematic Review of the Costs of the Community Led Response in HIV

PRESENTER: **Fern Terris-Prestholt**, United Nations Joint Programme on HIV/AIDS (UNAIDS)

AUTHORS: Kathleen McGee, Pitchaya Indravudh

Background: As countries expand HIV service outreach and aspire to achieve 95-95-95 Fast-Track targets, programs increasingly rely on community responses to deliver effective and low-cost services. Programs seeking to effectively utilize community-driven responses need to understand their costs to appropriately budget for these efforts. We developed a framework for operationalizing the community-led response for cost analyses and conducted a systematic review on the cost and cost- effectiveness of community HIV responses.

Methods: We searched eleven electronic databases and included studies reporting on cost and cost-effectiveness community HIV responses. We extracted details on the interventions, economic estimates, and evaluated costing methodologies using an adaptation of the Drummond checklist. We designed a framework to categorize community responses across a spectrum of community-engagement levels.

Results: The search strategy yielded 32,283 articles, of which 147 were included for extraction and analysis. Using our community-engagement framework, we found 46% of studies reporting on costs of community-based interventions (i.e. targeting specific localities or populations outside of facilities), 50% on community-mobilized interventions (i.e. engaging communities to varying degrees in design and implementation), and only 5% studies reporting on community-led interventions (i.e. designed and implemented by and for communities). Costed HIV response areas were primarily in service delivery, followed by education and information, while few to no studies evaluated the costs of programmes addressing societal enablers. Reported unit costs were predominantly based on activity outputs, and rarely based on quality-adjusted output units or impact outcomes. Provider costing studies of community responses rarely accounted for economic costs of in-kind community contributions such as volunteer time, nor programme start-up costs. When reported, personnel and start-up costs were common cost drivers.

Conclusion: The review demonstrates a significant gap in the literature regarding the costs and cost-effectiveness of community-led interventions across HIV response areas. Existing literature more commonly presents economic evidence for community-mobilized and community-based interventions, though these infrequently accounted for community in-kind contributions.

7.25 Estimating Societal Cost of Participatory Community Mobilisation Groups to Improve Maternal and Child Nutrition in India

PRESENTER: **Hassan Haghparast Bidgoli**, University College London

Background: Few studies have estimated cost and cost-effectiveness of community groups using Participatory Learning and Action (PLA) cycle. However, these studies estimated intervention costs from a programme provider perspective due to intervention's complexity and challenges in collecting communities' involvement in the intervention. It is important to measure and value communities' participation and contributions to the interventions, in particular community mobilisation interventions where communities develop, implement and (informally) evaluate strategies. In this paper, we present methodology and results of cost analysis of a participatory community groups intervention in India, called UPAVAN trial, from a societal perspective.

Methods: UPAVAN trial was a four-arm cluster-randomized controlled trial, in Odisha, India, testing the nutritional and agricultural impacts of three video-based participatory nutrition-sensitive agriculture (NSA) interventions, compared to a control arm. We estimated economic costs of the interventions from a societal perspective (including costs to programme implementers, government health system, and participants) using a combined approach of expenditure assessment and ingredients-based costing. We estimated the programme costs using data collected prospectively from expenditure records of implementing and technical partners, and societal costs using follow up surveys of participants, monitoring data and key informant interviews. All costs were adjusted for inflation, discounted, and converted to 2019 US$. A series of sensitivity analyses were conducted to assess the impact of uncertainties on the results.

Results: Total programme costs of each intervention ranged from US$272,121 to US$386,907, translating to US$62 to US$84 per pregnant woman or mother of a child aged 0-23 months (targeted population covered by the interventions). Including opportunity costs of participants contribution to the interventions (societal costs) increase intervention costs between 50% to 100%, i.e. to US$122 to US$143 per pregnant woman or mother of a child aged 0-23 months. In terms of input, staff costs, and in terms of activity/intervention component, developing and delivering the interventions and quality assurance were major cost components.

Conclusion: The findings showed that UPAVAN interventions were potentially cost-efficient when compared with results from the limited set of evaluated multisectoral NSA interventions, even when societal cost taken into account, and not capturing these costs risk severely undervaluing their resource use. Capturing societal costs is challenging task, in particular in community mobilisation type interventions. Developing low cost methodologies to capture contributions of the communities is essential for accurate measurement of their costs.

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Proposed Price Regulations for Patented Medicines in Canada

MODERATOR: **Wei Zhang**, University of British Columbia

DISCUSSANT: **Graham Cookson**, Office of Health Economics

Overview of Price Regulations for Patented Medicines in Canada

PRESENTER: **Alexander Tam**, Centre for Health Evaluation and Outcome Sciences
AUTHORS: Wei Zhang, Huiying Sun, Daphne Guh, Paul Grootendorst, Aidan Hollis, Aslam Anis
Background: Canada has the fourth highest list prices for patented medicines amongst the Organisation for Economic Co-operation and Development (OECD) member countries, behind only the United States (US), Germany and Switzerland. In response, the Patented Medicine Prices Review Board (PMPRB), Canada's patented drug price regulatory agency, started a lengthy process to modernize and strengthen its pricing regulations.

Amendment Timeline: PMPRB first released its proposed amendments in a discussion paper in June 2016, followed by the broad consultation conducted by Health Canada from May 16, 2017 to June 28, 2017 and the formal publication of the proposed amendments in the Canada Gazette on December 2, 2017. A series of consultations were further conducted including the deliberations of a multi-stakeholder Steering Committee and the recommendations of a Working Group. New regulatory amendments were approved by the Federal Minister of Health and published in the Canada Gazette on August 21, 2019, then published as draft guidelines on November 21, 2019, revised on June 19, 2020, and finalized on October 23, 2020, and planned to come into force on January 1, 2021. Intensive and far reaching public consultations occurred during the process. However, the coming-into-force of the amended regulations and guidelines has been delayed twice past January 1, 2022 partially due to COVID-19 and successful challenges on the net of all price adjustments disclosure requirement in the Federal Court, for example, by Innovative Medicines Canada, the branded drug company trade association. On April 14, 2022, the Federal Minister of Health announced that the Government would proceed with the amendments related to changing new basket of comparator countries but not those related to new price regulatory factors and to the requirements to file information net of all price adjustments. PMPRB then released its updated guidelines accordingly on October 6, 2022 and launched a 60-day consultation period until December 5, 2022. Thus, the finalization and implementation of amendments and guidelines are still pending.

Key Amendments: (1) The pool of comparator countries used for external price referencing to set ceiling prices for patented medicines was proposed to change from 7 (PMPRB7: France, Germany, Italy, Sweden, Switzerland, the United Kingdom and the US) to 11 (PMPRB11). The PMPRB11 are the PMPRB7 countries with two high price countries (the US and Switzerland) removed and six new countries with relatively low prices (Australia, Belgium, Japan, the Netherlands, Norway, and Spain) added. (2) PMPRB intended to regulate both list prices and actual transaction prices (i.e., ex-factory list price less any confidential rebates and discounts provided to drug plans). However, the disclosure of the price net of all price adjustments is not required any more in the recent announcement by the Minister of Health. (3) New price regulatory factors, including pharmacoeconomic value, gross domestic product, market size (annual sales) and therapeutic criteria level (based on the medicines' innovation and therapeutic improvement level), were proposed to determine more restrictive price ceilings for medicines with high treatment cost or high market size. Similarly, these new price regulatory factors would not be applied any more.

The Impact of the Proposed Price Regulations on New Patented Medicine Launches in Canada: Any Early Signs

PRESENTER: **Aidan Hollis**, University of Calgary
AUTHORS: Wei Zhang, Huiying Sun, Daphne Guh, Paul Grootendorst, Aslam Anis
Background: Studies in literature have shown that tightening price regulations or lower drug prices hinder access to new medicines. Industry groups, Life Sciences Ontario and Innovative Medicines Canada, have found early signs of reduced launches in Canada relative to global launches over the last several years before the implementation of the amendments. However, PMPRB's own assessment has found "no early signs." We independently examined whether there is any early impact on the new patented medicine launches during the lengthy amendment proposing and finalizing period.

Methods: Our study medicines were the New Active Substances and Innovative Branded Products (original brand, licensed brand, other brand and protected with protection expiry known) in IQVIA's MIDAS data for 14 countries, in 2012-2021. The 14 countries included the combination of PMPRB7 and PMPRB11 countries (the US, Switzerland, France, Germany, Italy, Sweden, the United Kingdom, Australia, Belgium, Japan, the Netherlands, Norway, Spain) and Canada. The launch date was determined by the first sale date for each country and the global first launch date was the first sale date in the 14 countries. The outcome was the probability of new patented medicines launched in a specific country within two years of global first launch (i.e., two-year launch probability). Since the proposed amendments started about five years ago and kept changing over time, we selected an "effective" date to indicate the period for proposing regulatory amendments to capture any early signs, i.e., December 2, 2017 (the formal publication date of the first proposed amendments in the Canada Gazette). We applied a generalized estimating equation logistic regression by including period, countries and interactions between countries and period, and adjusting for Anatomical Therapeutic Chemical (ATC level 1) classification, the number and the price of competitors within the same ATC level 3 in

Canada. The modifying impact of these factors were examined by sub-group analyses. The analyses were conducted at molecule level. Sensitivity analyses were conducted for one-year launch probability.

Results: A total of 329 new molecules launched in the 14 countries were included in our preliminary analyses. The two-year launch probability decreased over time in Canada (45% in and before 2017 vs. 30% after 2017). The decrease in two-year launch probability after the effective date in Canada was not significantly more than that in other countries except Sweden which had significantly more decrease. Similar findings were observed among sub-groups of ATC except nervous system and the molecules with more competitors. Among molecules with <3 competitors, the reduction in two-year launch probability in Canada was more than that in all other countries (significant differences were found only when compared to France, Germany, Italy and the US due to small sample size).

Conclusions: Our preliminary analysis suggested that although the decreases in new patented medicine launches in recent years in Canada were overall comparable to most of other countries, the launch reduction for certain types of patented medicines could be a concern.

The Impact of the Proposed Price Regulations on the Listed Price for Patented Medicines in Canada

PRESENTER: **Wei Zhang**, University of British Columbia
AUTHORS: Huiying Sun, Daphne Guh, Paul Grootendorst, Aidan Hollis, Aslam Anis

Background: The price regulation amendments as proposed in the guidelines on October 23, 2020 were estimated by PMPRB to lower 8% list prices for medicines with high treatment cost or high market size and 13% for other new medicines. A report conducted by the Office of the Parliamentary Budget Officer estimated a 7% potential expenditure reduction if using PMPRB11 median prices compared to using PMPRB7 median prices for medicines. Our study was to evaluate the impact of different proposed regulatory amendments on the price ceilings for new patented medicines using historical data from 2012-2021 by assuming the amended regulations were implemented from 2012.

Methods: The new patented medicines were selected in the following steps using IQVIA's MIDAS data: 1) new patented medicines, defined as New Active Substances and Innovative Branded Products, that were launched (i.e., sold) in Canada in 2012-2021; 2) new patented medicines launched in Canada in 2012-2018; 3) those launched in at least one country in PMPRB7 and one country in PBPRB11 at the end of the 3rd year after Canadian launch. The ex-factory list price for each strength (i.e., a specific molecule, dosage form and strength) in each country was determined by its annual average price before the end of the 3rd year after its launch in Canada. The Maximum List Price (MLP) for each strength was then determined by the median ex-factory list price among available countries in PMPRB7 vs. PMPRB11. The relative change in MLP was calculated when changing reference countries from PMPRB7 to PMPRB11. The change in expenditures was estimated based on the difference in MLP multiplied by the sales volume (i.e., the standard dose units sold) in the 3rd year after Canadian launch. The analyses were conducted at strength level. We also considered the factors that might modify the impact of different pricing regulations on MLP. These factors were Anatomical Therapeutic Chemical (ATC) classification, oral solid vs. other dosage form, the number of competitors in the same ATC level 3 (<3 vs. $\geq$ 3 molecules), and market size (annual sales at molecule level <$25M vs. $\geq$$25M in the 3^{rd} year, which is approximately $\geq$$50M in the 10th year). Sensitivity analyses were conducted by using the 1st year and the 5th year instead of the 3rd year.

Results: A total of 219 new medicines launched in Canada in 2012-2018 were selected in our final analysis. The mean relative change in MLP from PMPRB7 to PMPRB11 was -8% (SD=16%) and median was -5% (Q1-Q3: -9%–0%), which amounted to $217.2M reduction in expenditures. The relative price changes differed by dosage form (-8% vs. -6%), ATC (from 0% for respiratory system to -19% for nervous system), number of competitors (-11%, vs. -6%), and market size (-10% vs. -4%).

Conclusions: Our preliminary analysis suggests list price reductions differs by characteristics of medicines. Further investigation will be adjusted for the expected impact of lower prices on launches and different types of new patented medicines in the future.

An Empirical Examination of the Determinants of Clinical Trial Activity across OECD Countries By the Pharmaceutical Industry

PRESENTER: **Wei Zhang**, University of British Columbia
AUTHORS: Oliver Spicer, Aidan Hollis, Aslam Anis, Paul Grootendorst

Canada's Patented Medicine Prices Review Board (PMPRB) regulates the introductory prices of patented drugs and their rate of increase over time. Recently, the agency introduced new and revised existing price controls to further regulate and lower drug prices. In its regulatory impact statement, the PMPRB claims that further lowering drug prices will not affect the number of Canadian clinical trials sponsored by Big Pharma.

Industry advocates have argued the opposite. Clinical trials constitute the largest share of R&D investment by pharmaceutical companies over the past 30 years. Thus, understanding what, if any, effect tightening drug price regulations have on clinical trial activity is important.

We assembled and modeled annual data on country level clinical trial allocations by the 20 largest global pharmaceutical companies. We define a trial as initiating in a country in a specified year if there was at least one site for an industry sponsored Phase II-IV trial. The data spans each of 32 OECD countries by year, from 2014 to 2020. The data are from Trialtrove; these data are pulled from over 40,000 sources globally, including ClinicalTrials.gov and the EU Clinical Trials Register. We examine the following covariates at country and year level: population, GDP/Capita, patented drug prices, regulatory efficiency, membership within the European Medicines Agency, pharmaceutical company head office location, strength of intellectual property protection, and sales revenue by the global pharmaceutical companies. We use data on patented drug prices as published in the PMPRB annual reports. Country and year level sales revenue are obtained from IQVIA.

From 2001-2014, Canada consistently had the 3rd, 4th, or 5th most clinical trials initiated globally. Since then, Canada's rank has trended downward, having the 8th most trials globally in 2021. Along with Canada's rank amongst other countries, the absolute number of trials initiating in Canada annually has fallen recently: from 436 in 2015 to 300 in 2020. Whether or not this downward trajectory is related to the new PMPRB policy – which has been publicly contemplated since 2016 – is unclear.

This research will identify the key determinants of global pharmaceutical R&D allocation across the OECD. Furthermore, by uncovering the potential unintended consequences of the new PMPRB price controls on country level clinical trial activity, we will inform government policy making.

10:30 AM –12:00 PM   MONDAY   [Economic Evaluation Of Health And Care Interventions]

Cape Town International Convention Centre | CTICC 2 – Nerina

Exercise and Drinking: Promoting Responsible Use of Both [ECONOMICS OF RISKY HEALTH BEHAVIORS SIG]

MODERATOR: **Fredrik Norström**, Umeå University

Incentives for Physical Activity in Cardiac Patients in Germany: Pre-Trial Health Economic Modelling

PRESENTER: **Damon Mohebbi**, University Hospital Düsseldorf & German Diabetes Center
AUTHORS: Katherine Ogurtsova, Jan Dyczmons, Charalabos-Markos Dintsios, Nadja Kairies-Schwarz, Andrea Icks
Background: Cardiovascular disease is a leading cause of chronic disease and death in Germany and globally. The INPHY study is a prospective, three-arm, randomized-controlled trial in patients who are treated for cardiovascular disease in Düsseldorf, Germany. The trial aims to improve physical activity in terms of daily walking steps through incentivized reinforcement schemes, namely financial incentives and social incentives compared to a control group that receives no incentives. However, the cost-effectiveness of such incentivized exercise-based secondary prevention interventions is not well established.

Objective: We aim to estimate the long-term cost-effectiveness of a complex behavioural intervention in cardiovascular patients using pre-trial health economic modelling.

Methods: A Markov model was used to predict the cost, quality-adjusted life years (QALYs) and incremental cost-effectiveness ratios (ICERs) for the INPHY trial from a health services provider perspective. The model included four health states, including "history of first of myocardial infarction", "reinfarction", "post-reinfarction" and "death". In the pre-trial health economic model, input parameters of the model such as transition probabilities and hypothesized intervention effects were derived from the most representative data sources for the decision problem. The base case model assumed a 25-year time horizon. The model discounted future costs and benefits by 3% annually. Sensitivity analyses were carried out to investigate the role of parameter and model uncertainty.

Results: Both the financial and social incentive schemes generate minor quality-adjusted life-years and increase healthcare spending compared with control. The social incentive intervention was more cost-effective at an ICER of around €24,500/QALY gained, than the financial incentive intervention with an ICER of around €112,000/QALY gained. Comparing the cost-effectiveness results to the proposed level of value categories by the American Heart Association, the social and financial incentive interventions would be of high value (ICER \$<50,000/QALY gained) or intermediate value (ICER \$50,000-150,000/QALY gained), respectively.

Conclusions: Pre-trial modelling is a comprehensive health economic tool to inform complex behavioural interventions. Incentivized physical activity interventions for cardiovascular disease may lead to cost-effectiveness, but not to cost-savings. These analyses suggest that incentivized reinforcement schemes may provide good value for money.

Cost-Utility Analysis of Sedentary Behaviour Interventions to Reduce Sitting Time in Desk-Based Workers: A Modelling Study

PRESENTER: **Phuong Nguyen**, Deakin University
Objectives

Sedentary behaviour (SB) is associated with chronic diseases such as type 2 diabetes (T2D), cardiovascular disease, cancers, and premature mortality. This association is independent of physical activity levels. SB interventions in workplaces are effective in reducing sitting time. Economic evaluations of these interventions have assumed that reduced sitting time translates to increased physical activity when estimating the impact on chronic diseases related to physical activity. None of the economic evaluations have used changes in sitting time to estimate the long term impact of SB on chronic disease-related health and cost outcomes. This research evaluated three hypothetical SB interventions (behavioural (BI), environmental (EI) and multi-component intervention (MI)) using a newly developed model that estimates the impact of SB as a risk factor on long term population health and cost impacts.

Method

Pathway analysis was used to identify the resource items associated with implementing each of the three interventions using both healthcare and limited societal perspectives. The effectiveness of the interventions in reducing daily sitting time (informed by published meta-analyses) was modelled for the working population aged 20-65 years. A multi-cohort Markov model was developed to simulate the 2019 Australian population and estimate the incidence, prevalence and mortality of five diseases causally related to excessive sitting time over the life course. Monte-Carlo simulations were used to calculate each intervention's mean incremental costs and benefits compared to the do-nothing comparator.

Results

When implemented at the national level, the interventions were estimated to reach 1,018 organisations with 1,619,239 employees. The estimated net cost of SB interventions were $152M (BI), $658M (EI) and $437M (MT) over a year. Lifetime health adjusted life years (HALYs) gained by BI, EI and MI were 794, 1236 and 463, respectively. The mean ICER for BI was $197,381 per HALY gained, $559,890 for MI and $987,209 for MI. Only BI had any probability (3%) of being cost-effective at a willingness-to-pay threshold of AUD50,000 per HALY gained from a societal perspective. This probability increased to 84% using the healthcare sector perspective.

Conclusion

Sedentary behaviour interventions are not cost-effective when a reduction in sitting time is the outcome measure of interest. The cost-effectiveness results are heavily driven by the cost of the sit-stand desks and the small HALYs gained from reducing sitting time. Future research should focus on capturing non-health-benefits of these interventions, such as productivity, work satisfaction, and other health benefits: metabolic, physical, and musculoskeletal outcomes. Importantly, the health benefits of simultaneously reducing sitting time and increasing standing time for such interventions should be captured but the joint effects of these risk factors must be considered.

The Impact of Responsible Alcohol Marketing on Mental Health and Physical Inactivity Outcomes of South African Youth

PRESENTER: **Willie Njoroge Wainaina**, Aga Khan University - Brain and Mind Institute
AUTHOR: Cyprian M Mostert

Purpose

The South African government implemented responsible alcohol marketing (RAM) in 2007, intending to reduce alcohol consumption in the youth population. This study was designed to quantify the impact of the 2007 RAM on mental health and physical inactivity outcomes of eighteen-year cohorts born between 1984-1996.

Method

The authors exploited the changes in alcohol consumption that the 2007 RAM exerted in these cohorts. The authors then build credible control and treatment groups based on the exposure to the 2007 RAM. The eighteen-year cohorts born between 1990-1996 were considered the treatment group since they were exposed to the 2007 RAM. The other eighteen year cohorts born in 1984-1989 were classified as the control group since these cohorts were not exposed to the 2007 RAM. The authors then used a Two-stage Least Squared Model to quantify the impact of the 2007 RAM on alcohol abuse, depression, trauma, and physical inactivity.

Results

The model shows that the impact of the 2007 RAM is higher in the female population than the male population and more prominent in the urban settings than the rural regions. RAM reduced alcohol abuse, depression, and trauma cases by 18 percent, 10 percent, and 11 percent, respectively. RAM averted physical inactivity by 26 percent.

Conclusion

RAM improves mental health and physical inactivity outcomes of South African youth. However, the impact is biased towards cohorts residing in urban areas. These inequalities reflect a lack of response to RAM in rural areas and easy access to illicit alcohol in these under-resourced regions.

Cost-Benefit Analysis of a Community-Based Youth Alcohol Prevention Initiative in Australia.

PRESENTER: **Julie Abimanyi-Ochom**, Deakin Health Economics, Deakin University
AUTHORS: Sithara Wanni Arachchige Dona, Shalika Bohingamu Mudiyanselage, Kanika Mehta, Bosco Rowland, John W Toumbourou, Rob Carter

Background:

Globally, excessive alcohol consumption is a leading risk factor for death and disability. Alcohol consumption often begins during the early teenage years, and risky levels of consumption during the teen years is associated with harmful consumption in the adult years. Adolescent alcohol consumption is one of the major preventable risk factors of health and social problems. There are many interventions emerging around the world to prevent youth alcohol problems. In the USA, the Communities that Care (CTC) prevention framework, a public health intervention to enhance protection and reduce adolescent health and risky behaviour has been shown to be cost-effective in reducing alcohol-related

adolescent health and social problems. From 1999, Australia trialed the CTC framework in four community coalitions. Preliminary evaluation showed positive effects in reducing adolescent alcohol use and related problems. However, to be more widely adopted and implemented within Australia, it is important to establish the Australian cost-effectiveness of CTC. The aim of this study is to report the cost benefit analysis of the pilot implementation of CTC in reducing and preventing underage alcohol consumption in the four Australian communities from 1999 to 2015.

Method:

We conducted a trial-based cost-benefit analysis on reducing adolescent (aged 10-14) alcohol use in the first four community coalitions that completed CTC in Australia from 1999 to 2015 from a broad societal perspective. Costs were estimated using CTC intervention records. We estimated the benefits of the intervention related to avoided alcohol-related health, education, and social consequences over 15 years (2001-2015). The intervention cost measure was an average weighted cost per youth per year for the trial period, and the benefit measure was the average dollars saved per youth per year for the trial period in social, health and welfare costs. Both costs and benefits were estimated in excel and reported in 2020 AUD.

Results:

CTC as an adolescent alcohol prevention strategy was identified to have strong economic credentials, with a return of AUD 4.7 for each dollar invested based on benefits gained during the trial period after adjustment for co-joint effects. Per youth, the costs saved due to reduction in alcohol consumption was estimated as AUD 225.5 per year. The weighted average cost of CTC per year was AUD 3.2 per youth. The largest prevention benefit was associated with reduced crime and violence (50%) and school dropout (46%).

Conclusions:

Trial-based results indicate strong cost-effectiveness potential. Modelling of impacts beyond the trial period are less certain in alcohol prevention; but are likely to improve CTC's benefit cost ratio. This paper extends the range of cost-effective interventions available in the international context to prevent adolescent health and social problems. It suggests that mobilizing communities to work within a prevention framework to implement evidence-based programs or reorient services can be cost-beneficial. Future research should incorporate more robust experimental designs and account for long-term benefits.

10:30 AM –12:00 PM   MONDAY   [Health Care Financing & Expenditures]

Cape Town International Convention Centre | CTICC 1 – Room 2.61-2.62

Digital Technologies for Health Financing: How Can We Assess Their Benefits and Risks for UHC? Conceptual Guidance and Country Examples [FINANCING FOR UHC SIG]

MODERATOR: **Inke Mathauer**, World Health Organization (WHO)

DISCUSSANT: **Jovita Aragona**, PhilHealth

Estonia's Digital Claims Management System As a Lever for Making Purchasing More Strategic: Automatized Setting and Monitoring of Provider Contracts

PRESENTER: **Kristiina Kahur**, HC Management Consulting Ltd
Introduction

The introduction of the central digital claims database in the Estonian Health Insurance Fund (EHIF) in the early 2000s with detailed personalized patient-level fee-for-service information created a solid basis for the further development and implementation of various digital solutions in the claims management process. Claims digitalization unlocked new business processes in the purchasing function, such as setting of provider payment rates and performance-based payments, contract setting and monitoring of contract execution. This presentation outlines how the contract related digital features are designed and explores their effects as well as risks and implementation issues.

Methods

This study is based on in-depth discussions with key informants, secondary data analysis and document review.

Features of digital contract setting and monitoring

The upgrade of the electronic channel for claims submission and the digitalization of contracts starting from 2020 changed the EHIF's business process and enabled automated contract setting and monitoring. Analysis of digital claims allows to set contract volumes with lower and upper limits, quality of care standards, reimbursement conditions, and geographical access conditions (for equitable resource distribution). Real-time claims data can then be directly linked with the realized contract volume per provider (and by specialty and care setting in which the services are performed, e.g. in-patient, out-patient, day care), which is then compared with the planned contract volume. This enables monitoring the execution of the contract on an ongoing and real-time basis and to take appropriate actions, such as contract adjustments or sanctions in case of violations.

Benefits

Digital claims management and application of automated contract controls assure that the payments are made according to the signed contracts and established reimbursement policy. The digitalized process also allows for flexible shifting of volume caps across specialties. The system allows for easy and comfortable access to visualized contract execution information per provider and adds value by enabling comparisons between providers. This all contributes to various UHC intermediate and final goals, namely efficiency (saving time and administrative costs for both providers and the purchaser), equitable distribution of resources, transparency and quality.

Risks/challenges

The main risks and challenges related to implementation and use of any digital technologies are generic, including data security and data protection aspects to ensure health data privacy and confidentiality. To mitigate the different risks, a 24/7 monitoring and alert system is in place and most of the hardware (including servers) are duplicated. On the one hand, granular and instantly available provider data enhance transparency and accountability, and thus trust in the system, yet this could be somewhat offset by feelings and effects of continuous and comprehensive surveillance of all provider activities.

Conclusions: way forward, suggestions, lessons learnt

Digitalized claims management allows to optimize purchasing related tasks, i.e. make purchasing more strategic. Estonia's digitalization process started more than 20 years ago, reflecting the available technology by then. As digital technologies are developing constantly and new ones emerge, it is important to analyze the solutions which are considered as innovative and state-of-the-art and assess the feasibility to replace or upgrade the existing digital technologies.

Assessing the Electronic Claims Management System of the National Health Insurance Fund in Kenya

PRESENTER: **Evelyn Kabia**, KEMRI Wellcome Trust

Introduction: Kenya has committed to achieving universal health coverage by 2030. Part of this is to reform the National Health Insurance Fund (NHIF) to make purchasing more strategic. NHIF's shift to electronic claims - a web-based platform for claims management - is a major change in this respect. Our study documents the design and implementation of the e-claims system and explores its benefits as well as challenges.

Methods: This study is based on in-depth discussions with key informants, secondary data analysis and document review.

Design and Implementation: To access the e-claims system, contracted providers need to procure a biometric machine, a laptop, the e-claims software license, and an internet connection. Staff from NHIF local branches assist providers to install the software, register them on the NHIF database and train them on how to use the system. The e-claims system is linked to a biometric system that enables providers to verify NHIF members' identity before service delivery. The e-claims system indicates the service entitlements of NHIF members and allows providers to notify NHIF of outpatient visits, admissions, and discharges, seek preauthorization for specialized services, and submit claims for processing and payment.

Benefits: The e-claims system has reduced the turnaround time for preauthorization of services, claims submission, processing and payment. The ease and convenience of the claiming process has led to increased submission of claims, especially by higher-level public facilities, translating to higher facility revenues. Overall, this improves the efficiency and leads to reduced administrative costs for NHIF. The e-claims system enables both providers and NHIF to monitor progress in claims processing across various stages. The transition from paper claims ensures the the integrity of claims data is maintained and enables easy retrieval of past claims. Overall, the system has also enhanced transparency and accountability in the payment of claims and hence also provider trust in NHIF.

Challenges: Poor internet connectivity and electricity problems challenge the implementation of the e-claims system in some areas. Additionally, many public primary health facilities have limited financial support from the County government to procure the needed digital infrastructure to run the e-claims system. while those using the system face human resource shortages and lack skills which limit their ability to submit claims, which remains nonetheless a complex task, at least initially. Due to the high investment costs upfront, the e-claims system is not yet fully accepted, especially among primary health care facilities.

Conclusion: The NHIF e-claims system has enhanced efficiency and transparency in claims management. To further leverage the full benefits of the system, financial support for digital infrastructure and recurrent funding for maintenance will be needed. It is also important to address the human resources shortage with a particular focus on specific digital skills. Once well established, the e-claims system could be enhanced to capture more data related to quality of care and data on provider performance could be used to determine or refine provider payment rates. Other tools under discussion include predictive analytics for monitoring of trends in claims submission to support fraud detection.

The Use of Artificial Intelligence and Machine Learning for Health Financing. Does This Support the Realization of Universal Health Coverage? Findings and Reflections Based on a Rapid Literature Review

PRESENTER: **Maarten Oranje**, Cordaid

Introduction:

Both in research and practice, the application of digital technologies for health financing is receiving increasing attention. This encompasses the use of artificial intelligence (AI). While there is an abundance of publications on the application of AI for different areas in health, the topic of AI in health financing has received much less attention. To contribute to closing this gap, this paper provides an overview of the current applications of AI and machine learning (ML) for health financing functions and tasks. The different uses of AI and ML are mapped in relation to various health financing functions and tasks as well as to the objectives of universal health coverage (UHC). The main purpose is to identify the type of research and policy questions that are being studied and to explore key issues in relation to progress towards UHC.

Methods:

The paper is based on a rapid review of the literature from 2000 to 2021 in English, including published and grey literature, from PubMed and Google Scholar, using a defined list of search terms and strategy as well as inclusion and exclusion criteria. 38 publications were selected and data extracted.

Results:

This rapid literature review exposed the broad scope of health financing-related subjects to which ML approaches are applied. These are grouped into six categories: prediction of health expenditure, risk scoring, claims management and fraud detection, identification of households for targeted policies, health needs informed benefit package design, and analysis of the effects of health coverage scheme design on health service utilization.

Two main topics were found to be dominant in this literature, namely: 1) prediction of high-cost patients and health expenditures; and 2) fraud detection in health insurance claims management. Overall, the use of ML seems to produce findings that confirm and/or are consistent with existing knowledge. The main added value of ML lies in its enhanced speed and precision or accuracy compared to traditional statistical methods.

Discussion:

The various applications identified of ML for health financing could have the potential to affect all the intermediate UHC objectives, most importantly the equitable distribution of resources (either positively or negatively) and efficiency (most probably positively). Transparency and accountability could also be improved for example through more effective detection of fraud. In addition, there may also be effects on all three final UHC goals: utilization in line with need, quality of care and universal financial protection. Whether those effects will be positive or negative will mainly depend on how the technology is applied. Although ML techniques can change traditional ways of working, they do not seem to alter fundamentally the thinking about health financing – or at least not yet.

Conclusion:

Ultimately, research and practice related to AI and ML for health financing must be driven by a clear interest in UHC and by benefits to the health system, rather than particular interests. When the ethical issues related to AI and ML in health financing are addressed and feasible regulatory options are in place, there can be accelerated progress towards UHC.

10:30 AM –12:00 PM   MONDAY   [Health Care Financing & Expenditures]

Cape Town International Convention Centre | CTICC 1 – Room 2.63
Socio-Economic Variables in Risk Adjustment

MODERATOR: **Jürgen Wasem**, Institute for Healthcare Management and Research, University of Duisburg-Essen

ORGANIZER: **Florian Buchner**, Carinthia University of Applied Sciences

DISCUSSANT: **Lukas Kauer**, CSS Institute for Empirical Health Economics

Socio-Economic Variables in the Dutch Risk Equalization Model

PRESENTER: **Richard C van Kleef**, Erasmus University Rotterdam
Background: The Dutch basic health insurance for curative care relies on a sophisticated risk adjustment model to reduce incentives for risk selection. The current model uses risk adjustors based on age, gender, health indicators and socio-economic variables. Health indicators include cost groups based on prior-year hospital diagnoses, prior-year diagnoses from the physiotherapist, prior-year use of prescription drugs, prior-year use of durable medical equipment, and persistently high/low spending in multiple prior years. Socio-economic variables include indicators based on the level of education, the level of income, the source of income (e.g., employed, self-employed, disability allowance, and social security benefit), regional characteristics and household size.

Objective: The objective of this paper is to examine the contribution of socio-economic variables to the performance of the risk adjustment model. Our hypothesis is that – given the huge amount of health information included in the risk adjustment model – the contribution of socio-economic variables is relatively small.

Data and methods: Based on a dataset with spending and risk characteristics of the entire Dutch population with a basic health insurance plan in 2019 (N=17m), we apply a three-step approach to quantify the contribution of socio-economic variables. First, we replicate the risk adjustment model for somatic care (version 2022). Second, we estimate the same model though <u>without</u> the socio-economic variables. Third, we compare the models with and without socio-economic variables using the following measures: R-squared, Cummings Prediction Measure (CPM) and predictable profits and losses for socio-economic groups.

Results: In total, the Dutch risk adjustment model includes 226 risk classes (in the form of dummy variables) of which 60 risk classes are based on socio-economic information. With all 226 risk classes included the R-squared and CPM equal .3440 and .3397 respectively. Without the 60 socio-economic variables (but with the other 166 risk classes) the R-squared and CPM equal .3438 and .3392 respectively. This implies that the contribution of the socio-economic variables to the R-squared and CPM is trivial: .0002 and .0005 respectively (given that the other 166 risk classes are included in the model). However, when the 60 socio-economic variables are excluded non-trivial predictable profits and losses remain for most of these groups, which would generate incentives for risk selection.

Conclusion: In terms of explanatory power (as measures by the R-squared and CPM) the contribution of socio-economic variables to the Dutch risk adjustment model is very small. However, inclusion of these variables eliminates predictable profits and losses for socio-economics groups and thereby reduce incentives for insurers to select in favor or against these groups. Moreover, inclusion of these groups helps achieve a level playing field for insurers given that specific socio-economic groups (such as highly educated people and low-income people) are concentrated in specific insurance plans.

Socio-Economic Variables in the Belgium Risk Equalization Model

PRESENTER: **Erik Schokkaert**, KU Leuven

AUTHOR: Karen Guerts

Background: From its very start, the Belgian system of risk adjustment for the insurers has included a lot of socio-economic information. Examples are living alone, preferential reimbursement (linked to low income status), subsistence income beneficiary, self-employed. This is explained by the historical context. Socio-economic status (SES) was generally seen as an indicator of needs, and certainly in the beginning there was no better morbidity information available. Yet, it was <u>never</u> considered to restrict the explanatory variables to age and gender. When a long list of morbidity indicators was included in the model in 2008, the socio-economic variables remained highly significant and were kept in the model. For some variables that were significant in the estimated model, there was a political discussion on whether they should be neutralized for the purpose of risk adjustment.

Belgium has recently moved away from a system with "individual" financial responsibility for the insurers. Yet, the formula remains relevant as versions of it have been used for the financing of (regional) integrated care projects.

Objective: The objective of this paper is to examine the contribution of socio-economic variables to model performance in Belgium. We also want to show how the methodology of including socio-economic variables in the estimation, but neutralizing them in the risk adjustment exercise, offers a flexible tool to discuss the social and political implications of including them (or not).

Data and Methods: We compare three versions of an explanatory model for health care expenditures at the individual level, estimated with OLS on a large representative sample of the Belgian population: (1) a model with demographic information, (2) with demographic + morbidity information (ICD-10 diagnoses and pharmacy cost groups), (3) with demographic, morbidity and SES information. We compare the explanatory power of the models.

Results: The inclusion of socio-economic variables improved the explanatory power of the model significantly. Given that all these variables individually also remain statistically significant, it certainly would be politically infeasible to remove them.

Conclusion: Socio-economic variables make a statistically significant contribution to the explanatory power of the Belgian risk adjustment model. Inclusion of these variables is necessary to achieve a level playing field for insurers (or regions), given that the more vulnerable socio-economic groups are unevenly distributed over insurers (or regions). As soon as one starts introducing variables that are not directly related to morbidity, the discussion about "neutralizing" some of them becomes relevant. Regional variables and some socio-economic variables (e.g. self-employment) are prime candidates in this debate.

Socio-Economic Variables in the German Risk Equalization Model

PRESENTER: **Florian Buchner**, Carinthia University of Applied Sciences

AUTHORS: Gerald Lux, Theresa Hüer, Jürgen Wasem

Background: The current German risk adjustment formula includes age, gender, Hierarchical Morbidity Groups and regional variables. So, in the current formula no socio-economic variables are explicitly included, but until 2020 six groups for reduced earning capacity interacted with age and gender were included. Regional variables are based on a selection process out of a pool of variables including socio-economic variables as regional unemployment rate or reginal GDP per inhabitant.

Objective: We investigated, whether the four socio-economic groups of insured with co−payment exemption (1), who receive basic income support for unemployed (2), who receive benefits of social long-term-care-insurance (3) and who receive reduced earning pension (4) are systematically under- or over−compensated under the present risk equalization system. We present several approaches of including these socio-economic variables into the German risk adjustment formula.

Data and methods: We used a sample of about 9.2 mio. insured of a big sickness-fund network which was adapted with regard to several variables in order to simulate the total social health insurance. Classification data of 2018 and expenditure data of 2019 were used to avoid biases by Covid-19-effects. The most recent risk equalization model of 2022 including the newly introduced high-cost-pool was applied for calculations. For groups (1) and (2) one dummy variable was included into the formula in the respective approach. Three different approaches were calculated for group (3): one dummy variable for all those, who receive benefits of social long-term-care-insurance, two variables (ambulatory and stationary setting) and five variables according to the five degrees of need the long-term-care-insurance clusters its patients into. For group (4) we used the same approach that was used before 2021. We also calculated several models for different combinations of these variables.

Results: We find a substantial undercompensation for all four groups: predictive ratios between 85,5% and 95,4% and mean financial results per person per year between -1.772€ and -118€. The only overcompensated subgroup are the recipients of benefits of social long-term-care-insurance in the stationary setting. There are plausible explanations for this phenomenon as services paid by long-term-care-insurance in the statutory but not in the ambulatory setting.

The fit of the different models measured by R² and CPM (Cummings prediction measure) did not improve overwhelmingly from a status quo of 28,09% (R²) and 24,98% (CPM) to a maximum of 28,46% (R²) and 25,47% (CPM) by the best performing combined model, and respectively from 52,44% (Payment System Fit) and 27,31% (CPM) to a maximum of 52,77% (PSF) and 27,80% (CPM) when including the high-cost-pool.

Conclusion. The socio-economic groups under study are undercompensated and including the respective variables is highly recommended. Especially because these groups can easily be identified by routine administrative data available for sickness funds, there is room and incentives for risk selection. This causes biases in the level playing field of competition between sickness funds. Even if including these variables in the formula improves the fit of the model only modestly, it removes incentives for risk selection against groups of relevant seize of 2.5% to 7.8% of the whole population.

10:30 AM –12:00 PM   MONDAY   [Demand & Utilization Of Health Care Services]

Cape Town International Convention Centre | CTICC 1 – Room 1.63

Strengthening the Health System in Southeast Asia and China: Health Insurance, Demand, and Economic Impacts of Health Service Provision and Utilization

MODERATOR: **Piya Hanvoravongchai**, Faculty of Medicine, Chulalongkorn University

ORGANIZER: **Tiara Marthias**, Nossal Institute for Global Health, The University of Melbourne, Australia

DISCUSSANT: **Anne Mills**, Department of Global Health and Development, London School of Hygiene & Tropical Medicine

Hit Two Birds with One Stone: Private Primary Care Establishment and Improve Utilization in a Far Far Away Land through a Strategic Purchasing Approach

PRESENTER: **Han Win Htat**, Sun Community Health

Hit Two Birds with One Stone: Private primary care establishment and improve utilization in a far far away land through a strategic purchasing approach

Background: Chin State is one of the least developed areas in Myanmar where many people do not have access to quality primary care. Both public and private health providers are not motivated to practice longer resulting in extremely poor health indicators due to chronic underutilization of health services. We examine whether a strategic purchasing scheme with mixed-method payments can motivate private providers to set up services in an underserved area and provide primary health care to the community. Evidence generated from this study aims to contribute to the development of resource allocation plans and strategic purchasing schemes in remote regions by the government.

Methods: We gathered the service utilization and financial transactions data systematically between January 2021 and September 2022. 5,461 beneficiaries from three villages of Tedim township, Northern Chin State were registered, screened, and issued health cards. The beneficiaries were entitled to receive a defined primary care package with a small co-payment (US$ 0.1 per visit). Electronic Clinic Management Information System (CMIS) is utilized for effective record-keeping. A Unique Identifier Code (UIC) is generated for each beneficiary using iris scanning to track service utilization at the individual level. 2 private general practitioners were contracted by capitation and performance-based payments to deliver quality care. Direct provider payment transactions were recorded in QBE financial management system and analyzed.

Results: The pot-shaped population pyramid of beneficiaries with lower registration in the younger male group (20-24 years) was observed. During the study period, 3,306 (60.5%) individual beneficiaries received health services at least one time (Mean 12.39, Median 5) at the assigned clinic. 40,948 total clinic visits were made, among which 77% of visits were for general illnesses such as fever, ache, pain, and general weakness, followed by non-communicable diseases; hypertension and diabetes accounted for 16% of total visits. Per member per month capitation payment to GPs for the coverage of 19 primary care services for a total of 21 month period was US$1.09 which can be considered cost-efficient.

Conclusion: The results suggest that strategic purchasing arrangements have the potential to attract private health sector establishments and increase primary care utilization in remote areas. MOH or National Purchasing Agency that wishes to address problems with health workforce retention can consider this approach in a future contracting-in strategy. This could also create job opportunities for local communities and help the long-term economic development of underserved areas.

Unmet Healthcare Need and Catastrophic Health Expenditure for Patients with Multimorbidity: Findings from a Nationally Representative Cross-Sectional Study in China

PRESENTER: **Jin Xu**, Peking University

Unmet healthcare need and catastrophic health expenditure for patients with multimorbidity: findings from a nationally representative cross-sectional study in China

Introduction

Increasing prevalence of multimorbidity among low- and middle-income countries (LMICs) poses challenges to universal health coverage. Multimorbidity is associated with disproportionately increased healthcare use and expenditure. In LMIC systems with relatively high out-of-pocket expenditures, this can lead to financial vulnerability. This study examines the association of financial protection measures with multimorbidity, and any potential role of insurance status in offsetting negative effects. We do so in the context of China, with near universal population insurance coverage, but where variations between insurance schemes may lead to differences in the degree of financial protection.

Methods

We use a cross-sectional design and data from the latest wave of China Health and Retirement Longitudinal Study (CHARLS) collected in 2015-2016, representative of the Chinese population aged above 45 years. We measure financial protection in two aspects: (1) unmet healthcare needs due to financial barriers, distance, and waiting time; and (2) catastrophic health expenditure defined by household's out-of-pocket (OOP) health expenditure exceeding 40% of its basic ability to pay. We use multivariate logistic regression to examine the association between multimorbidity and the level of financial protection, controlling for key personal and household characteristics.

Results

Multimorbidity was associated with a substantial increase in the likelihood of both unmet healthcare needs (marginal effects=2.2%, 95% CI: 1.5-2.9%) and household catastrophic health expenditure (marginal effects=10.4%, 95% CI: 6.7-14.1%). Multimorbidity was found to be associated with a significantly lower incidence of unmet healthcare needs among the beneficiaries of the employee schemes (marginal effect=0.8%, 95% CI: 0.3-1.3%), while no significant difference was found between the beneficiaries of the resident schemes (marginal effect=2.3%, 95% CI: 1.6-3.0%) and those the uninsured (marginal effect=3.2%, 95% CI: 1.9-4.6%). However, there were no statistically significant differences in associations with the incidence of catastrophic health expenditure between households with different insurance coverage: 8.8% (95%CI: 3.8-13.8%) for employee schemes beneficiaries; 11.0%, (95%CI=7.2-14.8%) for resident schemes beneficiaries; and 8.6%, (95%CI=5.3-11.8%) for the uninsured.

Conclusion

Our study found that people and households with multimorbidity are substantially more likely to suffer from unmet healthcare needs and catastrophic health expenditures than those without multimorbidity. Social health insurance schemes appear to have protected multimorbid patients by lowering the incidence of both unmet healthcare needs and catastrophic health expenditures. Among social health insurance beneficiaries, people under the more generous employee schemes were less likely to suffer from unmet health care needs but were equally likely to incur financial hardship. Our findings reveal the financial vulnerability of patients and families with multimorbidity in China, as well as the success and limitations of the current design of social health insurance schemes in addressing this issue.

The Effect of Health Insurance, Geographical Location, and Socioeconomic Status on Patients' Provider Choice for Outpatient Health Services in Indonesia

PRESENTER: **Tiara Marthias**, Universitas Gadjah Mada

Background

Social health insurance program aims to provide equitable access to health services. In the context of low- and middle-income countries (LMICs), strengthening primary care is a priority to ensure more efficient and responsive health systems. However, there is limited evidence from LMICs on how social insurance coverage, socioeconomic status, and geographical locations affect the patterns of the choice of health service providers during acute illnesses. In particular, how the combined effects of these factors may change patients' choice in accessing secondary or primary healthcare as their preferred mode of healthcare services. This study aims to assess the effect of the Indonesia health insurance program (*Jaminan Kesehatan Nasional* or JKN), geographical location, and socioeconomic status on patients' choice of healthcare services, focusing on primary healthcare utilization.

Methods

Using a nationally representative dataset from Indonesia Susenas 2018 survey, we included 256,732 individuals in our analyses. We examined patterns and determinants of choosing to access formal healthcare providers versus self-medication among respondents with any health problems in the last month prior to the survey implementation. We utilized the quasi-Poisson regression model with a focus on the effect of health insurance coverage, geographical location, and socioeconomic disparities on patients' choice of health care services. We constructed four choice variables are public hospital vs self-medication, private hospital vs self-medication, public clinic vs self-medication, and private clinic vs self-medication. We also predicted the synergistic effect of insurance coverage, geographical location, and economic status on provider choice.

Results

JKN coverage had a larger effect in increasing the use of secondary healthcare services compared to primary healthcare services. Compared with those uninsured, insured respondents with acute conditions were three times more likely to utilize public hospitals ($p<0.05$), while only increased the likelihood of utilizing public primary health care by 1.54 times ($p<0.05$). The effect of JKN on the use of private hospitals was also larger (1.95 times compared with uninsured respondents). We found notable synergistic effects of insurance status, place of residence, and economic status on respondents' choice of type of health care services. Insured respondents living in Java-Bali and in the richest wealth quintile were 4.7 times more likely to access public hospitals compared with those without health insurance, living in Eastern Indonesia, and in the poorest income quantile. On the other hand, the likelihood of access to public primary healthcare facilities reduces as the wealth status improves among those living in the more developed regions of Indonesia.

Conclusion: There are large variations in the choice of healthcare services by population groups in Indonesia. Evaluation of health systems reform initiatives, including the JKN program and the primary health care strengthening, is essential to determine their impact on disparities in outpatient health services.

Addressing the Mismatched Demand and Supply of Diabetic Care Delivery Systems Under Thailand's Universal Health Coverage: A System Dynamics Approach

PRESENTER: **Borwornsom Leerapan**, Mahidol University

Background

System dynamics modeling can inform policy decisions on strategies for improving the health system's performance during an epidemiological transition. By testing innovative policy options with this systems thinking tool, policymakers can be more informed of cost-effective strategies to address the mismatch between the demand and supply of chronic care. We report on how to apply this approach to improving the performance of care delivery systems for people living with diabetes in the context of Thailand's Universal Health Coverage for the next 15 years (2023-2038).

Methods

A series of Group Model Building sessions involving 39 participants from the 7th Regional health systems of Thailand was conducted in July 2022. We facilitated policymakers, administrators, practitioners, and other stakeholders to do causal mapping by using a causal loop diagram to represent their shared understanding of why the demands of supplies of diabetic care were mismatched. Then we co-created a stock and flow diagram for testing the consequences of policy options by the simulation modeling.

Results

The findings from our simulation suggest that the root causes of underperformed care delivery systems for diabetes might be misallocating resources. The diagnosis of diabetes after the screening was identified as a high-leverage point within the systems but has been underinvested for a long time. Moreover, current practices provide suboptimal care while dealing with the increasing prevalence of diabetes. Hence, expanding the clinical capacity of diagnosing and effectively treating those with chronic illnesses is needed to improve the whole system's performance.

Conclusions

Our study confirmed that policymakers and stakeholders could shift their mental model from working separately and fragmentedly to more collaboratively planning and working together to improve the performance of diabetic care in Thailand's health systems. Thus, the decision analyses that address the whole system can reveal the most cost-effective, high-leverage policies for strengthening health systems.

10:30 AM –12:00 PM   MONDAY   [Health, Its Distribution And Its Valuation]

Cape Town International Convention Centre | CTICC 1 – Room 1.43

Issues in the Valuation of Children's Health for Use in Economic Evaluation [ECONOMICS OF CHILDREN'S HEALTH AND WELLBEING SIG]

MODERATOR: **Richard Norman**, Curtin University

Using Values for Pediatric HRQoL in Cost Effectiveness Analysis – Is There a Problem to be Solved? If so, How?

PRESENTER: **Richard Norman**, Curtin University

Background

Recent years have seen a significant increase in interest in valuing child health for the purposes of economic evaluation. A study testing adults' and adolescents' values for both the adult EQ-5D-3L and its 'child-friendly' counterpart, the EQ-5D-Y-3L, showed that adult respondents' values were different between the adult and child instruments (Kreimeier et al 2018). The study concluded that existing value sets for the EQ-5D-3L could therefore not be applied to patient data collected for the EQ-5D-Y-3L, suggesting a need for value sets specific to the child health-related quality of life (HRQoL) states described by it. In principle, the availability of these value sets allows their use to support the economic evaluation of interventions primarily aimed at children – an important step forward given the substantial evidence gaps noted in pediatric health technology assessments (HTA).

Aims and Methods

The aim is to consider what the empirical characteristics of EQ-5D-Y-3L values tell us about the underlying preferences of adults with respect to child health; and what the implications of that are for the use of EQ-5D-Y-3L values in economic evaluation. We discuss whether the value judgements embodied in the methods used to value EQ-5D-Y-3L are consistent with the extra-welfarist foundations of cost effectiveness analysis. We identify practical issues for health economics modelling that arise from differences in the characteristics of HRQoL values between child and adult states. At the heart of this paper is the question: are the observed differences in adults' preferences for child HRQoL and adult HRQoL problematic and need to be solved? If so, how?

To do this, we undertook a brief review of the literature, and then organised a series of workshops with key thought-leaders across HTA, economics, and public policy. We identified interpretations of the existing results, and explored the range of policy options available in future. We conclude with some suggestions for additional empirical and theoretical work that would help regulators to make consistent and defensible choices in child health in future.

Results and Conclusions

Using EQ-5D valuation data, we show that the distribution of health states for the child instrument is usually relatively narrow, reflecting different trade-offs between length of life and quality of life when adults are asked to make hypothetical choices for children and adults. Using a utility theoretical framework, we present a way to interpret differences in values, and draw implications around how health economists and policy makers should consider such differences.

All findings point to engagement with stakeholders about these methods choices and their implications being crucial. However, decision makers may lack familiarity with the relevant issues, and may lack clear views or underlying principles on which to form them. Consultation therefore requires a deep commitment to informing and engaging, and helping stakeholders to form carefully considered positions. Researchers need to be committed to informing users of the implications of methods choices and value set characteristics for decision making – and to remain open to the possibility that different methods choices may be appropriate in some decision contexts.

Development, Testing and Valuation of an Adapted Version of the EQ-5D-Y-3L for Measuring Health-Related Quality of Life of Children Aged 2-4 Years

PRESENTER: **Kim Dalziel**, The University of Melbourne

Background:

Few preference-weighted health-related quality-of-life (HRQoL) measures exist for use in children under 5 years of age limiting their inclusion in cost-utility analyses and resulting health care resource allocation decisions. This project seeks to develop, assess and value a version of the EQ-5D-Y HRQoL instrument for children 2-4 years.

Research Questions:

For children aged 2-4 years:

1. Can a suitable adaptation of the EQ-5D-Y be co-produced with parents?
2. What are the psychometric properties of the adapted EQ-5D-Y?
3. What are the implications for valuation and valuation design?

Methods:

Purposive sampling at the Royal Children's Hospital (RCH) in Melbourne, Australia was used to recruit parents for online focus groups. Parents provided feedback on each dimension of the EQ-5D-Y. Qualitative findings guided the design of adaptations to the instrument.

As part of the Australian Paediatric Multi-Instrument Comparison Study (P-MIC) parents completed an online survey and 4 week follow up to test the adapted versus original EQ-5D-Y instrument and the PedsQL. Families were recruited from the RCH and via online panels. Responses were described for the total sample and children with and without special health care needs (SHCN). Psychometric tests for ceiling effects

(>15% of responses at highest level), convergent validity (Spearmans correlations), known group validity (Cohen's d effect sizes for pre-specified groups), test-rest (Intraclass correlation coefficients) and responsiveness (Cohen's d effect sizes) were conducted.

Results:

Online focus groups were conducted with 13 parents of well children and 6 with medical conditions. Parents provided a range of examples of how each domain related to their children, and suggested alternative wording to improve the applicability of the instrument to this age group.

842 parents completed the online survey with 513 (61%) completing follow up. 279 (33%) children had SHCN. Respondents reported more problems in each dimension with the adapted EQ-5D-Y than with the original instrument (for example, 66% reported no problems on the Usual Activities dimensions for adapted EQ-5D-Y-5L compared to 78% with the original instrument). The adapted instrument more strongly differentiated children with and without SHCN needs based on Cohen's D effect size (EQ-5D-Y-5L adapted ES=1.01 (0.83-1.19), EQ-5D-Y-5L original ES=0.83 (0.52-1.14)). Test-retest was generally more reliable for the adapted instrument. Responsiveness for children with improved and worsened health was consistent with size of effect expected (EQ-5D-Y-5L adapted- better health ES=0.20 (0.07-0.33), no change in health ES=0.01 (-0.06-0.09), and worse health ES=-0.49 (-1.16-0.18).

Conclusions and implications:

We produced an adapted version of the EQ-5D-Y with considerable input from parents. The adapted EQ-5D-Y was found to be more sensitive, valid and reliable than the original EQ-5D-Y, and thereby can extend measurement of HRQoL into this younger age group. This provides an important step towards valid and consistent measurement of HRQOL across the lifespan and may make it possible to obtain values for health states in these younger ages. Important questions remain in relation to valuation of the adapted EQ-5D-Y, including whether a specific value set is required, consistency across age for utility values generated, appropriate sample and perspective, and feasible approaches for anchoring.

Systematic Review: Preference Elicitation Techniques for Valuing Children's Health-Related Quality-of-Life

PRESENTER: **Cate Bailey**, The University of Melbourne

AUTHOR: Martin Howell

OBJECTIVES Despite the importance globally of valuing children's health states for use in economic evaluations, much debate remains on what approaches should be used to elicit these values. This issue is of particular importance in jurisdictions where the preferred analysis for decision-making is cost-utility analysis. Different ages and stages of children's development need to be adapted for through preference elicitation methods, to account of differences in the ways that children perceive their health and health outcomes compared with adults. There are also specific ethical challenges in asking children to complete valuation tasks, and anchoring values on a scale that ranges from full health to dead. In this systematic review, we aimed to identify and describe methods used to value children's health states, and to investigate considerations specific to children that are required when using the methods.

METHODS We conducted a systematic search of electronic databases to identify studies published in English since 1990 that used preference elicitation methods to value child and adolescent (under 18 years-of-age) health states. Eligibility criteria comprised valuation studies for child-specific patient-reported outcome measures (PROMs) and child health states defined in other ways, and methodological studies of valuation approaches with or without a value set algorithm.

RESULTS We identified 77 eligible studies. Data were extracted for country, aims, condition (general population or clinically specific), sample size, age, perspective, and source of values. Studies were evaluated using narrative synthesis methods and classified into three groups: 1) comparing elicitation methods (n=30); 2) comparing perspectives (n=23); and 3) no comparisons presented (n=26). The studies varied considerably in both methods and how the results were reported. Methods included time trade-off, standard gamble, visual analogue scale, rating/ranking, discrete choice experiments, best worst scaling and willingness to pay. Perspectives included adults' own values, adults valuing a child (own, other, hypothetical), and child/adolescent valuing own or another child.

CONCLUSIONS Differences in reporting of results made it challenging to understand which methods might be most suitable for eliciting preferences for children's health; however, there was some evidence that children gave lower values to health states than either: 1) adults' values for comparable states from their own perspective or 2) adult/parents' values for children. Challenges in analysing the data suggests that reporting guidelines are required to improve reporting consistency.

Valuing Paediatric Health Related Quality of Life Using Discrete Choice: Testing Methodological Issues across Different Samples and Instruments

PRESENTER: **Brendan Mulhern**, University of Technology Sydney

Background

Value sets for paediatric specific preference-based measures (PBM) of health-related quality of life (HRQL) are required for the estimation of quality adjusted life years (QALYs). One method that can be used to elicit preferences is the discrete choice experiment (DCE), and these have been widely used to estimate value sets for adult PBMs. However, there are many unanswered methodological questions regarding the use of DCE to value paediatric HRQL. These include the extent to which preferences can be elicited from adults and adolescents, the influence of

perspective on the valuation process, and the inclusion of duration in the choice sets (to allow for utility scale anchoring). Research is also required to understand the extent to which different paediatric PBMs such as the EQ-5D-Y-5L can be valued using DCE.

Aims

The aim of this study is to conduct a large scale methodological investigation of using DCE to value the EQ-5D-Y-5L across adult and adolescent samples.

Methods

We tested two DCE choice set formats (latent scale without duration, and with duration), two perspectives (self and a 10 year old child), and two samples (a representative sample of approx. 700 adolescents and 750 adults are included in the data collection). Each respondent was randomly allocated two combinations of format, perspective and instrument, and completed 10 choice sets of each combination. The survey was administered online survey and also included demographics and self-reported health, and feedback questions. As the purpose of this work is methodological, data were analysed using conditional logit, with results compared by pooling data across each issue examined.

Results

Data collection and analysis is ongoing and will be complete in early 2023. Preliminary results suggest that adolescent and adult preferences elicited using DCE approaches differ, but both have a level of validity. This is the case for DCE choice sets with and without a duration attribute included. There is mixed evidence regarding the impact of perspective on preferences.

Discussion

DCE produces feasible health state utility values for use in the generation of value sets. The results of this work will inform the development of value sets for use in paediatric health care decision making both in Australia and internationally.

10:30 AM –12:00 PM   MONDAY   [Health Beyond Health Care Services: Health Behaviors]

Cape Town International Convention Centre | CTICC 1 – Room 1.64

Experimental Interventions to Improve health

MODERATOR: **Rocio Garcia Diaz**, Tecnologico de Monterrey

Graphics Health Warnings in Tobacco Products: Using Experimental Economics to Increase Effectiveness

PRESENTER: **Guillermo Paraje**, Universidad Adolfo Ibañez
AUTHORS: Emmanouil Mentzakis, Hangjian Wu, Wenceslao Unanue

Introduction

To curb the smoking epidemic a number of policies have been proposed and implemented, among them the requirement that tobacco products exhibit "health warning label". To the best of our knowledge there are no studies that examine how the interaction between user characteristics (e.g. gender, age) and warning attributes affect effectiveness.

Aim

The objective of this paper is to assess whether strategically varying warning label's attributes according to the user's individual characteristics can affect the effectiveness of warnings.

Methods

This paper uses a discrete choice experimental (DCE) approach (i.e. within-subject experimental variation) within a larger between-subjects experimental design with three treatments. The three treatments relate to the gender orientation of the health condition presented within the graphical warnings, namely breast cancer (female condition), impotence (male condition), lung cancer (gender-neutral condition). For each treatment, a DCE is developed presenting bundles of cigarette packages that between them vary on the type of graphical warning and price. The graphical warnings varied the age and gender of the person in the picture of the warning label, namely the levels were young and old females for the female condition, young and old males for the male condition and young/old males and young/old females for the gender-neutral condition. Further levels included the current label (gender-neutral oral cancer - one of warning currently in circulation in Chile) and a generic age and/or gender-neutral warning. Young/old, smoker/non-smoker, males and females from the general population of Chile were randomly assigned to each of the three treatments, allowing us to examine whether individuals' whose characteristics do or do-not match the characteristics of the individuals in the pictorial warnings affect the likelihood of purchasing a given cigarette package. Conditional logit, mixed logit and latent class models are used in the analysis, whereby respondents' characteristics enter as interaction terms with the graphical warning attribute.

Results

Our results suggest that there is little evidence of a strong effect emerging from the matching of respondents' characteristics with the characteristics of the individuals in the warning. On the contrary price seems to be the most dominant factor in the decision making of tobacco purchase among all groups. Nevertheless, some warning-respondent combinations are more impactful in certain situations, and less salient in other situations, compared to the current pictorial warning. Subgroup analysis suggests that male smokers obtain more disutility from choosing the age-neutral impotence picture than females, and this gender-specific reaction is also found to the other two pictures implying risk of impotence of young and old males, for young males who do not smoke.

Conclusion

Overall, we find that making behavioural choices in an effort to enhance the effectiveness of health warnings in cigarette packaging do not produce systematic patterns of effect and do not outperform the pictorial warning currently in circulation. However, we find strong evidence that curbing cigarette purchasing can be achieved through pricing strategies whose effects seems to be robust and consistent across conditions and individua sub-groups.

Impact of Calorie Labelling on Online Takeaway Food Choices: An Online Menu-Based Choice Experiment in England

PRESENTER: **Oana-Adelina Tanasache**, LSHTM
AUTHORS: Cherry Law, Joffre Swait, Steven Cummins, Richard Smith, Bas Donkers, Esther de Bekker-Grob, Laura Cornelsen

Purpose

Out-of-home purchases make up on average 25-39% of all food and drink expenditures in the UK. Eating out-of-home is linked to higher calorie intake and higher body weight, which are key risk factors for obesity and diabetes. Most main meals served in major restaurant and fast-food chains in the UK contain more the recommended calorie content for a main meal. From April 2022 it is mandatory for large out-of-home food businesses (250+ employees) in England to display the calorie content of the individual food and drink items sold at the point of purchase. This study examines whether providing calorie information on online takeaway food menus is associated with healthier food choices.

Methods

An online Menu-based Choice Experiment was conducted in October 2022 (pilot) / November 2022 (main study) among n=113 (pilot) / n=1000 (main study) participants in England. Each participant chose their preferred items for takeaway food delivery order from ten hypothetical restaurant menus which included starters/sides, main dishes, desserts, and drinks. To ensure respondent engagement the ten menus were based on five different cuisines. Each participant was randomly allocated to one of three groups, where in addition to price of menu items: 1) no calorie information was shown (group A), 2) individual item calorie content was shown in line with the current policy in England (group B) or 3) individual item and total calorie content were shown (group C).

Results

Preliminary results based on the pilot (full survey findings will be presented at the conference) indicate lowest average calories per menu ordered among the group that was provided with calorie information for both individual items and for the total order (918kcal), followed by the group that received no calorie information (938kcal) and the group that saw only individual item calorie content (1022kcal). The biggest differences between the groups in calories ordered were seen for desserts. Post-experiment survey responses indicated that more than half of the respondents (60-65%) shown calorie information reported not using the information in making their choices while 48% of those who did not see any calorie information reported wanting to have calorie information when making their choices.

Conclusion

Analysis of the full survey will use multivariate probit models to estimate the effect of providing calorie information on the likelihood of choosing healthier meals as well as calorie and price elasticities. Non-parametric tests will be carried out to compare the calories ordered in each of the three groups (A, B, C). Sub-analyses will test differences in associations by socio-economic status of the respondents, gender, self-reported BMI, and weight satisfaction. Pilot findings suggest that providing calorie labels for individual items only, like the current policy implemented, may not lead to healthier takeaway food choices.

Nudging into a Stem-Cell-Donor- Registry: Evidence from the Lab and the Field

PRESENTER: **Helene Könnecke**
AUTHORS: Simon Reif, Harald Tauchmann, Daniel Wiesen

Stem cell transplants are used to treat blood cancer. While 25% of patients can be transplanted with the stem cell donation of a relative, the majority of patients depend on other voluntary donors. However, the chance of a match between donor and patient is very modest, so that a large pool of registered donors is needed. Current efforts to increase the donor pool, such as public advertisement and organized recruitment events, are insufficient; 10% of patients in need do not find a suitable donor. In this study, we explore the power of changing the choice frame of registration to increase the pool of potential donors.

We conduct a combined online and field experiment. In the online experiment, an interactive decision game is adapted for the context of stem cell donor registration. We compare registration rates for two different choice-defaults and two information treatments. In the second part, these same participants are asked whether they want to actually register with a German donor center or not. Here, we replicate the different choice-defaults from the online experiment for the participants to request a registration link and additionally implement a treatment where participants receive buccal swab registration sets to the participation addresses a priori.

From March to September 2022, a total of 309 subjects participated in the experiment. Preliminary results indicate that both the default treatments and the information treatments have an effect on registration decisions in the lab. Exploratory analyses will refer to the influence of personal characteristics and dynamics within the simulated decision game.

Our results help to improve the design for stem-cell donor registration decision, possibly increasing registration rates. In addition, we contribute to the experimental literature on donation behavior as our unique setup allows us to measure the external validity of decisions in laboratory experiments.

Health Promotion Intervention Package for Prevention of Behavioral Risk Factors of Chronic Diseases: A Cluster Randomized Controlled Trial Among Adolescents in School Settings

PRESENTER: **Sandeep Kaur**, Postgraduate Institute of Medical Education and Research

Background

Increased consumption of processed food, physical inactivity, and tobacco and alcohol use has led to an upsurge in chronic diseases. These risk factors mainly commence in adolescence. Few studies have been conducted to prevent risk factors among adolescents in low-and-middle-income countries. Most studies had focussed on a single risk factor or had interventions of shorter duration, and none had included parents and teachers. As chronic diseases rise in India, impact evaluation studies of locally relevant comprehensive health promotion interventions are required.

Objective

To evaluate the impact of a school-based health promotion intervention package on preventing the behavioural risk factors of chronic diseases among adolescents.

Methods

A cluster randomized controlled trial was carried out in public schools in Chandigarh, India. Twelve schools were randomly selected from 106 schools with a cluster size of 30 adolescents per school. The sample size was estimated at 5% type 1 error and 80% power using risk factor data from literature assuming a 20% change post-intervention. A baseline assessment was carried out from May-2018 to September-2019 to estimate behavioural, anthropometric, physiological and biochemical risk factors among adolescents enrolled in 8th grade (n=453), one of their parents (n=395) and teachers (n=94).

Findings from ten group meetings with adolescents, parents, and teachers and one consultation meeting with teachers, principals and the school health in-charge were used to develop the intervention package. Six schools were allocated to intervention and six to the comparison arm using a stratified random sampling method based on parents' household income.

For adolescents, intervention comprised interactive learning sessions of 30-minutes per week and outdoor physical activity sessions of 30-minutes four times weekly. Four 30-minute sessions were carried out for parents and teachers. A pamphlet containing information on risk factors was provided to all participants.

Validated tools, standard apparatus, and methods were used to assess risk factors. The end-line assessment was delayed by eight-months due to COVID-19 restrictions. The ANCOVA based on cluster proportions/means was used to estimate the intervention effect accounting for baseline data.

Results

Among adolescents, the intervention reduced salt intake by 0.5 g/d (95% CI: -0.9, -0.1), current alcohol users by 5% (95% CI: -9, -0.007), and increased fruit consumption by 18 g/d (95% CI: 5, 30) and PA by 0.2 PAQ-A score (95% CI: 0.07, 0.3), it had no effect on the sugar and vegetable intake and smokers and tobacco chewers. Exploratory analysis revealed that PA increased by 205 METs (95% CI: 74.5, 336), fruits intake by 20 g/d (95% CI: 6, 34), vegetable intake by 117 g/d (95% CI: 50.5, 183) and salt consumption decreased by 0.5 g/d (95% CI 0.15, 0.9) and proportion of current alcohol users declined by 5% (95% CI: 9, -1) among parents. Vegetable consumption increased by 149 g/d (95% CI:12, 286) among teachers.

Conclusion

Implementation of a school-based health promotion intervention package was feasible and acceptable. Future studies should explore the impact of school-level and national-level policies, such as mandatory food package labelling and increased tax on salt and sugar-containing foods and beverages, tobacco, and alcohol.

Cape Town International Convention Centre | CTICC 1 – Room 1.41
SPECIAL SESSION: Presentation of Student Prize Winning Papers

MODERATOR: **Tinna Laufey Asgeirsdottir**, University of Iceland

Trading HIV for Sheep: An Estimation of the Sexual Behaviours Response of Female Sex Workers to Tabaski in Senegal

PRESENTER: **Henry Cust**, London School of Hygiene & Tropical Medicine (LSHTM)

We use a cohort of female sex workers in Senegal to show how large anticipated economic shocks lead to increased risky sexual behaviour. Exploiting the exogenous timing of interviews, we study the effect of Tabaski, the most important Islamic festival celebrated in Senegal, in which most households purchase an animal for sacrifice. Condom use, measured robustly via the list experiment, falls by between 27.3pp (65.5%) and 43.1pp (22.7%) in the 9 days before Tabaski, or a maximum of 49.5pp (76%) in the week block preceding Tabaski. Evidence is consistent with the economic pressure of Tabaski driving behaviour change in a context of risk premia for engaging in condomless sex. Those most exposed to the economic pressure from Tabaski were unlikely to be using condoms at all in the week before the festival. Our findings show that Tabaski leads to increased risky behaviours for FSWs, a key population at high risk of HIV infection, for at least one week every year and has implications for FSWs in all countries celebrating Tabaski or similar festivals. Because of the scale, frequency, and size of the behavioural response to shocks of this type, policy should consider protecting against anticipated shocks.

Changing Physicians Incentives to Control the C-Section Rate: Evidence from a Major Health Care Reform in Iran

PRESENTER: **Hanifa Pilvar**, Queen Mary University of London

We evaluate the effect of a major health care policy in public hospitals which altered the demand and supply side incentives for c-section in 2014 in Iran where the c-section rate was 55%. We show that supply side incentives had a major role in the effectiveness of the programme after which the national rate was reduced by 6 percentage points. This reduction was mainly driven by first-birth mothers. The reform also encouraged doctors to shift to the non-public sector with fewer restrictions. We cannot find any adverse effect on Apgar score, hospitalization, and mortality; however, gestation length and birth weight significantly increased.

Can Private Equity Buy Referrals? Evidence from Multispecialty Physician Practice Acquisitions

PRESENTER: **Yashaswini Singh**, Johns Hopkins University

Multispecialty physician practices (MSP) incentivize referrals from generalists to be made to specialists within the practice. With growing acquisitions of MSP by private equity funds (PE), there is concern that high-powered for-profit incentives of PE may accelerate misalignments in patient-physician relationships to increase self-referrals, with unknown implications for patient welfare. Using novel data on PE acquisitions linked to Medicare claims data, I advance the literature on PE and vertical integration in health care markets by studying the precise ways that PE acquisitions of MSP change strategic referral behavior. I base my empirical analysis on 230 acquisitions of MSP over a 4-year period. Using a discrete choice model, I find that PE acquisitions increase self-referrals by 7 percent. I then consider the channels through which acquisitions increase self-referrals and find that neither increased market concentration nor endogenous acquisition selection explains increases in self-referrals. Rather, observed increases in self-referrals are driven by the adoption of PE's managerial strategies. Finally, I consider the welfare implications for patients and payers. Self-referrals can reduce welfare if they foreclose competing specialists from accessing patient referrals; on the other hand, self-referrals can improve welfare if they facilitate care coordination between generalists and specialists. I find both forces to be present. Taken together, this paper contributes policy-relevant evidence of the heterogeneous effects of vertical integration that depend on the managerial environment that shapes provider incentives. As the United States continues to transition towards value-based care contracts that pay for clinical performance, corporate ownership in multispecialty settings may have the potential to balance profitability and patient welfare by leveraging managerial skills to improve both clinical and financial outcomes.

Timing Moral Hazard Under Deductibles in Health Insurance

PRESENTER: **Véra Zabrodina**, University of Basel

This paper develops a new approach to identifying to what extent individuals strategically time their healthcare consumption under deductibles in health insurance. I set up a dynamic model of healthcare consumption where individuals exceed a high deductible after a large health shock, and have an incentive to prepone care planned for the next year. The model elicits the links between timing and classical moral hazard responses, as well as deductible choice, and highlights trade-offs for insurance policy. It also serves to show that pure timing moral hazard can be identified using random variation in the timing of the health shock within the calendar year. Empirically, I find quantitatively large timing moral hazard in the context of mandatory health insurance in Switzerland. This response can create important distortions in insurance markets by shifting out-of-pocket healthcare costs onto the risk pool. Its extent decreases with the time available until the deductible reset. The insured do re-optimise on-the-go after the shock, but face substantial frictions in retiming.

Cape Town International Convention Centre | CTICC 1 – Room 1.61

Causes and Consequences of Mental Ill-Health [MENTAL HEALTH ECONOMICS SIG]

MODERATOR: **John Cullinan**,

Reflecting for a better semester? Experimental Evidence from Germany

PRESENTER: **Judith Vornberger**, Julius-Maximilians-University of Würzburg

AUTHORS: Prateek Chandra Bhan, Jinglin Wen

Increasing mental health issues and depressive symptoms in university students are seldom met with appropriate care. Research shows that treatment interventions during this sensitive period can prevent or abate the severity of these problems. Nevertheless, the potential impact of soft touch prevention interventions largely constitutes an extant research gap. With this study, we aim to narrow this research gap by examining mental health effects on academic achievement and the role played by reflection and/or literacy intervention. We conduct a randomized controlled trial (RCT), on undergraduate students during an academic semester. In our lab-in-the-field set up, we randomly assign undergraduate students to a treatment and a placebo group with both groups participating in a thought experiment. The treatment group is asked to reflect on questions concerning stress, while the placebo group is encouraged to reflect on priming free aspects of building architectures. In the baseline and two follow-up surveys during the semester we collect data on depressive disorder, perceived stress level, life satisfaction and mindfulness which we link to attendance and performance data collected during and at the end of the semester. This enables us to measure medium- and long-term effects of the intervention on mindfulness, mental health, effort, and performance as well as the effect of mental health on performance and attendance. We find significant improvements in students' mental health and a decrease of perceived helplessness and depressive symptoms. Importantly, our intervention leads students to engage in more mindful activities such as sports or self-care and to participate in the exam more seriously. Our findings highlight the potential of self-reflection intervention to induce behavior changes and address depression of university students. We further expect a negative effect of mental health on performance, with reflection and/or literature intervention acting as a buffer.

Commuting and College Student Mental Wellbeing

PRESENTER: **John Cullinan**, NUI Galway

AUTHOR: Darragh Flannery

We study the relationship between commuting, commute time, and college student wellbeing. To do so, we develop a taxonomy of student commuters, distinguishing between those who stay and live at home while in college, typically with their parents, and those who leave. We use this classification to present predictions relating to the effects of commuting on wellbeing and test these predictions using responses to the WHO-5 Wellbeing Index measure for more than 6,000 full-time undergraduate students in Ireland. Overall we show that students living at home have lower subjective wellbeing (SWB) than those who leave and this can be explained, to a large degree, by longer commute times. Our empirical strategy involves first modelling the overall effect of living at home on SWB by exploiting geographic variation in system-wide accessibility to higher education as an instrumental variable (IV). We find that living at home leads to a 6.5 percentage point (ppt) increase in the probability of poor SWB, with much larger effects for female students compared to males. Next we show that for students living at home, one-way commutes of more than 45 minutes are independently associated with an increased likelihood of poor SWB of 7.9 ppts, again with larger effects for females. We provide evidence for the credibility of our results using partial identification techniques and we investigate a range of plausible pathways through which commuting might impact SWB, including impacts on studies, friendships, health and health behaviours, time constraints, and living conditions.

The Effect of Individual Traits on Depression in Women in Europe

PRESENTER: **Imanol L. Nieto-González**, Universidad de La Laguna

AUTHORS: M. Carolina Rodríguez-Donate, Ginés Guirao-Pérez

Introduction

Mental health and, in particular, depression is one of the diseases of greatest global concern today, especially in middle- and high-income countries after the COVID-19 pandemic. In this context, it is also of interest to analyse the unequal gender prevalence of this disease, which is higher in women than in men, a relationship that occurs in any region regardless of other characteristics. The aim of this work is to analyse the prevalence of this disease for women in 27 European countries, as well as to quantify the effect of certain individual characteristics on the probability of suffering from depression and the degree to which it occurs. In addition, each country is evaluated and compared with the whole sample in order to identify differences in the effects found.

Data

In this study, we use data from 27 countries on mental health status of the European Health Interview Survey wave 2 (EHIS-2), which is the instrument for collecting data on the health status, health care use and determinants of health of the population in European countries. In particular, the mental health module of the survey is collected by the PHQ-8 questionnaire. Individuals are classified according to their scores on the items of the PHQ-8 questionnaire into three categories: no depression (0-4), mild or moderate depression (5-14) and severe depression (15-24).

Methods

Using microeconometric models, we assess, for the subsample of women, on the one hand the influence of age, level of education, income level and being unemployed or not on the probability of not suffering from depression or suffering from mild/moderate or severe depression, through the estimation of a multinomial logit model. On the other hand, a binomial logit model is estimated to calibrate the impact of these individual characteristics on the degree of depression for all women suffering from depression.

Results

The results show that higher educational attainment and income have a positive impact on the probability of not suffering from depression, while older age and being unemployed has a positive effect on the probability of suffering from depression and, in particular, on the probability of being severely depressed. Furthermore, from the calculation of ratios, notable differences are detected in the effects of the characteristics considered for the different countries. In particular, Malta and Portugal show the largest differences above the average for the countries as a whole, in contrast to certain Nordic countries such as Denmark and Estonia.

Conclusions

The results found highlight the importance of identifying which individual traits generate a higher propensity to suffer from depression in women. A similar profile is found in all countries in terms of the direction of the effect of each characteristic on the degree of depression suffered, however, the size of the effect of the sample of women in each country varies significantly from the sample average. The results obtained in this work provide a useful tool from which to design and implement more effective prevention plans focused on specific groups with higher prevalence.

Regional Variation in Mental Healthcare Utilisation: Evidence from Movers in Australia

PRESENTER: **Karinna Saxby**, Monash University

Background: Poor mental health is a leading cause of disease burden worldwide. While efficacious mental health treatment is available, there is persistent regional variation in its uptake. Variation due to demand, such as underlying patient health, is generally considered warranted. Conversely, variation due to place factors, which includes 'supply' of healthcare, can signal inefficiencies in spending, particularly if higher regional supply does not translate into improved mental health. Understanding the causes and health consequences of this variation is essential to inform targeted mental health policy. In this paper, we identify the extent to which patient and place factors explain variation in mental healthcare utilisation and mental health outcomes in Australia.

Method: Using longitudinal Census-linked administrative data, we exploit variation in migration across regions to identify how movers' utilisation of out-of-hospital mental healthcare services and mental health scripts (antidepressants, anxiolytics) is affected by place factors. Empirically, we estimate fixed effects models which assumes each individual's utilisation of mental healthcare comprises both a patient and a place effect. In this set-up, we account for underlying patient characteristics and identify how moving to a different region impacts within-individual utilisation, i.e., an aggregate 'place effect'. The relative importance of place is then estimated by quantifying the association between the estimated place effects and each region's average utilisation. We also investigate whether the importance of place varies among people with disability and low income groups as these populations experience unique place-based barriers to accessing care such as accessibility and price of care. Finally, we explore the association between place-based utilisation and key regional indicators for mental health; namely, self-reported mental health, mental health related ED presentations, self-harm hospitalisations, and suicides.

Results: We find that place factors account for approximately 75% and 16% of the regional variation in utilisation of mental healthcare services and mental health scripts respectively, with the rest reflecting patient demand. The relative importance of place is even greater for people with disability and low income populations. Controlling for patient demand across regions, we provide suggestive evidence that higher place-based utilisation for mental healthcare achieves improved mental health outcomes including fewer mental health related ED presentations, self-harm hospitalisations, and suicides. Specifically, a one standard deviation increase in the place-based utilisation for mental health scripts is associated with a 7% improvement in average self-reported mental health and a 13% reduction in mental health related ED presentations. A one standard deviation increase in the place-based utilisation for mental healthcare services is associated with an 8% reduction in mental health related ED presentations, a 11% reduction in the rate of self-harm hospitalisations, and a 10% reduction in the suicide rate. We also show that these associations exhibit no ceiling effects which is likely symptomatic of inadequate, rather than inefficient, supply.

Conclusions: Altogether, our findings suggest that greater mental health utilisation is justified and there is significant scope to improve mental health outcomes via place-based interventions. Such interventions are likely to be particularly important for people with disability and low income populations.

Cape Town International Convention Centre | CTICC 1 – Auditorium 2

The Cost to Global Economies of Inaction on Gender-Based Violence. Methodological Innovations from the Lancet Commission on Gender-Based Violence and Maltreatment of Young People [ECONOMICS OF RISKY HEALTH BEHAVIORS SIG]

MODERATOR: **Nata Duvvury**, University of Galway

ORGANIZER: **Beverley Essue**, University of Toronto

DISCUSSANT: **Felicia Knaul**, University of Miami

Cost of Inaction on Gender-Based Violence and Child Maltreatment in Uganda

PRESENTER: **Ibrahim Kasirye**, Economic Policy and Research Centre

After the 2010 Domestic Violence Act (DVA) for Uganda was enacted, an analysis was undertaken to establish the costs of failing to implement the DVA. The analysis focused on estimating individual direct costs faced by adults aged at least 15-49 years based on the incidence of intimate partner violence over the past year. Without implementing the DVA, Ugandans would continue to spend colossal amounts dealing with DV—estimated at 0.35 percent of GDP in 2012—about USD 31 Million per annum. This study aims to build from this work to estimate the cost of inaction against GBV and child maltreatment in Uganda in 2021. The cost of inaction was estimated using a framework that has been expanded to account for a broader categorization of GBV beyond IPV and, to account for violence against children aged 10-14 years, providing a more comprehensive estimate of the impact of gendered violence in Uganda. This study used the 2016 Uganda Demographic and Health Survey, and the 2015 Centre for Disease Control' Violence Against Children (VAC) surveys, supplemented with data from the literature and expert opinion to generate a prevalence estimate of the cost of GBV and child maltreatment that accounts for direct costs of violence (i.e., out-of-pocket expenses, cost of service provision, and lost earnings), indirect costs (i.e, lost productivity, lost unpaid care work), health and social impacts of childhood exposure, and economy-wide impacts. Other costs included the psychological and mental health-related costs associated with violence—from the survivor's standpoint as well as duty bearers. For the second level of analysis, the Social Accounting Matrix (SAM) approach estimated the inter-sectoral and economy-wide impacts (lost output and demand from violence) associated with GBV. This study demonstrates the feasibility of generating comprehensive estimates of the impact of gendered violence in a low-income country context where there is an evolving data infrastructure for monitoring and researching GBV. The estimates will inform advocacy, planning and policy in Uganda, strengthening the investment case for action against GBV to better integrate services for VAW and VAC. This study also highlights data gaps that should be addressed in order to enhance planning for GBV prevention and supports in this context. These results, together with the multi-country analysis, will inform the recommendations of the Lancet Commission on GBV and maltreatment of young people.

The Cost of Inaction on Gender-Based Violence and Child Maltreatment in Mexico

PRESENTER: **Renzo Calderón Anyosa**, McGill University

AUTHOR: Hector Ornales Arreola

Gender-based violence (GBV) continues to be an ongoing challenge for countries in the Latin America region. In Mexico, violence against women and girls has increased over the last five years, with seven out of ten women and girls experiencing violence in 2021. Nearly half of women and girls have reported experiencing sexual violence, with 23% reporting GBV within the last year. 52% said they had been abused psychologically, and nearly 35% had been assaulted physically. An economic impact calculation can be a powerful tool to encourage public and private sector investment in GBV prevention. Even though most costing studies focus on the direct economic impacts of violence for individuals, there is less understanding of its effects on the productive sector and on the overall economy. The objective of this study was to estimate the macroeconomic cost of GBV and child maltreatment in Mexico. The cost of inaction model used for this study established the costs of not implementing the relevant public policy actions to eradicate GBV in Mexico. We estimated the prevalence of GBV and child maltreatment in the last 12 months, as well as the average days lost due to violence, disaggregating by: (i) formal sector costs, (ii) informal sector costs and (iii) unpaid caregivers. Using the wages by occupation we calculate the total lost in income per occupation. For unpaid caregivers, we used the national average wage. Additionally, we accounted for the gender pay-gap, matching male to female wages by occupation. We used the National Survey on the Dynamics of Household Relationships (2011,2016,2021) for data on violence and the National Occupation and Employment Survey for the economic data. Further, the Social Accounting Matrix (SAM) was used to estimate the economy-wide impacts (loss of production and demand from violence) as well as the productivity losses that reverberate within and between sectors . The estimates are presented in 2022 USD. In Mexico between 2020 and 2021, four out of 10 women aged 15 and over experienced at least one situation of violence. Psychological violence stands out as the highest (29.4%), followed by sexual violence (23.3%). Violence against women mostly occurred in the community (22.4%). We will report the days lost, the yearly income lost due to GBV, by occupation an sector and the total yearly GDP lost. From the SAM model, we will illustrate the sectors that account for the greatest productivity losses, across public, private and informal sectors. These findings will highlight the severe impact of GBV and maltreatment of young people in Mexico, and the relevance of the findings will be interpreted for the region where similar patterns of GBV are evident. Demonstrating the micro and macroeconomic impact of GBV will help draw attention to this systemic and pervasive issue and will inform an all-of-society approach to address GBV. This project will be reported as an individual case study and will inform the development of a global cost of inaction projection.

The Macroeconomic Cost Associated with Gender-Based Violence and Maltreatment of Young People in Canada

PRESENTER: **Sujata Mishra**, University of Toronto

AUTHOR: Beverley Essue

Despite protection measures to preserve the rights of women and vulnerable populations, Canada continues to bear a high burden of gender-based violence (GBV) and maltreatment of young people (MYP). Existing estimates of economic costs for GBV are restricted mostly to costs associated with spousal violence for Canada. They fail to account for other types of non-spousal violence faced by women and children and do not estimate the macroeconomic losses in terms of output and demand between sectors or structural linkages of the economy. This study aims to estimate the magnitude of economic costs associated with GBV and MYP using the social accounting matrix (SAM) for Canada. We rely on four large data sources to capture the breadth of incidents of physical, sexual, and psychological violence; utilization of judicial and social services; and productivity losses in Canada. These include i) the police-based Uniform Crime Reporting Survey (UCRS, 2019); ii) the self-reported General Social Survey (GSS, cycle 34, Victimization- 2019); iii) labour market participation for Canada (2019) and iv) the Ontario Incidence Study of Reported Child Abuse and Neglect (2018). Further, we use the most recent SAM for Canada (2000) to derive the income and multiplier losses associated with GBV and MYP. We account for three broad cost categories: a) criminal justice system costs (e.g., legal aid, police and court; b) individuals' costs (e.g., physical and mental healthcare costs, productivity loss, personal costs and intangible costs due to GBV and MYP) and c) third-party costs to the system. By integrating the SAM within this estimate, we generate the macroeconomic estimates for Canada, accounting for interlinkages and dependencies of various sectors within the economy using multipliers and track the flow of income between activities, factors, and household accounts. All costs were adjusted for CAD 2019. We measured 214,379 violations against women in the UCRS in 2019 with 3.5% of women reporting experiencing intimate partner violence as per the GSS (2019) survey. Among women who reported violence, about 17% reported sexual violence, 11% reported physical violence and 5% reported psychological violence. Further, women lost on an average of 3.5 days of work on account of experiencing violence. Our preliminary analysis finds that the economic cost associated with GBV for the justice system is CAD $1.6 billion, for the victims is CAD $14.9 billion and third party costs is CAD $0.6 billion in Canada. Overall, the total economic cost associated with GBV in Canada is estimated at approximately CAD $17 Billion (2019) at the lowest bound. From a policy point of view, the study finds that the macroeconomic burden due to GBV and MYP renders a permanent invisible leakage to the circular flow of the economy that can potentially destabilize, weaken, or neutralize the positive gains from government expenditure on welfare programs. This case study will inform the projection of a global estimate of the cost of inaction against GBV and MYP.

The Cost of Inaction of Gender-Based Violence in Italy

PRESENTER: **Gabriella Conti**, Department of Economics and Social Research Institute, University College London

Gender based violence is a major public health problem in Italy, with significant consequences for individual victims and society. The number of sexual violence cases reported to the authorities experienced an increase over the last few years.

The last comprehensive study on the cost of violence against women (Badalassi et al., Intervita, 2013) is almost ten years old, and is mostly based on data from an ISTAT survey carried out in 2006; hence, there is a need to compute updated estimates of the costs of this phenomenon. In this paper we provide comprehensive updated estimates of the economic costs of gender-based violence in Italy, in relation to several short-, medium- and long term outcomes, ranging from physical and mental health problems to labor market outcomes and welfare use. We combine novel regression analysis of rich data from the ISTAT "Indagine sulla sicurezza delle donne: La violenza contro le donne dentro e fuori la famiglia" (2014) and the "Violence against women: an EU-wide survey" (2012) from the European Union Agency for Fundamental Rights with secondary evidence to produce an incidence-based estimate of the lifetime costs of gender-based violence (both direct and indirect costs) from a societal perspective. We also conduct an extensive sensitivity analysis to test the robustness of the results – something which has not been carried out in previous work. Our estimates provide the first comprehensive benchmark to quantify the cost of gender-based violence in Italy and suggests more coordination is needed between health (GPs), social services and law enforcement to improve surveillance of GBV and so reduce a substantial economic burden.

10:30 AM –12:00 PM   MONDAY   [Health System Performance]

Cape Town International Convention Centre | CTICC 1 – Room 2.43

Quality of Care

MODERATOR: **Óscar Lourenço**, University of Coimbra, Economics

The Relationship between the Adoption of Management Practices and Quality of Care Provided in Hospitals: A Systematic Review of the Global Evidence

PRESENTER: **Charlotte Ward**, LSHTM

AUTHORS: Victor Mwapasa, Linda Nyondo-Mipando, Monica Patricia Malata, Elias Phiri, Wanangwa Chimwaza, Catherine Goodman, Timothy Powell-Jackson

Background

A strong health system relies on healthcare management to continuously transform human and financial resources and other inputs into improved services and better health. The objective of this study is to review available evidence on the association between adoption of management practices and quality of care provided in hospitals across all country-income settings.

Methods

A systematic review of the literature was conducted according to a registered protocol. PubMed, EMBASE, EconLit, Global Health and Web of Science were searched using search constructs relating to health management, quality of care and hospitals. We supplemented traditional manual screening methods with novel machine learning software to automatically prioritise the most relevant articles. Of 10,211 articles retrieved, 23 studies met the inclusion criteria. The primary outcome of interest was quality of care, defined as (a) outcome measures that reflect patient health and the experience of care; (b) process measures that reflect delivery of evidence based clinical interventions or overprovision; and (c) structural measures reflecting the availability of inputs required for the provision of care. Risk of bias was assessed through a structured quality appraisal process. For each study, every individual association that was tested for was categorized as significantly positive (at 5 percent level), null or significantly negative.

Results

The 22 studies included in the final analysis were equally distributed between high and low- and middle-income countries. Twenty were cross-sectional in their design, and two used a before and after intervention study design. Just over half (13) were conducted in the hospital setting only and just under half used or adapted the World Management Survey method. Of 103 associations between management and quality of care, 48 (46.6%) were significantly positive, 54 (52.4%) were null and 1 (1%) were significantly negative. When dissaggregated by type of quality of care outcome, we see that the majority of associations are significantly positive with exception of associations between management and patient satisfaction of or experience with care, where 79.4% are null. Data do not show a notable difference in the direction of association between income settings. Studies with serious risk of bias had a higher proportion of significantly positive associations (58.9%) compared to those with moderate risk of bias (64.3%).

Conclusion

It is plausible that an association between management and quality of care exists. Compared to process and health quality of care outcomes, the association is weaker for outcomes measured through patient satisfaction or experiences of care. We found a good number of studies that have quantified hospital management; but it remains a challenging construct to measure and quantify.

Discordant Quality Ratings & Female Sterilization

PRESENTER: **Liana Woskie**, London School of Economics and Political Science (LSE)

Introduction: Patient-reported satisfaction is used as a measure to assess the patient centeredness of health systems. However, due to asymmetry of information, there is concern that patients may be unable to discern low quality services, particularly in cases where information is withheld. Tubal ligation is a procedure for which uninformed consent constitutes a form of coercion. Yet, we lack an understanding of how sterilized women rate the quality of their care and if subjective measures, such as satisfaction ratings, are able to pick up on issues of uninformed consent.

Methods: I use the National Family Health Survey of India (NFHS), with a sample of over 180,000 women who have undergone a sterilization procedure in India. The primary dependent variable of interest is a patient care rating where the patient is asked to subjectively rate the quality of services during and immediately following a tubal ligation procedure. For exposure to coercive care, I use the inter-agency WHO report "*Eliminating forced, coercive and otherwise involuntary sterilization,*" which outlines preconditions for non-coercive care within the control of the health system or provider. I also look at scoring discordance as an outcome; defined as an individual who is exposed to a coercion variable, but rates their care highly. I utilize a series of logit models to examine dissatisfaction as a dichotomous outcome and exposure to each of the coercion variables as predictors separately. For each predictor, I run multiple models: I: unadjusted, II: with year and district fixed effects and III: adjusted – controlling for key demographic characteristics.

Results: I find a statistically significant and positive relationship between being exposed to coercive care and the odds of reporting low quality. The relationship is strongest for patients who were not told the procedure's permanence (OR: 1.720, p <0.05) followed by not having alternate options and not deciding to undergo the surgery independently (OR: 1.558 and 1.566, respectively, both p<0.05). These results held when controlling for patients' demographic characteristics, such as: caste, religion, rurality, educational attainment, and care context variables, such as: facility type and procedure timing. However, the majority of respondents' scores were discordant: over 95% of women who underwent a tubal ligation procedure rated their care highly regardless of if they were provided with adequate information for informed consent; a recognized form of coercion. Further, discordance was more pronounced if a patient belonged to a historically marginalized caste or tribe (OR: 1.2, p <0.05). In examining system-modifiable factors, I find that both conditional cash transfers to the patient and procedure timing, e.g. during the immediate postpartum period, increase the odds that a women expressed satisfaction with a coercive procedure.

Conclusions: In a nationally representative sample of women who underwent tubal ligations across India, there was a positive relationship between exposure to coercion and odds of negative reporting, but over 95% rated coercive care positively. These data problematize status quo approaches in patient-centeredness measurement for a frequent, yet understudied, surgical procedure with practical implications for quantifying coercive reproductive care.

Does Pay-for-Performance Design Matter? Evidence from the National Programme for Improving Primary Care Access and Quality (PMAQ) in Brazil

PRESENTER: **Everton Silva**, University of Brasilia

AUTHORS: Letícia Xander Russo, Josephine Borghi, Jorge Otávio Maio Barreto, Garibaldi Dantas Gurgel Junior, Timothy Powell-Jackson

Background: Pay-for-performance (P4P) schemes are shown to have mixed or inconclusive effects on health care utilisation and quality of care in low- and middle-income countries. A challenge in interpreting this evidence is that P4P schemes are often considered a homogenous intervention, when in practice they vary substantively in their design along key dimensions that may matter for their impact. Our study contributes to this literature by providing a more detailed depiction of incentive design across municipalities within a national P4P scheme in Brazil. The National Programme for Improving Primary Care Access and Quality (PMAQ) was implemented in Brazil during a 9-year period, reaching around 95% of Brazilian municipalities (5,323 municipalities) and family health teams (FHTs) (40,684 teams). Municipalities had autonomy to decide on several key aspects of scheme design within the framework of a national programme. **Objectives:** To characterise the main types of incentive design implemented at the municipal level within PMAQ in Brazil in the third round of the programme (Oct/2015 to Dec/2019) and explore the association of alternative design typologies on performance in terms of quality of primary health care. **Methods:** The study design was a cross-sectional analysis of the association between P4P design features and quality of care performance. We carried out a survey of municipal health managers to characterise the scheme design, based on the size of the bonus, the providers incentivized, and the frequency of payments. We combined these primary data on scheme design with secondary sources of data measuring FHT performance and municipality characteristics. Using OLS regressions, we examined whether each design feature was associated with better FHT performance, with the reference category being municipalities that gave no bonuses. To capture potential interactions between design features related to performance, we then used cluster analysis to group municipalities into five design typologies. Performance was measured by the absolute PMAQ scores from participating FHTs, provided by the Ministry of Health. The PMAQ score reflects hundreds of structure, process and outcome indicators. **Results:** Most of the municipalities included in our study (373, 55.1%) opted for disbursing PMAQ resources to workers, using bonus allocations of different sizes, across different providers and with varying payment frequency. We identified frequent bonus payments (monthly) and higher size bonus allocations (share of 20 to 80% of PMAQ resources) as the main drivers of team performance, which is supported by individual and cluster analyses. Increasing who within a team was eligible to receive bonuses does not seem to affect performance, except when it is adopted in combination with high frequency bonus payments and higher shares of PMAQ funds allocated as bonuses. From the cluster analysis, the PMAQ score was 8.44 (CI95% 5.38–11.49, p<0.001) higher in cluster 5 (Large-bonus/Many-workers/High-frequency) compared to cluster 1 (no bonus), which means an increase of 21.7% in the average PMAQ score. **Conclusions:** Our results suggest the P4P design is strongly associated with performance outcomes. Evidence from our study can shed light on how design features affect performance, informing the design of more effective P4P schemes.

10:30 AM –12:00 PM   MONDAY   [Health Care Financing & Expenditures]

Cape Town International Convention Centre | CTICC 1 – Room 2.46

Equitable Financing of Reproductive Maternal Newborn and Children's Health Interventions in India and Nigeria [ECONOMICS OF CHILDREN'S HEALTH AND WELLBEING SIG]

MODERATOR: **Stéphane Verguet**,

ORGANIZER: **Osondu Ogbuoji**, Duke Global Health Institute

DISCUSSANT: **Justice Nonvignon**, University of Ghana

Sustaining Effective Coverage in the Context of Transition from External Donor Assistance for Family Planning Programs in India

PRESENTER: **Rajna Mishra**, Public Health Foundation of India

AUTHORS: Preeti Kumar, Sakthivel Selvaraj, Suhaib Hussain, Ipchita Bharali, Wenhui Mao, Gavin Yamey, Osondu Ogbuoji

Objective: Donor transition studies are commonly undertaken and documented in government and donor reports as part of donor requirements. However, they are rarely subject to robust independent evaluations—a scoping review of secondary literature found limited information on the subject. We undertook in-depth case study of the largest family planning project in India, the United States Agency for International Development-funded Innovations in Family Planning Services (IFPS) project. USAID provided external funding support to the IFPS from 1992-2012. The main objective of our research was to assess whether or not the coverage of family planning/reproductive health was sustained after donor transition and which factors may have supported or hindered sustained coverage.

Methods: Difference-in-differences (DiD) analysis was used to evaluate the causal impacts of donor funding on the three outcome measures - modern contraceptive prevalence rate (MPCR), total unmet need for contraception, and total fertility rate (TFR) - before and after the USAID-funded IFPS project for family planning was implemented in Uttar Pradesh (UP). Districts of UP were taken as the treatment districts, while districts of Bihar were taken as controls. We used data from two rounds of the District Level Household Survey (DLHS-2 [2002-04] and DLHS-3 [2007-08]) during the donor intervention period and two rounds of the National Family Health Survey (NFHS-4 [2015-16] and NFHS-5 [2020-21]) after donor exit. We also used data on health systems obtained from the Rural Health Statistics survey, for the years 2006, 2009, and 2016.

Findings: The DiD analysis for MPCR showed that in both pre-donor and post-donor funding periods, changes in MCPR were statistically significant, suggesting that donor funding had a considerable effect on increases in MCPR in UP as compared to controls. Our analysis found a 9.7 percent statistically significant increase in MCPR from 2008 to 2016. Total unmet need for contraception fell by 5.65 percent from 2004, but from 2008 to 2016 it declined by 7.11 percent in UP as compared to the controls, which was a statistically significant change. The total fertility rate (TFR) fell by 33.3 percent from 2004, but from 2008 to 2016, the TFR declined by 24.8 percent in UP as compared to the controls, which was a statistically significant change.

Conclusion: The USAID-funded IFPS project in UP helped in improving family planning indicators prior to the USAID donor transition and paved the way for sustained FP programs in post-donor exit years. To ensure smooth transitions, donors need to develop a well laid-out transition plan with transition readiness assessment tools developed in collaboration with all stakeholders involved in the program and implemented in a phased manner. Constant donor engagement with federal and state governments is vital for sustainability. Donor support to programs should not end abruptly as in the case of the IFPS project and post-transition support should continue for a certain period of time and should cease gradually. A reasonable amount of time should be built in and there should be strong alignment between government leaders and donors.

The Costs of Providing Essential RMNCH Services in Nigeria

PRESENTER: **Yewande Ogundeji**, Health Strategy and Delivery Foundation

AUTHORS: Aishatu Fodio, Wenhui Mao, Kelechi Ohiri, Osondu Ogbuoji, Gavin Yamey

Introduction

Given the limited fiscal space for health in Nigeria, service delivery cost estimates are essential for informing resource planning, allocation and prioritisation for basic reproductive, maternal, neonatal and child health (RMNCH) initiatives, including free/subsidised maternal health services, to ensure efficient use of available resources. Given the lack of recent costing data, this study examines the costs associated with delivering essential interventions for RMNCH services to inform necessary investments and domestic financing for the provision of a sustainable health benefits package. Data generated by the study also help in understanding the true financial burden exerted on individuals in Nigeria when seeking RMNCH services.

Methods

Thirty-three RMNCH interventions were selected and a hybrid costing approach (top down and bottom up) was used to estimate the costs of RMNCH services from patient and provider perspectives. Costs included from the patient perspective were direct medical (service fees, diagnostic costs, drug costs), direct non-medical (food and transportation), and indirect costs as a result of reduced of economic productivity for patients and caregivers. From a provider perspective, the total cost was defined as the sum of fixed and variable costs.

Results

Health facilities in Nigeria incur an average per annum unit cost of NGN 8,087.69 (US $26.34) per RMNCH service. Fixed costs account for 35.7% and variable costs account for 64.3% of the total. From a patient perspective, RMNCH interventions cost NGN 13,821.14 (US $45.02) on average per annum, where service fees, diagnostics, drugs, and commodities costs account for 27%, 10%, 32% and 31%, respectively. On average, patients incur an additional cost of NGN 551.04 (US $1.79) and NGN 1,157 (US $5.07) per visit for non-medical and indirect costs, respectively.

Conclusion

Despite free and subsidized RMNCH services at the point of care in Nigeria, RMNCH services remain cost prohibitive from a patient perspective. High costs can hamper access to care or result in catastrophic health expenditure. Thus the proposed benefits package need to be aligned with existing financial risk protection schemes. This study provides valuable evidence that can inform national, sub-national and global action for providing RMNCH health services packages to the poor and vulnerable and accelerating Nigeria's progress towards UHC.

Differential Effect of Public Financing of Essential Maternal and Child Health Interventions across Wealth Groups in Nigeria: An Extended Cost Effectiveness Analysis

PRESENTER: **Wenhui Mao**, Duke University

AUTHORS: David Watkins, Miriam Sabin, Katy Huang, Etienne Langlois, Yewande Ogundeji, Helga Fogstad, Marco Schäferhoff, Gavin Yamey, Osondu Ogbuoji

Background: The rates of maternal and newborn mortality in Nigeria are among the highest in the world, and there are large socioeconomic inequalities in access to maternal, newborn, and child health (MNCH) services. There are also inequalities in catastrophic health expenditure (CHE) experienced by households in Nigeria.

Methods: We conducted an extended cost effectiveness analysis to estimate the health and financial risk protection (FRP) benefits, across different wealth groups, of a public financing policy that assumes zero out-of-pocket (OOP) cost to the patient at the point of care for 18 essential MNCH services. We projected health outcomes and private expenditure averted for two scale-up scenarios using the Lives Saved Tool with data from national surveys.

Findings: If an additional 5% increase in coverage was provided for all quintiles (universal scale-up scenario), the policy would prevent over 1.1 million maternal and under-five deaths, avert 1.8 billion USD private expenditure, and avert 3,266 cases of CHE from 2019 to 2030. The incremental cost effectiveness ratio would be 44 USD per life-year gained, which is highly cost-effective when compared with Nigeria's 2018 GDP per capita of 2,028 USD. The policy would prevent more under-five deaths and CHE cases in poorer quintiles, but it would prevent more maternal deaths and private expenditure in wealthier quintiles. If the poor population experienced a greater increase in service coverage (pro-poor scenario), more maternal and under five deaths and more private expenditures would be prevented in the poorer quintiles than would be the case under the universal scale-up scenario.

Interpretation: Public financing of essential MNCH interventions in Nigeria would provide substantial health and FRP benefits to Nigerian households. These benefits would accrue preferentially to the poorest quintiles (the policy is pro-poor) and would contribute towards reduction of health and socioeconomic inequalities in Nigeria. The distribution would be more pro-poor if public finance for MNCH interventions could target poor households.

Health and Financial-Risk Protection Benefits from User Fee Removal for Essential Maternal and Child Health Interventions in India and Nigeria – an Economic Evaluation.

PRESENTER: **Osondu Ogbuoji**, Duke Global Health Institute

AUTHORS: Ashwini Deshpande, Miriam Sabin, Wenhui Mao, Katy Huang, Marco Schäferhoff, Etienne Langlois, Helga Fogstad, David Watkins, Gavin Yamey

Objective: Public financing for maternal, newborn, and child health (MNCH) interventions can improve uptake of MNCH services, prevent maternal and newborn mortality, and provide financial risk protection (FRP). India and Nigeria both have high maternal and child morbidity and mortality and are in the process of expanding universal health coverage. If successful, they will make significant progress towards achievement of the poverty-related and health-related sustainable development goals (SDG 1, SDG 3.1, 3.2, 3.8). In this study, we explored the health and economic benefits that would accrue to individuals and households in both countries if user fees for essential MNCH interventions are removed.

Methods: We developed a microsimulation model to estimate the health gains (deaths averted) and FRP afforded (cases of private expenditure, catastrophic health expenditure, and poverty averted) if the government removes user fees for 10 MNCH interventions in India and Nigeria. We developed a synthetic closed population for each country using the family/household structure obtained from national household surveys and used this to populate the model.

Findings: Health and economic benefits vary across MNCH interventions and countries. In addition, interventions have differential effects on individual and household finances. For every $100,000 dollar spent by government, the most deaths will be averted by case management for pneumonia in newborns (36 deaths averted) in India, and management of severe acute malnutrition (SAM) (50 deaths averted) in Nigeria. For the same investment, the largest number of cases of individual poverty will be averted by case management for pneumonia in newborns (18 individuals) in India, and management of childhood pneumonia (54 individuals) in Nigeria. Conversely, cases of household poverty averted per US$100,000 spent will be highest for management of SAM (4.7 households) in India, and essential ANC and facility delivery for non-complicated pregnancies (11 households) in Nigeria.

10:30 AM –12:00 PM   MONDAY   [Health Care Financing & Expenditures]

Cape Town International Convention Centre | CTICC 1 – Room 2.44-2.45

Health Budgeting in the Time of COVID-19: Rising Fiscal Pressure?

MODERATOR: **Tom Hart**, ODI

DISCUSSANT: **Kalipso Chalkidou**, The Global Fund; **Danielle Serebro**, Collaborative Africa Budget Reform Initiative (CABRI)

Budgeting for Health during COVID-19: Decision Making during a Crisis

PRESENTER: **Takondwa Mwase**, Health Economics and Policy Unit, Kamuzu University of Health Sciences

Many African governments increased health spending in response to the COVID-19 pandemic. But this occurred within a context of chronically underfunded health budget and as countries saw an economic contraction and falling revenues, meaning that increased health spending was generally funded either from additional borrowing, or from cuts to other important services such as education (if schools were closed during the pandemic) or infrastructure (if construction activity ceased), raising questions as to its sustainability.

Several studies have assessed the impact of the pandemic on health spending, but these have used global economic and fiscal forecasts for economic growth and overall government spending, with assumptions or modelling of what has happened to health budgets. There has not, thus far, been comparative studies of the actual trajectory of health spending using country budget data, and how budgetary decisions were taken. The country-specific formal and informal norms, processes and politics behind budget prioritisation and reprioritisation are not adequately documented or understood by the public finance and health financing communities.

To justify maintaining, or increasing, health spending, Ministries of Health must leverage programme expertise and engage effectively with key budget actors, including the Ministry of Finance, development partners and the legislature. Insight is limited into how the MoH engages with these stakeholders during budget preparation or precisely how resource allocation decisions are made. This has resulted in a gap in understanding what capabilities and institutions hinder or contribute to a Ministry of Health's ability to advocate for increased health financing. Unsurprisingly, even less is known about what budgeting processes looks like during a health crisis of the magnitude of COVID-19.

This study will analyse national and sub-national budget documents in Kenya, Malawi, and Zimbabwe to understand the changes in the health budget over the years of study. Key informant interviews with government officials, members of parliament and health development partners, will provide insight into understanding how and why the health budget allocation decisions were made. The study will seek to (1) set out the changes that took place in the size and composition of health budgets during Covid-19, (2) illustrate the practices, systems and coordination mechanisms that influenced health budgeting and how these were adjusted during COVID-19; (3) determine the extent to which evidence such as health technology assessments, informed budget allocations and the provision of health services; (4) uncover where weaknesses and bottlenecks lie in budget formulation and how these can be strengthened ahead of future crises; (5) understand how political factors affected spending decisions in each country; and (6) provide, by drawing on trends from the past three years, a view of the medium-term prospects for health spending.

Crowding out of Routine Immunization from COVID-19: Experiences from Cameroon, Nepal and Pakistan
PRESENTER: **Aniruddha Bonnerjee**, UNICEF Nepal
Many countries are facing fiscal constraints from the economic impact of COVID-19, which is constraining government budgets at the same time as governments face higher spending demands for the immediate COVID-19 health and socio-economic response, as well as the pent-up demand for health services from periods of lock-down, and the need to invest in health systems to better meet and respond to pandemic shocks. COVID-19 vaccination adds additional pressures as it may be competing both for a segment of the health sector's limited resource envelope and for the infrastructure, skills, and resources from national immunization programmes.

This study describes how childhood immunization and COVID-19 vaccine procurement and delivery are budgeted for within the national health budget and assesses the trends in budget allocations and expenditures across 2018-2022, together with the availability of external funding. It investigates whether COVID-19 vaccine procurement and delivery crowded-out expenditures for routine childhood immunization. To do this, the budget process for immunization is analysed, including the adequacy and availability of funding from different sources, and any bottlenecks or constraints to this expenditure. It will formulate practical recommendations that respond to the challenges identified, including improvements to available data, and monitoring and reporting of allocations and spending on childhood immunization and the COVID-19 response.

Preliminary findings show variation across countries with Nepal showing substantial health expenditure increases in 2020/21 and 2021/22, although budget allocations are expected to drop in 2022/23. Despite significant resources dedicated to COVID-19 response and vaccination, the rise in health expenditure indicates limited crowding out of other health expenditure areas, although there were still initial negative impacts on service delivery. This is shown by a fall in immunization coverage rates in 2020, with survey data indicating multiple contributing factors, including border closures affecting the delivery of routine immunization, the impact of lockdowns on transportation and logistics, a shortage of PPE, and household concerns over visiting health facilities.

The Impact of COVID-19 Budget Reallocations
PRESENTER: **Stephanie Allan**, OPM
Disasters have both short- and long-term fiscal consequences, such as deteriorating fiscal balances, economic contraction, and increasing public debt. Beyond these costs, disasters also cause reallocations in government budgets. During COVID-19, governments with constrained fiscal space or limited pre-arranged sources of funds (such as reserve funds or insurance) were forced to raid their existing budgets and reallocate funds to finance the COVID-19 response, including to the health sector. While such actions are necessary, they crowd out other important planned public expenditures, presenting an opportunity cost in terms of forgone or delayed returns. Yet, across the world, budget reallocations are poorly documented and rarely quantified.

The World Bank, FCDO, and the Centre for Disaster Protection, through its partner Oxford Policy Management, has analysed the scale and incidence of budget reallocations and their impact during COVID-19 in Albania, Ethiopia, Pakistan and South Africa. A five-step methodology was used, comprising: (i) understanding what sources of funding are in place; (ii) analysing the procedures and legal frameworks for using these sources; (iii) establishing a counterfactual – a best-guess estimation of what spending in 2020 would have looked like without the pandemic; (iv) expenditure analysis (comparing outturns against the counterfactual) alongside interviews with the government; and (iv) impact analysis, to quantify the returns foregone from diverted public spending.

The results reflect that to strengthen crisis response and improve budget credibility in the face of future pandemics or shocks, governments should rely less on ex-post sources of financing. They should consider developing a framework for budget reallocations that includes shifting budget reallocations from a rushed ex post instrument to a pre-planned ex ante instrument. Implementing such a framework would facilitate greater engagement with line ministries, greater scrutiny from parliament, and a more credible budget. A proactive approach to budget reallocations should be couched within a broader disaster risk financing strategy to ensure that the costs and benefits of such an approach are weighed against other available financing tools, such as risk transfer instruments and the cost-effective use of domestic public finance. Efforts should also be made to increase and improve access to financing for emergencies. This will help governments provide sufficient finance when it is needed, as limited financial capacity means that while budgeting and budget process improvements will help mitigate the impacts, they will

not be able to provide all the required finance to respond to the most serious disasters. Access to additional financing will help to further mitigate the impacts of disasters and make responses timelier and more cost effective.

The case studies offer recommendations on how to lessen the opportunity costs associated with disaster-related budget reallocations and make public budgets more responsive and resilient to crises. Resilience budgeting is a novel budget formulation approach which specifies formalised criteria for reallocation and ex-ante agreement between line ministries and central finance agencies about their priorities. With such an approach, the decision-making process about budget cuts can become more transparent, cost-effective, and quicker, while simultaneously providing line ministries with more predictability on in-year budget changes.

10:30 AM –12:00 PM   MONDAY   [Economic Evaluation Of Health And Care Interventions]

Cape Town International Convention Centre | CTICC 2 – Protea

Developing Realist Economic Evaluation Methods (REEM) and Guidance to Evaluate the Impact, Costs, and Consequences of Complex Interventions. a Series of Facilitated Round-Table Discussions to Inform Methods Development.

MODERATOR: **Cam Donaldson**, Yunus Centre, Glasgow Caledonian University, UK

ORGANIZER: **Angela Bate**, Northumbria University

DISCUSSANT: **Meghan Kumar**, LSHTM

The Need for More Nuanced Economic Evaluation Methods to Address Complexity: An Introduction to Realist Economic Evaluation Methods (REEM) and Research on Their Development.

PRESENTER: **Angela Bate**, Northumbria University
Paper 1. Title: The Need for More Nuanced Economic Evaluation Methods to Address Complexity: An Introduction to Realist Economic Evaluation Methods (REEM) and Research on their Development.

In this paper we set out our research which aims to bring together realist and economic evaluation to develop realist economic evaluation methods (REEM). This three-year funded research study will advance understanding of how these approaches can be integrated and develop forms of evaluation that both enables economic evaluation to become more context-sensitive and explanatory, and realist evaluations to better capture the role of resources and the opportunity costs. We are keen to seek the wider input of iHEA participants from the outset to ensure that we capture the multiplicity of views, perspectives, and experiences of the health economics community to shape this research.

Health and social care require well-designed complex interventions and robust evaluation, which itself is often complex. In recent years, there has been increasing recognition that complex interventions require adapted or new methods of evaluation that explicitly embrace for complexity. This has most recently been articulated in the updated MRC framework for developing and evaluating complex interventions and the recent updates to the ISPOR Consolidated Health Economic Evaluations Reporting Standards (CHEERS) II statement. However, economic evaluation methods often do not fully account for the importance of context on outcomes, or how interventions work differently for different people. Further, the results of economic evaluations in health and social care are often poorly generalisable (transferable). Where more general attempts have been made in economic evaluation to account for context (such as applying explicit value judgements retrospectively to data analyses through stratification, modelling, or subgroup analysis) the intervention is still typically treated as a 'black box', with the focus on the inputs and outputs - with no explicit reasoning on eliciting causes as to the 'how' or 'why'. It can be argued that these economic evaluations are therefore still insufficient.

On the other hand, realist evaluation was designed to evaluate complex social interventions, evaluating how and why interventions are effective for different groups and in different settings. But realist evaluations do not tend to explicitly capture the economic costs or consequences of interventions. This represents a methodological gap in the evaluation of complex interventions and a key limitation to providing applicable evidence for policy and service delivery. We argue that, despite their different (implicit or explicit) ontological and epistemological bases, there is considerable potential for realist and economic evaluations not only to learn from each other but to be combined, bridging this methodological gap. Our research will advance understanding of how realist and economic evaluation approaches can be integrated and develop forms of evaluation that both enables economic evaluation to become more context-sensitive and explanatory, and realist evaluations to better capture the role of resources and the opportunity costs.

What Are the Theoretical, Methodological and Practical Similarities and Differences between Realist and Economic Evaluations? Implications for Integrating Realist and Economic Evaluation Methods. a Scoping Review.

PRESENTER: **Andrew Fletcher**, Northumbria University
Paper 2.

The aim of this scoping review was to scope and map the evidence about current approaches and advances in realist research and economic analysis when evaluating complex interventions. This included: identifying the available evidence, gaps in knowledge, clarifying key definitions, and examining *what* the theoretical and methodological barriers and facilitators to integrating these methods are. The searches gathered guidance documents and studies to address four sub-questions:

1. What are the recent developments in methods/guidance recommended for economic evaluation of complex interventions in health and social care?
2. How are realist concepts i.e., programme or intervention theory or context-dependency captured theoretically or applied in the conduct of economic evaluations, including any examples that have demonstrated this?
3. What are the recent developments/guidance recommended for realist evaluations of complex health and social care interventions?
4. How are economic concepts i.e., resource use/impacts, outcome valuation and opportunity costs of interventions, captured theoretically or applied in the conduct of realist evaluations including any examples which have demonstrated this?

We used search methods recommended for conducting reviews of methods papers to gather methods documents efficiently for Questions (a) and (c). This involved: 1) gathering key guidance, methods papers and chapters from a core expert group and project team members; 2) identifying further relevant sources using forward and backwards citation search techniques using Science and Social Science Citation Indexes (Web of Science) and Google Scholar; 3) a focussed literature search of databases (Assia, Medline, EconLit, Web of Science databases) and a Google to supplement our collection of methods guidance. Searches for Question (b) identified published and unpublished studies that have attempted to use realist concepts or programme theory within economic evaluation using the same databases and sources as those outlined above. The initial search strategy included the search terms 'programme theory', 'causal mechanisms' and 'intervention theory', combined with a purposive search for economic evaluations. Searches for Question (d) identified published and unpublished realist evaluations that capture costs or resource use. Again, searches were run in the sources listed above, using the search term 'realist evaluation' and words, synonyms and index terms for 'costs' or 'resource use'. This approach ensured we drew on research, experience, and knowledge across multiple disciplines and countries (published and grey literature sources, ongoing projects, and training materials).

We are currently at the stage of running the searches. Given the overlap in search terms used for each question we anticipate finding considerable duplicate records. Rayyan software will be used to review relevant studies will be coded for which question(s) they relate to, noting that some studies/reports will be relevant to more than one review. Each source will be judged in terms of their clarity of reporting (especially methods/recommendations) and its contribution to the emerging synthesis. This will involve tabulating the main characteristics of included papers/sources, grouping them, identifying outliers/discrepant points/evidence, and discussing them initially within the research team. We will use the findings to address questions (a) to (d) posed above. The review reporting will follow PRISMA ScR guidelines.

What Theoretical and Methodological Principles and Definitions Are Fundamental for the Pragmatic Application of Reem?

PRESENTER: **Sonia Dalkin**, Northumbria University

Paper 3. Title: What theoretical and methodological principles and definitions are fundamental for the pragmatic application of REEM?

Abstract: In this paper the presenter will introduce and share 3 topics, drawing on critiques from previous work identified in the second paper in this organised session (What are the Theoretical, Methodological and Practical Similarities and Differences between Realist and Economic Evaluations? Implications for Integrating Realist and Economic Evaluation Methods. a Scoping Review). These will form the basis for further round-table discussions with the session participants. The topics for discussion are:

- What are the epistemological and ontological **commonalities** that underpin economic and realist evaluation and how might these undermine or support and shape the theoretical development of REEM?
- What are the **pragmatic implications** of combining evaluation methods and what fundamental tenets of economic evaluation would we need to retain in the practical development of REEM?
- What **shared language, terms, and definitions** are fundamental or necessary in the applied development of REEM?

The round-table discussions will be facilitated by the session organiser and moderator. Software such as JamBoard will be used to capture the input from participants.

Cape Town International Convention Centre | CTICC 1 – Room 1.42

Provider Supply & Outcomes

MODERATOR: **Duane Blaauw**, University of the Witwatersrand

Where Do Community Health Worker Visits Make a Difference on Child Mortality? An Instrumental Variables Approach Using Trial Data from Rural Mali

PRESENTER: **Calvin Chiu**, University of California, Berkeley

AUTHORS: Kassoum Kayentao, ProCCM Trial Group, Jenny Liu

Remote, rural populations in low-and-middle income countries have limited access to health care services as demand is extremely elastic to distance to nearby health facilities. This contributes to high neonatal and under-5 mortality due to common, but untreated childhood illnesses, such as malaria, diarrhea, and pneumonia. While some health systems promote proactive outreach by community health workers (CHWs) to bring services closer to communities, there is limited evidence on the intensity of service delivery required to achieve significant improvements in health outcomes. Understanding the shape of this dose-response function can help policymakers allocate resources more efficiently.

Leveraging exogenous variation from a cluster-randomized trial of a Proactive Community Case Management (ProCCM) strategy by CHWs in 137 village clusters in Bankass, Mali (powered to detect differences in under 5 mortality rates) we estimate the dose-response relationship between the number of visits individuals receive and various health outcomes. Using an instrumental variables approach, we estimate both linear and poisson models controlling for cluster and month fixed effects. This overcomes concerns around adverse selection of patients that affect observational studies that attempt to address this question. We measure health outcomes using the trial's household survey responses from all consenting women of reproductive age (15-49) at baseline, 12, 24, and 36 months, identified from a population census (N=135,149) in the study area. We measure the intensity of service delivery using program monitoring data collected by a custom-built CHW mobile application capturing both outreach and facility-based visits throughout the study period (N=567,526). Linking the two datasets allows us to understand how health service utilization (from the CHW app) affects health outcomes (from the household survey) at the population level.

We find a strong first stage result: from a mean of 3 visits in the Control arm, ProCCM increases the number of visits by 10 (SE: 0.66) over the study period (IRR: 4.6), corresponding to an increase of 0.3 (SE: 0.03) visits per individual per month (IRR: 4.5). However, there is no effect on under 5 mortality, our primary outcome of interest, in the second stage. Across the distribution of visits delivered, only in 10% (5%) of study-months did individuals receive at least 1 visit in the ProCCM (Control) group, despite ProCCM protocols specifying visiting each household twice per month. Only individuals predicted to receive CHW visits in the highest quintile (i.e. >15 visits in the first stage) had lower mortality rates (IRR: 0.33, SE: 0.07), suggesting that ProCCM-induced utilization impacted health outcomes only among those regularly receiving health services. Ongoing research will i) characterize the individuals induced to access regular health services (compliers); ii) the nature of the health services provided during CHW visits; and iii) effects on secondary health outcomes, such as diarrhea, fever and pneumonia.

Estimating the dose-response relationship between health service utilization and health outcomes is difficult because those induced to take-up additional health services may be highly selected even in the case of a randomized controlled trial. Policymakers need to consider treatment heterogeneity due to differential take-up when designing community-based health systems.

Effects of Physician Supply on Health Outcomes: Evidence from a Natural Experiment in Bangladesh

PRESENTER: **Nirman Saha**, University of Surrey

AUTHOR: Md Amzad Hossain

This paper examines whether an increased physician supply in lagging areas improves health outcomes. Under a unique intervention commenced in Bangladesh in 2013, the government increased the physicians' existing stocks by more than 25 percent. We use the variation generated by this program, one of the most massive such interventions globally, to show that the increased number of physicians led to an increase in the number of visits to doctors, an improvement in the child delivery practice, and a substitution in treatment-seeking practice from unqualified personnel or traditional healers to qualified physicians. We also document a significant decline in the mortality rate due to increased number of doctors. Our back-of-the-envelope cost-effectiveness analysis suggests that the cost per life saved was $505, implying that increases in the number of physicians in lagging areas can be a cheap but effective intervention to promote better health outcomes in the developing world.

The Effect of Physician Supply on Prevalence of Dementia in Rural and Urban Areas

PRESENTER: **Nasim Ferdows**, Northeastern University

Objective: Rising life expectancy has led to increasing prevalence of age-related diseases, such as Alzheimer's disease and related dementia (ADRD). The more rapid increase of the US rural older population may lead into higher rates of dementia in these communities. However, growing evidence suggests that the rural residents face disparities in availability, accessibility and affordability of healthcare services compared to their urban counterparts, making diagnosis more challenging, leading to underestimation of ADRD prevalence in these communities. The objective of this study is to examine the effect of availability of physicians on ADRD prevalence, comparing rural and urban communities.

Design and participants: We used 20-percent random sample of Medicare beneficiaries older than 65 (2002-2014) to create a dataset that contains ADRD prevalence in a given county-year. We merged this data with Area Health Resource File (AHRF) which contains county-level data on the availability of healthcare services and demographics.

Our main explanatory variable was per-capita physician supply in a given county-year. Counties were categorized into urban, rural counties adjacent to an urban county, and rural counties not adjacent to an urban county. We employed Chinese Import Competition (CIC) as an instrumental variable to deal with the endogeneity problem. We calculated CIC based on the Census Integrated Public Use Micro Samples and World Trade Organization (WTO) data.

We used county fixed-effect two-stage linear regression model to estimate the effect of physician supply on ADRD prevalence, using CIC as an instrument variable, controlling for per-capita income, unemployment rate, and the ratios of female, Black, and Hispanic older adults in a given county-year.

Results:

Our sample included 10,590,016 individuals in 3,041 counties (57.08% females, 8.18% Black, and 1.86% Hispanic adults 65 years and older): 1,127 urban counties, 1,000 rural-adjacent, and 914 rural-nonadjacent counties. ADRD prevalence was higher urban counties during all study years following by rural adjacent counties. ADRD prevalence rates peaked in 2008 and declined steadily in all counties. There were fewer per-capita physicians in rural areas with a sharp growth in urban areas (from 2.78 in 2002 to 3.03 physicians per 1,000 population in 2014) whereas a persistent decline in rural areas following a peak in 2003 (from 1.07 and 1.32 in 2002 to 0.99 and 1.33 in rural-adjacent and nonadjacent in 2014).

Our results indicate that 1% increase (above the mean) in per-capita physicians decreases ADRD prevalence by 0.0055%p (P<0.01) in urban, increases by 0.0010%p (P=0.26) in rural-adjacent, and decreases by 0.0003%p (P=0.749) in rural nonadjacent. Our 2SLS results indicate that 1% increase in per-capita physicians decreases ADRD prevalence by 0.56%p (P=0.037) in urban, whereas increases by 0.77%p (P=0.019) and 0.99%p (P=0.045) in rural-adjacent and rural-nonadjacent.

Conclusion:

Since the response of ADRD prevalence was higher in rural-adjacent and rural-nonadjacent counties compared to urban counties, the hypothesis that the available effect was stronger in rural areas compared to urban is confirmed. Also, since ADRD prevalence increased by an additional per-capita physician supply in rural-adjacent and rural-nonadjacent counties, more physicians in rural areas may lead to higher number of elderlies diagnosed with ADRD.

10:30 AM –12:00 PM   MONDAY   [Economic Evaluation Of Health And Care Interventions]

Cape Town International Convention Centre | CTICC 2 – Orchid
Economics of Pricing, Payment and Financing Strategies

MODERATOR: **Meredith Rosenthal**, Harvard University

Considering Disease Severity for Drug Pricing and Reimbursement: A Comparative Analysis of Dutch and German Health Authorities

PRESENTER: **Afschin Gandjour**, Frankfurt School of Finance & Management
Considering Disease Severity for Drug Pricing and Reimbursement: A Comparative Analysis of Dutch and German Health Authorities

Background/aim: Severity of disease and/or unmet need are important considerations in assessing the value of new health technologies. The Dutch National Health Care Institute (Zorginstituut Nederland) captures severity of disease by the method of proportional shortfall (PS). The purpose of this study is to compare the PS concept to i) the consideration of disease severity implied by the regular early benefit assessment (EBA) of new, innovative medicines in Germany, ii) the consideration of disease severity implied by the efficiency frontier (EF) method used by the Institute for Quality and Efficiency in Health Care (IQWiG), and iii) an equity framework using relative maximization of quality-adjusted life years (QALYs) as a maximand.

Methods: Value functions pertaining to the different approaches are characterized by formal mathematical models. Differences in value functions are specified and then interpreted from a social fairness viewpoint. Mapping algorithms are developed that convert the different approaches to one another.

Results: The EF method and the method of relative QALY maximization have in common that the value of health decreases at a decreasing rate as the baseline level of health improves. The PS method implies that the value of health decreases at a constant rate. In contrast, the EBA approach value implies that the value of health increases at a decreasing rate as the baseline level of health improves. Conversion of value functions is demonstrated, for example, between the EBA and EF approaches.

Conclusion: This analysis shows similarities but also fundamental differences between value functions incorporating disease severity in the assessment of new health technologies.

Predicting Price Dynamics after Launch for Branded Drugs in the United States

PRESENTER: **Joseph Levy**, Johns Hopkins University
Introduction: The need to project how drug prices will evolve is common in health economic models, there have been recent calls by methodologists for cost-effectiveness models of chronic medications to account for their likely price changes when generics become available (genericization) which suggests all price dynamics, including brand price increases common in the US market, should be included in cost-

effectiveness models. Unfortunately, there are two significant problems with existing methods for projections, particularly in the United States. First, there is a large and growing divergence between publicly reported list prices and prices ultimately paid by payers due to confidential rebates. Second, the market dynamics that impact how prices will change are not well understood and are potentially esoteric to the market for any given drug. We study these issues and ultimately devise a regression model that can be used to project how branded prices will evolve before and after brands' loss of exclusivity.

Methods: We utilize a dataset that contains estimates of net prices, the SSR Drug Brand Price Tool, which we combined with additional drug information from Redbook. We construct multiple regression models focused on explaining variation in existing dynamics from 2007-2022. Our preferred model specification is a generalized least squared fixed effect panel regression of log annual net price on the following covariates: product, class, launch year, the number of branded competitors in class, the predominant mode of administration and log launch price. Finally, there is an interaction term between the calendar quarter and binary variable for quarters post-loss of exclusivity, which allows different trajectories of prices pre and post-loss of exclusivity.

To test the predictive accuracy of our model, we train a model on data from 2007-2018 using the SSR data. Because the full SSR data runs until 2022q1, we are able to examine the predictive accuracy of the model for 5,084 drug price quarters for existing drug prices (launched prior to 2018) and 1,095 quarters for 139 drugs (launched post-2018) assuming the launch price is known. We compare root mean squared error (RMSE) to other common trajectory prediction approaches, including linear trajectories, static prices, and one-time price drops at genericization.

Results: The training regression model is built on 14,295 calendar quarters for 523 branded products. All covariates were significant, and the R-squared was 0.9091. Out-of-sample prediction for both existing drug quarters and launches from 2019q1-2022q1 yield a RMSE of 1.265, and the best fitting RMSE (linear projection) yielded RMSE 1.588, suggesting our model improves prediction.

Discussion: The results of this model can be used to predict how prices will evolve beyond the current calendar quarter of prices and for new products based on features that will be known at launch (launch price, date of loss of exclusivity, class, competitors). This model has the potential to inform cost-effectiveness analyses interested in how price dynamics are likely to change over time, such as genericization. Further, other health economic research on pharmaceutical dynamics can adopt this method to improve price prediction.

Effects on Spending and Quality of a Global Payment Initiative for Primary Care Providers in the Netherlands: A Quasi-Experimental Study

PRESENTER: **Tadjo Gigengack**, Erasmus University Rotterdam

Background

In many countries including the Netherlands, general practitioners (GPs) fulfill a central role in the healthcare system. However, the methods used for paying GPs and the resulting incentives are often poorly aligned with this role, which may have negative consequences for the value of care delivered in the whole healthcare system. Therefore, policymakers and other actors have been exploring alternative payment models (APMs) with incentives that are better aligned with the roles expected of GPs and the overarching system goals. Despite the interest in APMs, insight in their effects on quality of care and spending is still limited. This study evaluates an APM initiated by a large Dutch health insurer and a GP practice organization which replaced the existing primary care payment system (comprising a mixture of fee-for-service, capitation, and bundled payments) with a single global base payment per enrolled person. In addition, under the new model participating GP practices share in savings or losses on total healthcare spending (including hospital care), conditional on achieving quality targets. This model is expected to reduce volume incentives, improve quality, and stimulate GPs to be critical gatekeepers and care coordinators.

Methods

We evaluated the impact of the initiative on spending and quality of care. For the impact on spending (in total and for subcategories), we performed difference-in-differences analyses using claims data from the health insurer from 2015 through 2019, encompassing the first 2.5 years of the initiative. We used fixed panel data of 16,425 patients registered at one of the 20 GP practices participating in the initiative (the intervention group) and a control group of 195,397 patients registered at non-participating GP practices, and compared these before and after the start of the initiative. For the impact on quality, we performed before-after analyses on 24 indicators on data from participating GP practices for appropriate management of chronic care, efficient prescribing of medication, and patient satisfaction. Analyses were adjusted for patient characteristics.

Results

The study found no evidence that the initiative led to a significant decrease in average total health care spending per patient per quarter (differential change in the intervention group as compared to the control group of -1.2%, P = 0.583). Primary care spending did significantly decrease by -10.2% (P < 0.000). No significant effect was found on either pharmaceutical spending (-1.3%, P = 0.552) or medical specialist care spending (-0.0%, P = 0.993). Results on the effect of the program on quality indicators were mixed.

Conclusions

The study did not find evidence that the introduction of a global payment with a shared savings arrangement in Dutch primary care reduced total health care spending per patient in its first 2.5 years. However, the study did find a significant decrease in primary care spending, which

may suggest that the program is more effective at improving the value of primary care delivery specifically. Results on the effect of the program on the quality indicators were mixed.

Cost-Effectiveness of Implementing Performance-Based Financing in Improving Maternal and Child Health Services in Ethiopia

PRESENTER: **Mideksa Adugna Koricho**, University of KwaZulu Natal
AUTHORS: Girmaye Deye Dinsa, Nelisiwe Khuzwayo
Introduction:

Globally, the implementation of performance-based financing (PBF) has been seen as a strategy for the realization of universal health coverage. The benefits of implementing PBF include promoting bargaining between purchasers and service providers, identifying health services, and monitoring health indicators. The purpose of the study was to explore the implementation of PBF in improving maternal and child health services in Ethiopia.

PBF promotes bargaining between purchasers and health service providers by identifying priority health services and monitoring indicators. In PBF, purchasers use health statistics and quality information to make decisions rather than merely reimbursing invoices. In this respect, PBF is a step toward strategic health purchasing and the realization of the goals of universal health coverage. PBF implementation began in Ethiopia in 2015 as a pilot at one hospital and eight health centers in Yabello town and at an adjacent rural administration in Yabello district in the Oromia region. The purpose of the study was to determine whether the implementation of PBF is cost-effective in improving maternal and child health services in Ethiopia.

Methods:

A pilot implementation of PBF began in Ethiopia in 2015 at one hospital and eight health centers in Yabello town and at an adjacent rural administration in Yabello district in the Oromia region. The study used cost-effectiveness analysis to assess the effects of PBF on the provision of health services in four selected districts. Two districts implemented PBF and two followed input-based financing. The provider perspective costing approach was used in the study. Data at the district level were gathered retrospectively for the period of July 2018 to June 2021. Data from health service statistics were transformed to population level coverages then, using the Lives Saved Tool (LiST), to the number of lives saved. Finally, saved lives were translated into discounted quality-adjusted life years (QALYs).

Results:

The number of lives saved due to improved service delivery in PBF districts was 261, whereas the number of lives saved in input-based financing districts was 194. The identified net annual PBF cost per capita was $1.8. QALYs obtained under the PBF and input-based financing were 6,118 and 4,526 per million people per year, respectively. The assessed incremental cost-effectiveness ratio (ICER) of PBF compared to non-PBF/input-based financing was $ -606 per QALYs gained. The predicted ICER was less than the country's GDP.

Conclusions:

While the calculated ICER is less than the country's GDP, implementing PBF is both very cost-effective and cost-saving in Ethiopia compared to input-based financing.

10:30 AM –12:00 PM   MONDAY   [Economic Evaluation Of Health And Care Interventions]

Cape Town International Convention Centre | CTICC 2 – Daisy
Economic Analyses in Novel Areas

MODERATOR: **Daphne Voormolen**, Erasmus School of Health Policy & Management, Erasmus University Rotterdam, Rotterdam, The Netherlands

Modelling the Cost-Effectiveness of Digital Health Applications for Chronic Obstructive Pulmonary Disease (COPD) in Ireland

PRESENTER: **Gintare Valentelyte**, RCSI University of Medicine and Health Sciences
AUTHOR: Jan Sorensen
Background

Digital health offers affordable and scalable solutions to assist Chronic Obstructive Pulmonary Disease (COPD) management, patient education and can improve clinical outcomes and expand service reach at low cost. COPD is associated with significant impairment in quality of life and substantial healthcare resource use, particularly in its advanced stages. Ireland has the highest rate of COPD hospitalisations with around 10% of the adult population living with COPD. Acute exacerbations are the primary drivers of direct COPD costs, accounting for over 70% of COPD-related hospitalisation costs including emergency visits, with 35% of readmissions within 90-days. A pilot program for treating COPD

patients using digital technology in a Community Virtual Ward (CVW) was launched. The CVW objective is to provide acute care to COPD patients at home, by providing and facilitating access to specialist community care, hence minimising hospital admissions. However, uptake and compliance with the digital technology differs among social groups determined by socioeconomic factors like population age, education, rural/urban lifestyle, labour market status. The aim of this study is to develop a framework to model the cost-effectiveness of the digital CVW care pathway for different COPD patient social groups in Ireland and to examine the potential distributional impacts of this digital technology.

Methods

Our framework proposes the key data and information required for developing cost-effectiveness models for digital health application for COPD in Ireland. First, we define the baseline study population by identifying the incidence and prevalence of COPD in the general population and modelling life expectancy and HRQoL as quality-adjusted life expectancy (QALE). Additionally, we consider patient age and educational length as two key characteristics for defining COPD social groupings. We suggest three health states based on disease severity for each socioeconomic group: mild COPD (bronchodilator use), moderate COPD (short-term steroid use), severe COPD (exacerbations requiring hospitalisation). Second, for each health state, resource utilisation and direct costs of resources for usual COPD care i.e. hospitalisations, are gathered from national hospital data (e.g. Diagnosis-Related Groups), national surveys and costing studies. Third, based on local trial data, the proportion intervention uptake and compliance for different social groups is assumed, and CVW intervention costs captured. Finally, our framework proposes sensitivity analyses by selecting the highest disease severity group i.e. COPD exacerbating patients, to evaluate the cost-effectiveness of the CVW digital technology to normal treatment as defined by each social grouping. This should help determine which patient groups benefit the most from the intervention.

Results

The model framework should be calibrated using best available data to assess the cost-effectiveness of the digital technology and its impact on health outcomes across social groups. In sensitivity analysis the impact of different assumptions related to uptake, effectiveness and cost for each social group and change the group-specific net health benefit.

Conclusion

Our framework for modelling the cost-effectiveness of digital health technologies targeted at treating COPD in Ireland will identify the required relevant data and information. Focus on the social group variations may help determine which patient groups would benefit most from the CVW.

Is Nurse-Delivered Sleep Restriction Therapy to Improve Insomnia Disorder in Primary Care Cost Effective?

PRESENTER: **Yaling Yang**, The University of Oxford
AUTHORS: Simon D Kyle, Stavros Petrou

Background: Insomnia is a prevalent and distressing sleep disorder and access remains limited to the recommended cognitive–behavioural therapy in primary care. Sleep restriction therapy (SRT) can potentially be delivered as a brief single-component intervention provided in primary care. The Health-professional Administered Brief Insomnia Therapy (HABIT) trial incorporated a within trial cost effectiveness analysis to examine whether or not nurse-delivered SRT sleep restriction therapy was cost-effective in UK primary care.

Methods: HABIT was a pragmatic, multicentre, individually randomised, parallel-group, superiority trial conducted in NHS general practice in three regions of England. Adults aged ≥ 18 years with insomnia disorder were randomised to the SRT group (i.e. the intervention group) where a brief four-session nurse-delivered behavioural treatment were offered to support the participants to follow a prescribed sleep schedule. Participants were also provided with a sleep hygiene leaflet. Participants in the control group received the same sleep hygiene leaflet by e-mail or post.

The staff time of providing and receiving training in how to deliver the SRT intervention, and the community nurses' time to deliver the SRT intervention were recorded. Measurement of resource use including OTC medicines was collected during the trial period using the self-reported CSRI at baseline, 3, 6, and 12 months after randomisation. Resource use and clinical staff's time were converted to NHS costs using national unit costs including PSSRU, NHS reference costs and British National Formulary. Productivity loss due to insomnia were collected using the WPAI questionnaire at baseline, and 3, 6 and 12 months after randomization. Patients completed the EQ-5D-5L questionnaire and EQ-5D-3L+ Sleep measure and SF-6D (derived from the SF-36) at baseline, 3, 6 and 12 months after randomization, and to facilitate calculation of Quality - adjusted life years. Incremental cost per QALY gained were calculated using the completed dataset, and data sets obtained using the multiple imputation to count for missing data and bootstrap to quantify uncertainty in estimates.

Results: A total of 642 participants were recruited into the trial. An average of £31.7 for SRT training and an average of £52.6 for delivering SRT intervention were estimated while the cost of sleep hygiene was £1.7. Using the multiple imputation sample and controlling for baseline covariates, the mean difference of NHS cost between the SRT and the sleep hygiene arm was £43.59 (-18.41 to 105.59) and the mean difference of QALYs based on EQ-5D-3L was 0.021, which resulted in an ICEA of £2076 per QALY gained, and a 95.3% probability that SRT being cost effective at the willingness to pay threshold of £20,000 per QALY gained. While using QALYs derived from EQ-5D-3L+ Sleep and SF-6D, the point estimates of ICER remain the same but the uncertainty of ICER improved. While a societal perspective was used for the analysis incorporating productivity loss and out of pocket payment for OTC medications, the SRT intervention dominates the sleep hygiene.

Conclusion: The nurse-delivered SRT sleep restriction therapy is highly likely to be cost effective for the NHS, and for the society.

Real-World Economic Evaluation of Genome-Wide Sequencing for Diagnosing Childhood Developmental and Seizure Disorders in British Columbia, Canada

PRESENTER: **Deirdre Weymann**, BC Cancer

AUTHORS: Dean A Regier, Rosalie Loewen, Brandon Chan, Morgan Ehman, Samantha Pollard

Background: Finding a genetic cause for developmental and seizure disorders can improve prognostication and clinical management for patients and their families. Owing to the vast number and individual rarity of gene-disease associations, patients wait years to determine the underlying cause of a disorder, with many never receiving a genetic diagnosis. Exome sequencing (ES) and genome sequencing (GS) increase the rate of genetic diagnosis in research settings. Real-world cost-effectiveness of adopting ES or GS into healthcare systems is unknown.

Purpose: To estimate the real-world diagnostic rate, cost trajectory, and cost-effectiveness of ES and GS for children with developmental and/or seizure disorders in British Columbia (BC), Canada.

Methods: We abstracted real-world standard of care (SOC) outcomes data from BC Children's and Women's Hospital (C&W) biochemical diseases department and from the Treatable Intellectual Disability Endeavor (TIDE) research study. We developed a state-transition Markov model to examine cost-effectiveness of three competing diagnostic strategies informed by real-world clinical trajectories. The first is SOC in BC and involves chromosomal microarray (CMA) followed by sequential second tier genetic and biochemical testing, with last-tier access to ES. The second is CMA followed by streamlined access to ES. The final strategy is first-tier GS. Model inputs were probabilistic and based on Kaplan-Meier and Weibull regression analysis of real-world time to event data. Cost parameterization was time-dependent and based on generalized estimating equation models of observed weekly costs. We calculated incremental cost per additional diagnosis and net-benefit over a time horizon of 10 years, from the perspectives of families and the healthcare system.

Results: Our study cohorts included 411 TIDE-BC research participants who underwent CMA followed by tiered diagnostic testing and 90 patients referred to C&W biochemical diseases department who received publicly reimbursed, last tier ES. For SOC, we estimated that 49.4% (95% CI: 40.6, 58.2) would receive a diagnosis at an expected cost of $11,683 per patient (95% CI: 9,200, 14,166). Streamlined ES and first-tier GS were associated with similar or improved diagnostic rates, shorter times to diagnosis, and cost-savings when compared to SOC, with 94% of simulations resulting in cost savings for ES and 60% for GS. Net-benefit from the perspectives of families and the healthcare system was $3,047 (95% CI: -516, 6,610) and $2,956 (95% CI: -608, 6519) for streamlined ES compared to SOC, respectively. First-tier GS was unlikely to be cost effective compared to streamlined ES without price reductions or diagnostic yield improvements.

Conclusion: Our study draws on real-world data from a Canadian healthcare system to determine the economic impacts of genome-wide sequencing for diagnosing childhood developmental and seizure disorders. We find that earlier access to ES may generate cost savings compared to current clinical practice. Results can inform resource allocation decisions for competing genomic technologies and optimized testing pathways.

The Victorian Healthy Homes Program: Energy, Health, and Cost Effectiveness Outcomes from a Randomised Control Trial in Australia.

PRESENTER: **Katie Page**, University of Technology, Sydney (UTS)

AUTHORS: Lutfun Hossain, Dan Liu, Yohan Kim, Kerryn Wilmot, Toby Cumming, Kees van Gool, Rosalie Viney

Poor housing quality is associated with increased risk of morbidity and mortality. Vulnerable people, particularly the elderly, and those with a disability or chronic illness, are at higher risk because they are more likely to spend significant time at home and therefore, be more exposed to health risks associated with cold homes. Home upgrades that increase indoor temperatures have the potential to provide health benefits but currently there is no evidence of these benefits in an Australian context. The Victorian Healthy Homes Program (VHHP) addresses this gap by delivering home energy efficiency and warmth upgrades to 1000 low-income households across the Western suburbs of Melbourne and the Goulburn Valley, where at least one person in the household had a need for home care support services or had an existing health condition.

The VHHP was implemented over a 3-year period and used a staggered, parallel group clustered randomised controlled trial (RCT) to test the home upgrade in 1000 households. All households received a home upgrade either before (intervention group) or after (control group) winter (22 June – 21 September). Outcomes were analysed over the 3-month winter period with several regression models dependent on the outcome of interest, while controlling for age, sex, geographical area and year. We also conducted a full economic evaluation.

Analysis showed that a comparatively low-cost home upgrade (average $2,809) had several benefits over the winter period. Average indoor temperature significantly increased by a third of a degree across the day, and by half a degree in the morning when temperatures are typically the lowest. Exposure to cold temperatures (<18°C) was reduced by 43 minutes per day. Gas use was significantly reduced by the intervention, by 5.53 KWh/day but the intervention did not significantly affect electricity usage.

The home upgrade was also associated with several health benefits, including reduced breathlessness, and improved quality of life, particularly with respect to mental health and social care. Specifically, the intervention group saw a significant improvement in both the metal health component score of the SF-36 after winter (2.3 norm-based scores) and on the after-winter ASCOT scores. Health benefits of the upgrade were reflected in the cost savings, with an average of $887 per person saved in the healthcare system over the winter period. Cost-benefit analysis showed that the upgrade would be cost-saving within 3 years and would produce a net saving of $4,783 over 10 years, due to savings in both energy and health. Savings were heavily weighted towards healthcare: for every $1 saved in energy, more than $10 was saved in health.

This program is the first-of-its-kind in Australia, implemented alongside an innovative and robust research program. It is rare to have RCTs in this area of public policy. Therefore, data from this study have the ability to significantly impact both state and national government housing policy, which is of increasing importance because of the growing recognition of the impact of climate and housing on health and well-being.

10:30 AM –12:00 PM   MONDAY   [Health, Its Distribution And Its Valuation]

Cape Town International Convention Centre | CTICC 1 – Room 1.44

Equity Considerations for Health Economic Analysis Internationally [EQUITY INFORMATIVE ECONOMIC EVALUATION SIG]

MODERATOR: **Neha Batura**, University College London

Distributionally Sensitive Measurement and Valuation of Population Health and Disease Burden in Sub-Saharan Africa

PRESENTER: **Owen O'Donnell**, Erasmus University Rotterdam

AUTHORS: Shaun Da Costa, Raf Van Gestel

Motivation. Measurement of population health is commonly done with life expectancy (LE) or health-adjusted life expectancy (HALE). These are averages that take no account of aversion to dispersion in lifespan and health. The lack of distributional sensitivity of these measures may impede an inequality averse social decision makers allocating resources to and within the health system.

Method. We introduce a measure of population health that is sensitive to dispersion in both age-specific health and health-adjusted lifespan. Importantly, the measure can be calculated from a health-extended period life table and so does not require more data than HALE. It is both a generalisation of HALE, and LE, and always a feasible alternative to it. We use nested equity equivalents to allow for aversion to dispersion in health at each age of life and in health-adjusted lifespan to derive a measure we label equivalent health-adjusted lifespan (EHAL). As far as we know, this is the only distributionally sensitive population health measure that adjusts for dispersion in both the health and lifespan dimensions. We derive the willingness to pay (WTP) for change in EHAL to allow distributionally sensitive valuation of potential health gains that can be used for disease prioritization. The contribution of this money metric to previous valuations of population health gains is through the incorporation of aversion to dispersion in both health and lifespan. This recognises that the value of progress against disease lies not only in increased health-adjusted life expectancy but also in reduced exposure to variation of health and lifespan.
We use our distributionally sensitive life-years and money metrics, and data from the Global Burden of Disease, to evaluate trends in population health and disease burden in Sub-Saharan Africa (SSA) between 1990 and 2019. We measure the contribution of each of 293 diseases to the overall disease burden in SSA by eliminating morbidity and mortality caused by that disease from the health-extended life table, recomputing HALE and EHAL, and subtracting the result from the respective measure obtained from the complete life table in which no disease has been eliminated.

Results. Sensitivity to dispersion in age-specific health has relatively little impact on the trends. Sensitivity to dispersion in health-adjusted lifespan has a large impact. While health-adjusted life expectancy increased by around 28% over the period, our distributionally sensitive measure increased by around 70% due to steeper reductions in mortality at younger ages. Distributional sensitivity greatly reduces the extent to which the burden of noncommunicable diseases (NCDs) is converging on the burden of communicable, maternal, neonatal, and nutritional diseases (CMNNDs) that strike at younger ages. Previous evidence that the NCD burden had overtaken the CMNND burden in SSA by 2017 is not robust to allowing for distributional sensitivity. The adjustment also increases the value of health improvements relative to GDP. WTP to eliminate each of lower respiratory infections, diarrheal diseases, and malaria, increases by more than five percentage points of GDP after allowing for distributional impacts.

The Health Inequality Impacts of Marginal Health Care Expenditure in England

PRESENTER: **Misael Anaya-Montes**, University of York

AUTHORS: Katja Grasic, James Lomas, Laura Anselmi, Miqdad Asaria, Benjamin Barr, Matt Sutton, Richard Cookson

Objective: To estimate how the mortality effect of marginal hospital expenditure varies between people living in 32,784 more and less deprived small areas of England

Data and Methods: We used data on core hospital funding allocations (including general and acute, maternity, mental health and prescribing services) to all 195 NHS administrative areas in England in 2018. We instrumented hospital expenditure using a component of the funding formula ("distance to target") and estimated mortality effects by small area deprivation groups. We conducted extensive sensitivity analysis using different units of analysis, outcomes, functional forms, instruments, controls and exclusions

Results and Discussion: Mortality effects were similar across most deprivation groups, but significantly smaller in the most deprived group. In our preferred model, a 1% increase in expenditure reduced all-age standardised mortality by 0.76% (1.34% to 0.18%) overall, 0.76% (1.36% to 0.16%) in the least deprived group and 0.43% (1.01% to -0.14%) in the most deprived group. The social gradient in the mortality effect of marginal hospital expenditure may be flat or even slightly negative. This could be due to disproportional marginal hospital expenditure, whereby deprived small area populations receive a larger share of total expenditure than of marginal expenditure, or unequal marginal hospital productivity, whereby deprived small area populations gain smaller health benefits per unit increase in expenditure.

Conclusion: Health inequality cannot be reduced simply by increasing hospital expenditure in large administrative areas with high average levels of deprivation – additional efforts are needed ensure resources are targeted and used effectively to improve the health of individuals living in deprived small areas.

Health and Economic Benefits of Reducing the Cardiovascular Health Equity Gap in Australia

PRESENTER: **Zanfina Ademi**, Monash University

AUTHORS: Jedidiah Morton, Clara Marquina

OBJECTIVES: Integrating equity in health economics is important as it will inform who gains most and who is most burdened. Understanding inequities in cardiovascular disease (CVD) by socioeconomic status will inform policy planning. To estimate the health and economic outcomes of reducing CVD in the most disadvantage group compared to the least disadvantaged, for the next 10 years in Australia.

METHODS: The Pooled Cohort Equation (PCE) was populated with Australian-specific data, stratified for each socioeconomic quintile to predict annual new cases of CVD by socioeconomic disadvantage. Population was aged 40-79 years of age and were followed dynamically as their progress through 10 years of follow up. A hypothetical intervention reducing cardiovascular risk by 10% and 20% was applied to the most disadvantage socioeconomic group and was compared to a 10% and 20% reduction in cardiovascular risk in the least disadvantage socioeconomic group. Costs data were based on published sources. The model was designed to capture years of life lived, quality- adjusted life years (QALYs), acute healthcare medical costs due to new cases of CVD. All health and costs outcomes were discounted by 5% annually.

RESULTS: Applying annual CVD risk reduction of 20% in the most and least disadvantage group would prevent 25,221 versus 19,124 CVD events. There were more QALYs gained in the most disadvantage group compared to least disadvantage 30,930 and 23,207, respectively. This consequently led to more healthcare savings in most disadvantage group compared to least disadvantage (156 million versus 120 million).

CONCLUSION: This model presents an approach to integrate equity measures in economic evaluations of cardiovascular disease and highlight which primary prevention interventions are likely to yield more benefits by socioeconomic disadvantage. A 20% reduction in CVD would reduce CVD health inequity.

Regional Disparities in Hypertension and Chronic Kidney Disease in England: A Decomposition Analysis of the Contribution of the Neighbourhood Environment.

PRESENTER: **Godsfavour Ewere Ilori**, University of East Anglia, Norwich, United Kingdom

AUTHORS: Stella Lartey, Lee Shepstone, Mizanur Khondoker

Background: A crucial link has been established between hypertension, one of the major cardiovascular diseases (CVD) and chronic kidney disease (CKD). Hypertension and CKD affect millions of people in the UK and globally, and there are substantial human and financial costs resulting from both diseases. In England, hypertension and CKD do not affect everyone equally, as people from socially deprived regions will most likely develop these diseases. However, understanding these diseases geographically can be complex given the regional disparities, different underlying lifestyles factors, and other health indicators at the individual and environmental levels. Moreover, there is a paucity of information to facilitate such understanding and to support intervention development. Therefore, this study aimed to investigate the extent to which neighbourhood-level characteristics affect hypertension and CKD distributions in England and examine the relative role of neighbourhood-level characteristics over and above individual-level characteristics to these regional disparities.

Method: A nationally representative data of 14,043 from the Understanding Society with biomarker measures across the government office regions was used in this study. We linked the individual-level biomarker data to neighbourhood-level data from the English deprivation indices at the Lower Layer Super Output Area (LSOA) level. We use the London region as a reference group as we find that it has better systolic blood pressure and Estimated Glomerular Filtration Rate (EGFR) levels than England's other eight regions. Systolic blood pressure (BP > 147) and EGFR ($\leq$80) were used as markers for hypertension and CKD, respectively. Oaxaca-Blinder decomposition combined with unconditional quantile regression analysis was used to examine regional differentials in the biomarkers and to measure the contribution of the neighbourhood-level characteristics to these differentials across regions.

Results: The results showed regional disparities between the regions, with neighbourhood-level characteristics being one of the main drivers of regional inequalities ($p < 0.01$). The neighbourhood-level characteristics include air quality, income deprivation, skill deprivation, crime levels, road distance to a General Practitioner (GP), and anxiety levels. We concentrated mainly towards the lower tail (25th quantile) of the EGFR distribution and the upper tail (90th quantile) of the systolic blood pressure distribution. For the systolic blood pressure results, we find that the contribution of demographic factors (age and gender) became less evident, moving to upper quantiles of the regional distributions (for example, in the case of Southeast and London differentials, demographic factors moved from 54% to 22% in the upper quantiles while neighbourhood-level characteristics moved from 25% to 64% in the upper quantiles). The detailed decomposition showed that differences in neighbourhood income deprivation are the reoccurring contributor to regional disparities in lower EGFR levels across the regions. In contrast, differences in neighbourhood crime levels are the reoccurring contributor to regional disparities in higher systolic blood pressure across the regions.

Conclusion: Results from this study suggest that neighbourhood characteristics affect hypertension and CKD distributions in England, and interventions/policies are needed to address the neighbourhood environment and reduce regional disparities in disease areas.

Cape Town International Convention Centre | CTICC 1 – Room 2.64-2.65

Children's Obesity: Costs, Policy Responses and Their Effects [ECONOMICS OF OBESITY SIG]

MODERATOR: **John Cawley**, Cornell University

ORGANIZER: **Felipe A. Lozano-Rojas**, University of Georgia

DISCUSSANT: **Juan Echenique**, New York University; **Kosali Simon**, Indiana University

The Social Costs of Childhood Overweight in Denmark
PRESENTER: **Mette Thorsager Jensen**, Danish Center for Social Science Research
AUTHOR: Jane Greve

Over the past forty years, the prevalence of obesity has risen dramatically in many countries. Substantial research has sought to estimate the impact of obesity on numerous outcomes of interest, including educational attainment, labor market outcomes, and health care costs.

This presentation makes two contributions to this literature. First, it estimates the impact of high body mass index (BMI) on these outcomes using rich genetic data on siblings. We regress outcomes on the polygenic score for a high BMI, controlling for sibling fixed effects; this identification strategy takes advantage of Mendelian Randomization – the fact that full siblings each inherit a random combination of genes from their parents. This approach addresses the problem of the endogeneity of BMI and thus any reverse causality between BMI and the outcomes.

Second, the presentation makes use of high-quality registry data from Denmark. We have data for 4,253 sibling pairs (8,670 individuals) with valid data for genetic endowments (polygenic scores), educational attainment and other educational outcomes, labor market outcomes, receipt of social welfare programs, and health care utilization. Use of population registry data ensures a very high rate of linkage and lower measurement error relative to self-reports of the outcomes.

Preliminary analyses confirm that the polygenic score for high BMI is strongly predictive of measured BMI. Sibling fixed effects models exploiting Mendelian Randomization indicate that a higher genetic predisposition to high BMI is associated with a lower probability of receiving a high school degree and university-level education. A higher genetic predisposition to high BMI is also associated with a larger number of General Practitioner (GP) visits and the probability of hospitalization. Consistent with previous literature, consequences are often larger for women. These results contribute to the evidence that high BMI and obesity have substantial negative consequences, including lower education and higher health care costs. The policy implications of these findings are discussed.

The Role of Repugnance in Markets: How the Jared Fogle Scandal Affected Patronage of Subway
PRESENTER: **John Cawley**, Cornell University

Economics has long studied how consumers respond to the disclosure of information about firms, such as product quality, accounting fraud, or environmental disasters. We study a case in which the disclosed information is unrelated to the product or firm leadership, but which could still potentially affect consumer patronage through the mechanism of repugnance. The information concerns the arrest of Jared Fogle, the well-known spokesman and advertising pitchman for the Subway sandwich franchise, who was arrested in 2015 on charges of sex with a minor and child pornography. We study how the disclosure of this information, which was widely covered in the media, affected patronage of Subway. We estimate synthetic control models using data from a large nationwide survey of consumers regarding the restaurants they patronize. Despite the close and long-standing association of Jared Fogle with Subway, and heavy publicity of his crimes, we estimate a relatively precise zero of the effect of the Jared Fogle scandal on patronage of Subway. This is in contrast to past studies of negative information disclosure, which tend to find negative impacts on sales, revenue, or stock price of the relevant companies. The absence of an effect in this case suggests that repugnance did not drive demand, and that consumers largely separated the offenses of a symbol of the firm from the products of the firm.

Searching for the Long-Term Consequences of Soda Taxes: Changes in Soda and Sugar Purchases for Families with Children
PRESENTER: **Felipe A. Lozano-Rojas**, University of Georgia

Following the introduction of soda taxes, large decreases in consumption of sodas have been documented across US cities, however, most of the evidence has been centered in overall consumption patterns with only a few exceptions focusing on heterogeneous characteristics of consumers. Previous experience with tobacco suggested that the-long term consequences of discouraged consumption where more profound as younger consumers were prevented from developing a smoking habit. In this article we explore that idea in the case of soda taxes. I leverage the information from the HomeScan Panel information from Nielsen, which follows more than 60,000 households every year along the continental US, to evaluate the heterogeneous effects of the taxes enacted in Philadelphia and its surroundings, with an specific focus of the effect of the policy on families with children. We measure the effect over the consumption of beverages, on additional sugary items and a complete net effect.

I estimated a difference in difference model where we followed households, and their purchases according to the store location (Philadelphia, not in Philadelphia) and their status of children presence. First, I find that the overall effect on sugar purchases from beverages is deeper for families with children, than for other households. I also find that the patterns of substitution, cross-border, and to other sugary items is smaller for families with children. Finally, once all margins of substitution are considered, we find a significant reduction in sugar purchases for families with children, while the effect of the soda tax is not significant for other families. The results indicates that even if the margins of substitution offset a large portion of the policy effect, there is an expectation of reduced sugar consumption in the long term, as the current generation purchasing less sugar in their households, will be less likely to develop habits of excessive sugar consumption.

10:30 AM –12:00 PM   MONDAY   [Demand & Utilization Of Health Care Services]

Cape Town International Convention Centre | CTICC 1 – Room 1.62
Ageing: Health Care Demand and Costs

MODERATOR: **Florence Jusot**, Université Paris Dauphine

Home Sweet Home: End-of-Life Health Care Costs and Place of Death

PRESENTER: **Jiunn Wang**, University of Exeter
AUTHORS: Jenny Shand, Manuel Gomes
Background

It is well-documented that health care costs increase significantly as individuals approach the end of their lives. Concurrently, end-of-life care models are increasing taking into account patients' preferences for place of death. However, little is known about whether health care costs at the end of life differ according to place of death. Moreover, as existing studies mostly focus on either hospital or social care settings, the multi-sectorial impacts within the health care system tend to be neglected. To address these gaps, this paper explores the association between end-of-life health care cost and place of death across multiple care settings.

Methods

We used data linking council, health and social care services for people who died at the age of 50 or over between 2016 and 2020 in London Borough of Barking and Dagenham in east London. We matched hospital and non-hospital decedents according to sociodemographic, economic and health outcome variables using a genetic matching approach. We calculated mean differences in health care costs over the last 12 month of life between the matched groups across five care settings: primary, hospital, community, mental and social care. We reported the 95% bias-corrected bootstrap confidence intervals (CIs) for the mean differences. Subgroup analyses were conducted to investigate if the role of place of death differs according to long-term conditions and age.

Results

The included sample contained 1,810 matched pairs. Decedents who died in hospital were associated with a higher mean hospital cost of £5,433 (95% CI £4,734 – £6,112), a higher mean mental care cost of £233 (95% CI £22 – £830) and a lower mean social care cost of £676 (95% CI £323 – £1,050), compared to decedents who died outside hospital. Across all settings, mean difference in total cost between hospital and non-hospital decedents was £4,643 (95% CI £3,143 – £6,092). Cost trajectories over the last 12 months of life showed that the major driver for these differences was non-elective hospital care costs in the last 3-month period. Our subgroup analyses indicate heterogenous patterns of end-of-life health care costs according to decedents' characteristics. For example, mean differences in social care costs between hospital and non-hospital decedents were much wider (-£2,081) amongst individuals with mental health conditions, compared to those with no long-term conditions (-£188). For decedents under the age of 65, mean difference in total costs according to place of death was twice as large as that for individuals aged 65 or older.

Discussion

This is the first study evaluating end-of-life care costs according to place of death. We find that end-of-life health care cost patterns differ according to place of death, in a differential way across health care settings. Our findings suggest that some subgroups, say cancer and mental health patients, can benefit from improved health care planning to help reduce unplanned hospital care costs and shift some of the burden to 'lower-cost' community and social care settings. A whole-system perspective is needed for informing advanced care planning in optimising the allocation of care and improving system efficiencies.

Diversity in Care Costs after Cardiovascular Disease: A Longitudinal Analysis across 28 European Countries

PRESENTER: **Ramon Luengo-Fernandez**, University of Oxford
AUTHORS: Inna Thalmann, Jose Leal

Background: Cardiovascular disease (CVD) is a leading cause of morbidity and mortality worldwide and its burden on health and social care systems has been widely quantified. However, few studies have evaluated its impact over time, with most studies only evaluating costs

acutely after the event. Given that CVD is associated with age and comorbidity, disregarding pre-event costs might overestimate the burden of the disease. In addition, information on socioeconomic and regional determinants of costs is limited.

Objective: To estimate, over the time-course of the condition, the level and socioeconomic predictors of health and social care resource use and costs after CVD across 28 European countries.

Methods: This retrospective open cohort study uses the Survey of Health, Ageing and Retirement in Europe (SHARE), a cross-national panel database of 139,769 non-institutionalised individuals aged 50+years from 28 European countries and Israel from 2004 to 2020. We included 7,176 individuals with self-reported heart disease (HD) and/or cerebrovascular disease (CEVD) and an average follow-up time of 10 years. French unit costs (2021) were used to value primary, emergency and outpatient care contacts, hospital admissions, community and informal care.

Multivariable fixed effects (FE) regression models with clustered standard errors were used to assess the effects of CVD event occurrence on health care resource utilisation, as well as direct, indirect and total health care costs over time. All analyses were adjusted for individual characteristics (demographic, socioeconomic, clinical, geographic), CVD type and survey wave. FE and random effects (RE) models were compared to assess any bias arising from unobserved patient heterogeneity, and Hausmann tests were performed to examine the appropriateness of the estimators.

Results: Results from the FE estimator showed that individuals who experienced HD or CEVD incurred a mean annual increase in direct costs of 1,663 EUR (95%CI: 1,236 EUR, 2,090 EUR) and 2,875 EUR (95%CI: 2,172, 3,577), respectively, in the year of the event compared to the years prior. Costs continued to increase over time, with individuals incurring mean costs of 828 EUR (95%CI: 292,1365) for HD and 639 EUR (95%CI: -24,1303) for CEVD. Individuals experiencing subsequent HD or CEVD events incurred, respectively, mean annual costs of 2,589 EUR (95%CI: 1,610, 3,567) and 2,225 EUR (95%CI: 1,210, 3,240). Compared to Central Europe, participants from Scandinavia and Southern Europe (SE) incurred lower health care costs (Scand.: -954 EUR, 95%CI: -1,327, -581; SE -754 EUR, 95%CI: -1,090, -417), while no significant differences were observed for Eastern Europe using an RE estimator. Household income quartiles were not associated with changes in direct healthcare costs, likely due to the included countries providing universal healthcare. Higher mean costs were observed among divorced individuals compared to married counterparts. FE and RE estimator results will also be reported for social care costs and health care resources.

Conclusions: There was considerable variation in long-term costs after heart and cerebrovascular disease across European countries. Healthcare costs of CVD events were considerable and increased over time. Although patients' income did not explain variations in costs, other socioeconomic determinants, such as marital status, did.

Eye-Opening Products: Uncertainty and Surprise in Cataract Surgery Outcomes

PRESENTER: **Emilio Gutierrez**, ITAM
AUTHORS: Jose Tudon, Adrian Rubli

In markets for experience goods, consumers are ex-ante unsure about product characteristics, such as quality. This paper focuses on the market for cataract surgeries, a particularly important experience good in the healthcare industry, because forgoing treatment implies a lower quality of life or, even potentially, worse health outcomes.

We obtain patient-level records that allow us to observe cataract diagnoses, subsequent price quotes, and whether the patient purchases a surgery. Our data contain all patients whose first contact with this provider occurred during 2018, and who we observe over multiple visits to the clinics during 2018 and 2019.

We present a model in which a patient must choose---sequentially---whether or not to get surgery in each eye, conditional on her current information set. From her point of view, there is an uncertain component in the outcome of the first operation, which is revealed after the first surgery, conditional on making that choice. Then, all (knowable) information is known to the patient before having to decide on the second surgery. This setup implies consumers have an option value from the first surgery.

In our estimation, we deal with endogenous prices with a control function that uses daily sales targets as an instrument, and we identify the magnitude of the uncertainty shocks from discrepancies in estimated coefficients between the first and second surgery.

Our estimates show that demand elasticities for the first operation are larger in absolute value than those for the second surgery. We also find that heterogeneity matters for our estimation of the uncertainty parameters, and we obtain a distribution of estimated values, suggesting an important role in this decision-making process for the option value of the first surgery.

With our estimated parameters, we proceed to simulate counterfactual policies that may increase take-up of cataract surgeries. First, we consider interventions related to the uncertainty parameter in the form of information provision (or persuasive advertising). Our simulations show that this intervention might be welfare-improving, as long as the size of the revealed information shock is large enough.

Our second set of counterfactual exercises consider revenue-neutral price changes, subsidizing the price of the first surgery but taxing the price of the second, all while leaving the firm indifferent. Across a range of symmetric and asymmetric price changes, we consistently find large welfare gains: consumer surplus increases, because lowering the price of the first surgery leads to an increase in take-up for both first

and second surgeries (recall that patients are more inelastic on the second surgery and that, trivially, second surgery demand is increasing in the first surgery demand).

Overall, these exercises suggest that persuasive advertising that reduces uncertainty will not be as effective, unless the firm is able to truly convince potential patients that their outcome will be very positive. Instead, implementing revenue-neutral price changes will allow for a larger take-up of surgeries for both the first and second eyes.

Public Reporting of Quality Ratings and Consumer Demand in the Home Health Care Sector

PRESENTER: **Jun Li**, Syracuse University

Health care report cards aim to address imperfect information and increase quality competition. I exploit a natural experiment in the home health sector in the United States to assess whether a higher rating under the federal star ratings program affects patient choice at the margin. Agencies with one more half star increased their market share by 1.4% or 0.25 (95% CI: −0.63 to 1.12) percentage points, an economically and statistically insignificant amount. I find no evidence of heterogeneous effects across the rating distribution or over time that would indicate a meaningful consumer response. I also find null effects among consumers expected to be more responsive, such as community-entry patients with more time to search for information and patients in competitive markets with more care options and star types. Suggestive evidence indicates that patient selection by agencies may have modestly impeded consumer choice. The star ratings are unlikely to improve home health quality.

10:30 AM –12:00 PM   MONDAY   [Economic Evaluation Of Health And Care Interventions]

Cape Town International Convention Centre | CTICC 2 – Freesia
Advances in Economic Evaluation of Non-Communicable Disease

MODERATOR: **Sarah Wordsworth**, University of Oxford

Cost-Effectiveness of Population and Individual Level Interventions for the Prevention and Control of Non-Communicable Diseases in Low -and Middle-Income Countries

PRESENTER: **Filip Meheus**, World Health Organization
AUTHORS: Annalisa Belloni, Carl Pretorius, Tessa Edejer, Bente Mikkelsen, Slim Slama
Objective

Non-communicable diseases (NCDs) are the leading cause of death accounting for 74% of all deaths globally with 15 million people dying prematurely between the ages of 30 and 69 years. The vast majority of these premature deaths occur in low -and middle-income countries (LMICs). Progress in preventing and controlling NCDs and their key risk factors has been insufficient and uneven with few countries on track to achieve the Sustainable Development Goal (SDG) 3.4 that aims at reducing by one third premature mortality from NCDs. In May 2017, the World Health Assembly endorsed a menu of cost-effective interventions for the prevention and control of NCDs that countries can select from, as appropriate for their national context (known as the "Appendix 3"). As part of the WHO implementation roadmap developed in 2022 to accelerate national responses and progress towards achieving NCD targets, we carried out an update of the appendix 3 to take into consideration the emergence of new evidence from new WHO normative and standard-setting products, refine the formulation of interventions based on lessons learned from the previous version, and updating and/or adding interventions based on new and available scientific evidence on impact.

Methods

Generalized cost-effectiveness analysis (GCEA) was used to determine the cost, health impact and cost-effectiveness of interventions for the prevention and control of NCDs for LMICs. Interventions to tackle tobacco use, the harmful use of alcohol, unhealthy diet and physical inactivity as well as interventions for cardiovascular diseases, cancer, diabetes and chronic respiratory diseases were considered if they were part of WHO guidance and had a demonstrated effect size. Health outcomes, in terms of health life years (HLY) gained due to a specific intervention, were estimated using the NCD module in Spectrum. The Spectrum suite of models, that are part of the OneHealth Tool , are policy models that produce projections of impact of interventions. Costs were measured in 2019 international dollars. Both costs and health outcomes were modelled over a 100-year time horizon.

Results

A total of 58 interventions were included in the analysis. Of these, 28 interventions were shown to be highly cost-effective with a cost-effectiveness ratio less than Int\$100. These include for example excise taxes and bans on advertising for tobacco and alcohol, reformulation policies for healthier food and beverage products, promotion and support of optimal breastfeeding practices, secondary prevention for rheumatic fever, acute and long-term management of asthma and chronic obstructive pulmonary disease and several cancer control interventions related to cervical, breast, colorectal, liver and childhood cancer, and comprehensive treatment of cancer for those living with HIV.

Discussion

Our analysis has shown that the majority of interventions for the prevention and control of NCDs represent good value for money and can be delivered at a low cost per person to address the increasing burden of NCDs in LMICs. The results provided in this study represent global normative estimates; the WHO-CHOICE programme has developed several tools to support country contextualization, including the generalized cost-effectiveness analysis module.

The Costs of Multimorbidity in Belgium: A Retrospective Observational Longitudinal Study Using System Linkage Data 2017-2020 (COMORB)

PRESENTER: **Phuong Bich Tran**, University of Antwerp

AUTHORS: Joseph Kazibwe, Ewan Tomeny, George Nikolaidis, Johan Van der Heyden, Finaba Berete, Vanessa Gorasso, Philippe Bos, Guido Van Hal, Catia Nicodemo, Philippe Beutels, Josefien Van Olmen

Background

Multimorbidity is on the rise and while epidemiological research on multimorbidity is still evolving, its impact on healthcare systems and societies is already becoming evident. Disease-specific studies often focus on single conditions, neglecting the syndemic nature of diseases and heavily underestimating patient cost and health outcomes.

Most studies on the costs of multimorbidity have only assessed the cost per number of co-existing conditions. The lack of cost data on specific disease combinations hinders the development of new models of integrated patient-centered care and evaluation of their cost-effectiveness. Multimorbidity is also complex in that there are potential additive/sub-additive/super-additive interaction effects on costs between conditions. This study estimated the costs of dyads and triads in Belgium, and explored the influence of disease interactions on healthcare costs.

Methods

We followed a retrospective longitudinal study design, using the linked Belgian Health Interview Survey and administrative claim database (IMA) for 2017-2020 of 6 million observations. We costed for all possible disease combinations (300 dyads and 2300 triads) and reported those prevalent ($\geq$ 2.5%), applying a system costing perspective. Average annual cost per person per dyad/triad was presented in 2022 Euro and consisted mainly of direct medical costs.

Three-level mixed models were constructed to analyze two/three-way interaction effects of dyads/triads on healthcare costs. The single conditions in each dyad/triad, their interaction terms, and other confounding factors were used as fixed effects; household clustering, subjects nested in households, and repeated measures in subjects as random effects. Due to the high dimension nature of the data with 3000 covariates, we used a gradient ascent algorithm of the LASSO regression to train the model and shrink the regression coefficients associated with the least important predictor variables to zero to identify the optimal model; k-fold cross-validation was applied to evaluate the model performance.

Results-Discussion

Preliminary results suggested that annual average cost of dyad per person ranged from €700-€10,000 and €3000-€14,000 for triads. Dyads/triads including conditions signifying "low-severity" such as Allergy or Chronic Fatigue incurred lower healthcare cost; while dyads/triads involving conditions indicating "high-severity" such as Diabetes or CVD led to higher cost. The "low/high severity" classification derives from studies exploring the number of episodes occurring within a period and the frequency of transition from primary to specialist or emergency care.

24 of the 38 most prevalent dyads and 6 of the 12 most prevalent triads showed significant interactions, with a dominant presence of super-additive interactions. Dyads/triads involving conditions that affect similar organ systems or linked pathology tend to incur lower cost than the summed cost of the same conditions existing in different individuals.

Conclusions

This study provides valuable insights into the costs across multimorbid health profiles, highlighting the costs of the most prevalent as well as the most/least costly dyads/triads. Knowledge of the interaction effects of costs between conditions is essential for informing the reorganization of health services to build-back-better a fragmented health care system, and accommodate patients with multiple needs in a more cost-saving manner.

Methodological Challenges for Economic Evaluation of Community-Based Health Promotion Interventions: A Critical Review

PRESENTER: **Funeka Bango**, University of Cape Town

AUTHOR: Susan Cleary

Background: Community-based health promotion (CBHP) interventions are attractive for disease prevention in low and middle-income countries (LMICs) due to their capacity to address context-specific socio-economic and environmental factors contributing to disease patterns and health disparities. Due to limited budgets and several competing needs in LMICs, using economic evidence to set public health priorities

is critical. However, existing guidance for addressing the complexity in economic evaluation of public health interventions does not offer categorical recommendations for assessing CBHP interventions. These interventions have multiple dimensions of complexity stemming from inherent intervention characteristics and the properties of the implementation context. Consequently, applying traditional economic evaluation frameworks to CBHP interventions may not be appropriate to capture the multidimensional complexity of such interventions, significantly affecting evaluation results. This can misrepresent the significance of these interventions and underestimate their value relative to other investment needs. Understanding the economic evidence of CBHP interventions can assist decision-makers in prioritising investments in CBHP interventions, reducing health inequities for disadvantaged communities.

Objectives: To systematically identify and critically appraise applied methods in identified economic evaluation studies of community-based individual-level behavioural health promotion interventions, with reference to the analytical challenges related to the characteristics of these interventions.

Methods: A broad search strategy was used to systematically identify published full economic evaluations of CBHP interventions in seven databases (the Cumulative Index of Nursing and Allied Health Literature (CINAHL), Africa-Wide Information, APA Psych Info, Health Source: Nursing Academic Edition, EconLit, Scopus and PubMed), regardless of country of origin. A comprehensive tool was developed to capture the critical methodological aspects relevant to the study objectives. We performed a narrative synthesis to critically appraise currently applied methods compared to published guidelines.

Results: A total of 25 studies were included, and 99% originated from high-income countries. There was significant heterogeneity in included studies which focused on a range of different CBHP interventions, with the majority focusing on obesity prevention or reduction (32 per cent). The analytical approaches in the included studies were wide-ranging, with cost-utility analysis being the most commonly used approach (64 per cent). Using a traditional checklist, the methodological quality of the included studies was assessed to be good overall. However, applied methods did not adequately address the methodological issues of conducting economic evaluation in CBHP. The main methodological challenges were related to the perspective of the study, identifying, measuring, and valuing relevant costs and consequences, including intersectoral costs and benefits, and the inclusion of equity considerations.

Conclusion: With increasing pressure on healthcare budgets, robust evidence supporting population-level public health expenditure is necessary, especially in LMICs where resources are highly constrained. There is a need for further development of specific recommendations to support the design of high-quality economic evaluation studies that can produce robust evidence to justify investments in individual-level CBHP, especially in LMICs.

The Role of Benefit-Cost Analysis in Priority-Setting for Noncommunicable Diseases: A Modeling Study

PRESENTER: **David Watkins**, University of Washington
AUTHORS: Sarah Pickersgill, Sali Ahmed

Many policies that can improve health are implemented by non-health ministries and have significant costs and benefits outside the health sector that are relevant to consider in priority-setting processes. Cost-effectiveness analysis provides an incomplete picture of these types of policies. The issue is especially pertinent to noncommunicable diseases (NCDs) for which there are numerous intersectoral policy opportunities to address behavioral and environmental risks. In this study, we sought to demonstrate the usefulness of benefit-cost analysis to guide cross-sectoral priority-setting for NCD prevention and control by directly comparing the efficiency of health sector and intersectoral interventions that address NCDs.

Our analysis builds on several modeling studies we published recently and that used literature-based epidemiological, demographic, and healthcare cost data to model the costs and health consequences of different NCD interventions in 77 low-income countries (LICs) and lower-middle-income countries (LMICs). In the current study, we considered 31 NCD interventions, including 6 intersectoral policies (e.g., regulations on alcohol advertising) and 25 clinical interventions (e.g., treatment of chronic respiratory diseases). We build on our previous modeling by conducting benefit-cost analyses of these interventions from the societal perspective, including, importantly, costs to households (e.g., foregone consumer surplus from tobacco taxes) and firms (e.g., reformulation costs from sodium reduction regulations) as well as implementation costs to governments. Benefits were estimated using value-of-a-statistical-life methods. We analyzed costs and benefits (both discounted at 5%) through 2030, the end of the Sustainable Development Goal period, and presented results as benefit-cost ratios (BCRs), comparing findings between country income groups.

We found that across all LICs and LMICs, intersectoral policies generally had high BCRs, with tobacco taxes and sodium reduction policies being the most cost-beneficial (BCRs around 500-600). However, several clinical interventions also had very favorable BCRs (15 or higher); these include pharmacological management of heart failure and epilepsy and multimodal treatment of early-stage breast cancer; these sorts of interventions have not featured in previous "Best Buys" reports. Usually interventions were more cost-beneficial in LMICs than LICs by a factor of about 2, but a few ran counter to this trend (e.g., cervical cancer treatment, surgery for selected gastrointestinal disorders), mostly because of higher disease burden. Only a few clinical interventions (e.g., treatment of bipolar disorder) were not found to be cost-beneficial (BCRs <1). While the intersectoral policies were generally more cost-beneficial than clinical interventions, as a group they only generated about 5-10% of the potential health and economic benefits. Among all 31 interventions, about one-third of the total health and economic gains could be achieved through a combination of tobacco control and drug therapy for primary and secondary prevention of cardiovascular disease.

Our analysis demonstrates that benefit-cost analysis is a useful complement to conventional cost-effectiveness analysis in situations where intersectoral policies have a key role to play in disease prevention, such as for NCDs. Our findings reiterate the high value for money in health-related interventions. Intersectoral policies are necessary but not sufficient to achieve global targets for NCD mortality reduction; targeted investments in clinical care are also needed.

10:30 AM –12:00 PM   MONDAY   [Health Care Financing & Expenditures]

Cape Town International Convention Centre | CTICC 1 – Room 2.41-2.42

Balancing Flexibility and Accountability: Institutionalizing Arrangements for Channeling Funds to Health Facilities Delivering Primary Health Care Services

MODERATOR: **Moritz Piatti**, World Bank

ORGANIZER: **Nirmala Ravishankar**, ThinkWell

DISCUSSANT: **Sophie Witter**, Queen Margaret University Edinburgh; **Sierd Hadley**, Overseas Development Institute

Increasing Facility Financing through Government Integration of Results-Based Financing in Uganda: Concessions, Trade-Offs, and Wins.

PRESENTER: **Angellah Nakyanzi**, ThinkWell
AUTHORS: Eric Tabusibwa, Sarah Byakika, Anooj Pattnaik, Tapley Jordanwood, Michael Chaitkin

Introduction: In the final year of the five-year results-based financing (RBF) project for reproductive, maternal and child health financed by the World Bank, the Global Financing Facility, and the Swedish Development Agency, the Government of Uganda faced the challenge of how to integrate the RBF mechanism into the country's health financing system in alignment with its public financial management (PFM) rules. In early 2022, the Ministry of Health (MOH) began developing a strategy to guide the transition of the RBF mechanism into the government's annual budget and planning process. This initiated an iterative process of technical redesign to reconcile RBF principles with government PFM rules.

This study provides a qualitative analysis of the policy process to mainstream RBF, exploring the interests and contributions of key stakeholders shaping the outcome. These ranged from the MOH as steward of the health system; the World Bank, which designed the current RBF scheme and has advocated for its transition to government systems; the Ministry of Finance (MOF), which oversees the PFM system and drives the annual budget development process; health development partners supporting health financing reforms in Uganda; local government officials; and health facility managers. The study adds to our understanding of the bureaucratic politics that frames health financing reforms.

Methods: This study used a participatory research methodology built around in-depth key informant interviews (KII) and consensus building. Using an analytical framework developed by Piatti Fuenfkirchen, Hadley and Mathivet (2021), this study systematically analyzes Uganda's RBF transition experience. Following the MOH-led development and approval of the strategy by the MOF, 20 KIIs were conducted among participants in the process. Interviews were recorded, with participant consent, transcribed, and coded for analysis.

Findings: The results of this analysis provide a series of nuanced and detailed insights into the cross-stakeholder dynamics of transitioning a donor-driven RBF project to a reform that fits within the PFM rules of the government. This process was iterative and required significant efforts to translate the technical implications of both health financing and PFM to reach a design understood and agreed by all parties. Analysis of KII responses reveals their areas of interest in the design, non-negotiable boundaries, negotiated areas, and successes in the new mainstreamed government RBF mechanism for health financing. These included concessions, such as foregoing cash bonuses to individual providers; trade-offs, including moving from a quarterly to annual cycle of performance-adjusted payments hence mainstreamed PBF will not be able to respond as much in real time to performance; and meaningful wins for the health system that will see facility operating allocations increased and potentially greater resource allocation efficiency.

Implications: The findings of this study highlight the need to consider the realities of PFM rules and regulations at the initial design stage of a project-based RBF mechanism. Misalignments between the RBF design and the financial management processes allowed under a project-based approach create difficult choices at the end of the implementation period that put at risk gains made during the project period and the sustainability goals through government adoption.

Enabling Conditions for Primary Health Care Financing through Public Financial Management Systems: Zimbabwe Case Study

PRESENTER: **Chenjerai Sisimayi**, The World Bank
AUTHORS: Hamish Colquhoun, Moritz Piatti, Rosa Dubey, Angel Bombarda, Sheperd Shamu
Introduction

A performance-based financing (PBF) modality has been piloted in Zimbabwe since 2011 and has been scaled up to all rural health facilities since 2014. A 2016 impact evaluation of the PBF initiative demonstrated the potential for significant efficiency gains through its implementation. This paper aims to assess the extent to which Zimbabwe's public financial management (PFM) system aligns with the core principles of PBF and develop a roadmap of reforms for strengthening this alignment (including through identifying the compromises and trade-offs that are required).

Methods

The assessment had two phases. The first was a situation analysis of the extent to which the existing PFM system for the Zimbabwe health sector is aligned with the principles of PBF. The second was the development of a reform roadmap setting out the actions, which will be undertaken to strengthen the alignment.

The situation analysis was organized by four key pillars of PBF (Piatti Fuenfkirchen et al., 2021): a) performance orientation: the extent to which the financing of facilities is linked to their performance; b) autonomy: the extent to which facilities have control over how their resources are managed such that they can respond to incentives; c) financial management capacity: facilities' having the wherewithal to ensure the integrity of public spending; and d.) unified financing: the extent to which the fragmentation of financing can provide conflicting or diluted incentives for facilities. The analysis was limited to the primary health care (PHC) level.

Findings

Alignment of PBF principles with the PFM system requires a broad consideration of reform sequencing. For example, it is likely to be preferable to strengthen facilities' financial management capacity sufficiently before granting further autonomy. Similarly, the benefits of reforms targeting a greater performance orientation of the system may be constrained without facilities first having sufficient autonomy to respond to the incentives created.

Some of the reform actions proposed pose certain risks and challenges, such as extending the Integrated Financial Management System (IFMIS) to the PHC facility-level, which can help reduce fragmentation but also risks reducing the autonomy and flexibility of these facilities for spending. This will require hybrid solutions with ex-post reporting to strengthen the accountability of facility-level spending without involving rigid ex-ante IFMIS controls. There is also a distinction between PHC facilities being cost centers in the national budget and them being included in the IFMIS. The latter requires the former, but not vice versa. If PHC facilities become cost centers in the budget they would have explicit budget allocations attached to them. This would increase the transparency of resource flows and provide a foundation for a more explicit linking of overall facility spending to results.

Conclusion

Zimbabwe's PFM system already has significant alignment with the principles of PBF. There is furthermore huge potential to build on the momentum of existing reforms to strengthen this alignment. The reform options require value judgements about where the Zimbabwe government wants the system to be.

Arrangements for Facility Financing and Their Effect on Human Resources for Health: Insights from Kenya

PRESENTER: **Dr. Stephen K Muleshe**, Department of Intergovernmental Relations and Regional Coordination
AUTHORS: Isabel Maina, Anne Musuva, Boniface Mbuthia, Janet Wanjiku Keru, Ileana Vilcu

Introduction

In Kenya, government-owned health facilities could retain the revenue they collected from user fees, health insurance reimbursements and government transfers prior to devolution in 2013. Facilities would spend these funds to address their immediate needs, including sourcing for commodities, hiring casual workers, and paying for operating costs. After devolution, most counties started requiring public facilities to transfer all own-source revenue to the county treasury. Some have since put in place arrangements to grant some financial autonomy to public facilities. Against this backdrop, we undertook a study to explore the effect of facility autonomy on hiring, paying, and managing human resources for health and on their performance by comparing three counties: one with no facility autonomy (A), one with modest facility autonomy (B), and one with extensive facility autonomy (C).

Methods

This study used a mixed-method approach. In each of the three counties, three public hospital and two public health centers were purposively sampled. Data collection was done through in-depth interviews and by reviewing financial and performance data, with a focus on human resources for health, across the last three years. We interviewed country government officials, facility committees and managers, and health workers. We analyzed qualitive data in NVIVO and used Excel for descriptive analysis of the quantitative data.

Findings

In county C, public facilities have been granted the authority to retain and spend the funds they collect from user fees and insurance reimbursements. While health staff are typically hired and paid by the county, facilities use these funds to hire casual workers, including nurses, laboratory technicians etc. to fill in staffing gaps but also to incentivize them to improve their performance. In county B, public

facilities have modest facility autonomy. Facilities are required to remit all own-source revenue to a fund account created and managed by the county. The county retains an administration fee, redistributes part of the funds to lower level facilities, and transfers the balance to the facility bank account that remitted the funds. Thus, facilities often do not have enough financial resources available to hire casual workers. Instead, they use the funds to cover smaller costs such as facility maintenance or buy emergency commodities. In county A, public facilities lack autonomy given that the county requires them to remit all the funds they collect from user fees and insurance reimbursements to the county treasury. They do not necessarily receive back the remitted funds. These facilities experience severe staffing gaps, delays paying staff affecting service delivery.

Conclusion

Lack of or limited financial autonomy over own-source revenue has a negative impact on facilities' ability to hire and pay casual health workers. Ensuring that facilities have funds that they can use flexibly and account for them is critical for improving service delivery in the public sector in Kenya. This could be enabled through clear guidance from the national government about how counties can authorize facilities to retain and spend own-source revenue and more evidence about the pros and cons of different arrangements so that counties learn from each other.

12:00 PM –1:30 PM   MONDAY   [Special Sessions]

Cape Town International Convention Centre | CTICC 1 – Auditorium 2
IHEA Members' Meeting

12:00 PM –1:30 PM   MONDAY   [Social Events]

Cape Town International Convention Centre | CTICC 1 – Jasminum & Strelitzia restaurants
Lunch and Poster Viewing

12:00 PM –1:30 PM   MONDAY   [Social Events]

Cape Town International Convention Centre | CTICC 1 – Ballroom East
Lunch and Poster Viewing

1:30 PM –3:00 PM   MONDAY   [Health Care Financing & Expenditures]

Cape Town International Convention Centre | CTICC 1 – Room 2.66
Influencing Health Seeking Behaviors through Improved Health Financing [FINANCING FOR UHC SIG]

MODERATOR: **Matthew Jowett**, World Health Organization

Using Performance-Based Financing to Improve Quality of Care: Evidence from the Democratic Republic of Congo
PRESENTER: **Gil Shapira**, The World Bank
AUTHORS: Emma Clarke-Deelder, Hadia Samaha, Gyuri Fritsche, Michel Muvudi, Guenther Fink
Background: Health systems' weakness remains one of the primary obstacles towards achieving universal access to quality healthcare in low-income settings. Performance-based financing (PBF) programs have been increasingly used to increase both the quantity and quality of services delivered in LMICs. However, evidence on the health system impacts of these programs remains fragmented and inconclusive. In this paper, we analyze the health system impacts of the PBF program in the Democratic Republic of the Congo (DRC), one of the largest performance-based financing programs introduced in LMICs to date.

Methods: We used a health systems perspective to analyze the benefits of PBF relative to unconditional financing of health facilities. Fifty-eight health zones in six provinces were randomly assigned to either a control group in which facilities received unconditional transfers or to a PBF program that started in the end of 2016. Follow-up data collection took place in 2021-2022 and included health facility assessments, health care provider interviews, direct observations of care, patient exit interviews, and household surveys. We estimate the impact of the program on 55 outcomes in seven health system domains using multivariate regression models. We used random-effects meta-analysis to generate pooled average estimate within each domain.

Findings: Detailed facility assessments were conducted in 279 health centers and 56 hospitals. Interviews were completed with 1,465 health workers and 8510 household respondents. In addition, 5,235consultations and 442 deliveries were observed by trained health professionals. The PBF program improved structural quality of health facilities by 4 ppts (95% CI 0.01-0.08), technical process quality by 5 ppts (0.03-0.07), and non-technical process by 2 ppts (0-0.04). PBF also increased coverage of priority health services by 3 ppts (0.02-0.04). Positive impacts were also measured for facility management (9 ppts, 0.04-0.15), and for service fee policies and users' satisfaction with service affordability (14 ppts, 0.07-0.20). Service fees and health workers' satisfaction were not affected by the program.

Interpretation: The results presented here suggest that well-designed PBF programs can lead to improvements in most health systems domains relative to comparable unconditional financing. However, the modest impacts in some domains and the large persisting gaps suggest that additional health system reforms will be necessary in DRC to achieve the Sustainable Development Goals.

The Unequal Responses to an Universal Increase in Cost-Sharing for Emergency Care in Hong Kong: A Discontinuity Analysis

PRESENTER: **Yushan WU**, Centre for Health Systems & Policy Research, Chinese University of Hong Kong
AUTHORS: Lai Yi Wong, Eng-Kiong Yeoh, Yingxuan Wang, Menghan Shen

Importance: To address long wait times and encourage the appropriate utilization of emergency care, cost-sharing for emergency care was increased from HK$100 to HK$180 per visit in July 2017 in all public hospitals in Hong Kong. However, there are concerns that this increase could deter appropriate emergency department visits and cause income-related disparities in access to care.

Objective: To examine changes in emergency department visits after the fee increase.

Design: Regression discontinuity analysis using public hospital administrative data from June 2015 to May 2019.

Setting: All public hospitals in Hong Kong.

Participants: All Hong Kong residents aged 64 years and below, categorized into low-, middle-, and high-income groups based on the median household income in their district of residence.

Main outcomes and measures: The primary outcome is the number of emergency visits per month, categorized into three severity levels (emergency, urgent, and non-urgent). Secondary outcomes include the proportion of emergency care patients admitted to hospitals, the number of visits to public general outpatient clinics, and inpatient admissions via emergency departments.

Results: Our study included 5 441 679 emergency department visits (47.90% male; 38.76% 45–64 years old). The fee increase was associated with a 21.40% reduction in emergency department visits (95% CI [17.13%, 42.70%]), including a 15.37% reduction in urgent visits [8.10%, 35.67%] and a 24.31% reduction in non-urgent visits [18.71%, 48.40%]. The reduction in urgent visits reached significance among patients from low-income districts (16.55% [21.86%, 45.17%]) but not middle- or high-income districts. The fee increase was not associated with changes in the proportion of emergency care patients admitted to hospitals or the number of visits to general outpatient clinics, but it was associated with a 15.91% reduction in inpatient admissions via emergency departments [9.28%, 36.65%].

Conclusions: The fee increase was associated with a significant reduction in non-urgent emergency department visits. A statistically significant reduction in urgent emergency department visits was detected in low-income groups but not in middle- or high-income groups. Further study is warranted to examine strategies to protect low-income people from avoiding needed care.

The Impact of Ghana's NHIS Exemption Policies on Health-Seeking Behaviour

PRESENTER: **Yaw Boateng Atakorah**, Kwame Nkrumah University of Science and Technology

Countries all over the world are seeking to enhance the general well-being of their populations by instituting a prepayment health system in which people can access health care at any time without financial risks. In Ghana, the national health insurance scheme (NHIS) seeks to achieve this objective while leaving no one behind. To accelerate the country's UHC agenda, the scheme was designed to also provide premium exemptions to the poor and vulnerable. However, almost two decades after the introduction of the policy, its effectiveness has not been evaluated. In this study, we seek to evaluate the impact of the premium exemption policies on health-seeking behaviours.

Data from the most recent round of the Ghana Living Standards Survey (GLSS 7) was used. A total sample of 8,297 individuals were included in the analysis comprising 5,686 rural and 2,611 urban dwellers. We used non-experimental techniques to estimate the desired impact. The sample includes individual who required health care within two weeks prior to the survey. The Lewbel instrumental variable technique was employed to allow the use of both internal and external instruments. This technique was also validated using the propensity score matching technique as robustness check. The analysis was further disaggregated by rural-urban location.

The results suggest that premium exemption policy of the NHIS has a positive and statistically significant impact on health care use. Specifically, we found that premium exemption for children under 18 and the aged (above 70 years) has the highest impact on health care utilization. The findings also suggest that the impact of these polices was higher for urban dwellers compared to their rural counterparts. A positive and statistically significant impact of the exemption policy on formal health care seeking was estimated.

In general, the findings confirm the relevance of the NHIS premium exemption policies in encouraging formal care seeking. However, this finding seems to be driven by urban dwellers relative to their rural counterparts. Policies to complement such financial risk protection policies through improved health infrastructure in rural areas would be relevant.

The Effect of Public Health Expenditure on Health and Care Use in Mozambique

PRESENTER: **Eliana Chavarría Pino**, University of Manchester
AUTHORS: Laura Anselmi, Matt Sutton

Background: Health expenditure is commonly used to increase health, but evidence on the returns is still mixed. Some studies found that health expenditure increases life expectancy, reduces child mortality and maternal mortality, while others have found no effects at all or significant effects only on specific intermediate outcomes, such as immunisation coverage and malaria prevention. Results are often context-dependent and evidence from low-income countries is scarce, mostly based on national-level data and assessing effects on mortality or life expectancy only.

Aim: To provide novel evidence from a resource-constrained setting by assessing the effect of public health spending on health and health care use in Mozambique. We examined the impact of health expenditure at the sub-national level differentiating between domestic and international expenditure.

Methods: We used three main data sources covering 120 districts over eight years: i. District and provincial government recurrent health expenditure, ii. International health expenditure (either channelled through provincial directorates of health to support their recurrent expenditure or through earmarked projects implemented in different provinces and districts), and iii. Health outcomes from the 2011 and 2015 Demographic Health Survey. We estimated the effects of district expenditure from all sources on individual health and health care use. We included household and mother characteristics and district and year-fixed effects. To address endogeneity and account for cumulative effects, we included lagged values of domestic and international health spending.

Results: Domestic spending has a significant and protective effect on child mortality. Increasing government health expenditure by 1% reduces the probability of infant death by 0.031 percentage points (pp) and the probability of under-five death by 0.022 pp. An increase of 1% in international expenditure managed by local governments reduces the probability of infant death by 0.028 pp and of anaemia in children under 5 by 0.042 pp. It also increases the probability of attending at least four antenatal care appointments by 0.103 pp, and of accessing skilled health providers by 0.073 pp. Despite representing approximately 60% of total health spending, we did not find any significant effect on mortality of international funding channelled through earmarked projects. However, we found that this expenditure contributes to the presence of skilled personnel at ANC visits (0.049 pp) and is negatively associated with full immunisation before the first year of life. This suggests international funding has been allocated to deploy specific programmes, such as vaccination campaigns or the provision of skilled personnel during ANC visits.

Conclusions: Government expenditure is critical in determining health outcomes. International expenditure can have a positive impact when it is managed by local governments through sustainable and predictable funding schemes, suggesting that governance is key in achieving intended results. Further analysis will discriminate between international earmarked projects and explore alternative instruments.

1:30 PM –3:00 PM   MONDAY   [Health System Performance]

Cape Town International Convention Centre | CTICC 1 – Room 2.43
Equity in Aid Allocation

MODERATOR: **Justice Nonvignon**, University of Ghana

ORGANIZER: **Sedjro Oscar Paoli Ricci Behanzin**, MRC Unit in The Gambia at London School of Hygiene and Tropical Medicine

Equity of Donor Aid Flows for Reproductive, Maternal, Newborn, and Child Health: A Comparison between Donors and over Time

PRESENTER: **Catherine Pitt**, London School of Hygeine and Tropical Medicine
AUTHORS: David J Bath, Aaron Littlefield, Peter Binyaruka, Sedjro Oscar Paoli Ricci Behanzin, Melisa Martinez-Alvarez, Josephine Borghi

Donor aid can contribute to redressing global health inequities through transfers from those countries with the greatest ability to pay to those countries with the least ability to pay and greatest health needs. However, different donors pursue different objectives with their aid, and these objectives may change over time. Reproductive, maternal, newborn, and child health (RMNCH) outcomes are particularly sensitive and important metrics of health inequity between countries. We compared the equity of donor aid flows for RMNCH between donors and donor types and examine changes over the period 2002-20.

Analyses are based on application of the Muskoka2 algorithm to the Organisation for Economic Cooperation and Development's Creditor Reporting System Database. First, we describe all-sector and RMNCH aid flows by donor type (bilateral, multilateral, and private) and for

key individual donors and donor groups (e.g. G7, non-OECD bilaterals), over the period 2002-2020. Second, we use descriptive statistics and Kakwani indices to examine equity of bilateral donors' contributions to all-sector aid and aid for RMNCH relative to their economic capacity to contribute. Third, we use concentration curves and concentration indices to assess equity of the distribution of RMNCH aid relative to need across recipient countries each year for all donors, and for different types of donors, individual donors, and donor groups. We use per capita gross domestic product (GDP), neonatal mortality rates, and under-5 child mortality rates as metrics of need.

Total reported aid for RMNCH increased from $3.5 billion in 2002 to $17.0 billion in 2020, with a peak of $17.3 billion in 2017 (constant 2020 USD). The United States was by far the largest donor, accounting for 25% of all RMNCH disbursements in 2020, a drop relative to 2002 (when it comprised 30%) and its peak share of 41% in 2008. Donor countries with higher per capita GDP contributed proportionately more aid for RMNCH; this progressivity rose from 2002 to 2006 (Kakwani indices of 0.09 and 0.27, respectively) but fell in 2020 (Kakwani index: 0.15). The distribution of aid for RMNCH became increasingly concentrated amongst the poorest countries, with concentration indices (CI) falling from -0.36 in 2002 to -0.54 in 2020. However, aid for maternal and newborn health was slightly less concentrated amongst countries with higher neonatal mortality rates in 2020 (CI=-0.21) than in 2002 (CI=-0.24). Aid for child health was also slightly less concentrated amongst countries with higher under-5 mortality rates in 2020 (CI=-0.33) than it was in 2002 (CI=-0.37). Disbursements from multilateral donors were consistently slightly more concentrated amongst recipients with greater needs than disbursements from bilateral donors; multilaterals as a whole tended to prioritise those countries most in need to a greater degree.

The overall progressivity of aid contributions from bilateral donors improved over the period, although donors' contributions varied relative to their ability to pay. While aid for RMNCH became more concentrated amongst poorer countries, targeting to RMNCH needs worsened. To support global progress towards universal health coverage, donors must ensure that the volume and distribution of their aid is equitable.

Equity of Aid for Reproductive, Maternal, Newborn and Child Health to West African Countries, 2010-2020

PRESENTER: **Sedjro Oscar Paoli Ricci Behanzin**, MRC Unit in The Gambia at London School of Hygiene and Tropical Medicine

West African countries have the highest maternal and under-five mortality rates in the world. Most are low-income or lower-middle-income countries and far from reaching relevant Sustainable Development Goal targets. Out-of-pocket payments from households account for a large share of health spending in the region and contribute to financial hardship, poor health outcomes, and inequity. To reduce the share of out-of-pocket payments and increase access to needed health care, governments and foreign donors must be held accountable for equitable and effective financing.

To assess the equity of aid flows for reproductive, maternal, newborn, and child health (RMNCH) in the 16 countries of West Africa region over the period 2010-20, we used estimates of aid to RMNCH based on the Muskoka2 workbook and additional data from the Global Health Expenditure Database (GHED) and World Bank Database. First, we analyzed aid flows to RMNCH for West Africa, describing trends and levels of RMNCH aid for the region as a whole and for each country, and presenting the type and contribution of donors. We then looked at equity in the distribution of aid to RMNCH across the world's regions. Finally, we studied the equity of aid to RMNCH within the West African region. Equity analyses are based on concentration curves and concentration index calculations.

Results show that aid to RMNCH for West Africa increased between 2010 and 2016, with a slight decline from 2017 to 2019, before increasing again in 2020. From 2010 to 2020, aid to the RMNCH in West Africa raised from USD 1.4 billion to USD 2.2 billion, a 58% increase. Over the entire 2010-2020 period, child health accounts for 49% of aid to the RMNCH. Bilateral donors are the largest contributor to RMNCH in West Africa, accounting for 52% of aid to RMNCH over 2010-20. The level of aid to RMNCH is very high in countries such as Liberia, Sierra Leone and Cabo Verde, considering the amount disbursed per capita. On the other hand, aid to RMNCH per capita is very low, under USD 5 per year, in countries such as Nigeria. Across the study period, bilateral aid is the largest contributor to RMNCH in West Africa. Globally, aid to RMNCH increased in most world regions over the 2010-2020 period. West Africa is, after East Africa, the second region in the world to receive the largest amount of aid to RMNCH in 2020, with USD 2.2 billion and USD 4.7 billion respectively. About equity of aid to RMNCH across regions, analyses reveal that aid is concentrated among the poorest regions and those with the highest neonatal and under-5 mortality rates for the years 2010, 2015 and 2020. However, aid to RMNCH within West Africa is pro-rich. But considering health needs, aid is pro-needs within West Africa.

This research demonstrates the need for donors to harmonize their funding actions for RMNCH in West Africa and to maintain their support at a level commensurate with the health needs of the West African countries.

Chinese Health Funding in Africa: The Untold Story

PRESENTER: **Carrie B Dolan**, College of William and Mary

Background The motivations behind China's health aid allocation remain complicated because the details around health aid project activities are limited. We know too little about the purpose of China's health aid in Africa, and we believe this incomplete information prohibits understanding China's entire role in supporting Africa's healthcare system. Our study aimed to understand better China's health aid priorities and potential drivers of these priorities across Africa.

Methods Based on AidData's Chinese Official Finance Dataset set and the Organisation for Economic Co-operation and Development guidelines, we reclassified all 1,026 health projects in Africa from their broad 3-digit OECD-DAC sector codes to their more specific 5-digit CRS codes. We analyzed project count and financial value to assess shifting priorities over time.

Results China's priorities have shifted over time (2000-2017). During the early 2000s, China allocated aid primarily to basic health personnel and lacked sub-sector diversity. After 2004 however, China focused more on basic infrastructure and less on clinical-level staff. Their interest in malaria also expanded in scale and depth between 2006-2009. We continued to see this demand response in 2012 and 2014 when China shifted from basic infrastructure to infectious disease in response to Ebola.

Conclusion Taken together, our findings observe the changes in China's health aid, starting with a disease eliminated in China, then moving towards global health security and health system strengthening, followed by shaping the governance mechanism.

1:30 PM –3:00 PM   MONDAY   [Demand & Utilization Of Health Care Services]

Cape Town International Convention Centre | CTICC 1 – Room 1.63
Equity in Health Outcomes and Healthcare Use

MODERATOR: **Marcia Weaver**, University of Washington

Did the Design, Implementation and Impact of a Publicly Funded Health Insurance Scheme in India Have Intended and Unintended Effects on Gender and Health Equity?

PRESENTER: **Rajalakshmi Ram Prakash**, Public Health Foundation of India

Background:

While India implements the world's largest Publicly Funded Health Insurance Scheme(PFHIS), few studies have explored decision-making pathways of men and women from low-income households around PFHIS enrolment and utilisation, or that apply a gender lens to financial risk protection for health. This paper aims to undertake a gender analysis of the design, implementation and impact of a PFHIS in a southern Indian state.

Research questions:

(a)What are the gender differences in healthcare expenditures, insurance enrolment and utilisation which are unfair and avoidable

(b)What are the processes and patterns in decision making around enrolment and utilisation of PFHIS for men and women

(c)Did the design, implementation and impact of the PFHIS have intended and unintended effects on gender and health equity?

Methodology:

The research followed a mixed methods study design. The findings draw from analysis of four data sets-(1) Government of India's sample survey data (3917 households) (2) Over 900,000 insurance claims data spanning three years (3) Primary household survey data in one impoverished urban and one rural area (1176 households) (4) Qualitative data from 49 in-depth interviews at home with purposively selected hospitalised men and women, 14 interviews with healthcare providers & stakeholders. Data was collected between 2015-2017. Descriptive statistics were employed on quantitative data and qualitative data was content analysed based on Social Relations framework.

Key Results:

Government data showed that in spite of women and men having comparable hospitalisation rates, total health expenditure and Out of Pocket Expenditure(OOPE) were lower for women than men (INR 15577 vs 24427 and INR 13121 vs 21187 respectively). Claims data revealed that men benefitted more than women from PFHIS (64% of total claims and almost twice in total claimed amount-INR 120.5 million vs 63.9). Primary data showed that gender-based barriers such as poor awareness of enrolment methods and benefits of PFHIS , unpaid care work, lack of identification documents, gender identity, lack of negotiating power, rationing of PFHIS benefits, etc. dictated pathways to enrolment and utilisation. A range of services preferred by women such as Sexual and Reproductive Health, drugs, diagnostics, outpatient consultations and preventive care were excluded from the PFHIS benefit package. Private and public providers engaged in cherry picking among enrolled patients causing delays and denials. PFHIS did not significantly reduce OOPE, with women having fewer and different mechanisms for coping with OOPE than men.

Conclusions:

The design and Implementation of PFHIS did not adequately consider gender barriers and the different decision-making pathways for men and women in low-income households to utilise health insurance benefits . PFHIS provided inadequate financial risk protection for health for women, caused unintended effects and did not facilitate gender and health equity.

Implications for Policy & Practice:

Existing tools and measures of 'out of pocket' and 'catastrophic' expenditure captured at household level mask intra-household gender power relations and need revisiting. Universal Health Coverage schemes are not gender neutral. An intersectional understanding of financial risk

protection for health that accounts for age, gender, class, religion, caste/race, sexual orientation and gender identity, disability is needed.

Inequality in Visual Impairments Among Older Adults and Elderly in India: A Gender Perspective

PRESENTER: **Rajeev Ranjan Singh**, International institute for population sciences

Background: Globally, 1.1 billion people have some form of visual impairment, and 90 percent of them live in low and middle-income countries. Though evidence suggests a global reduction in the age-standardized prevalence of blindness, the prevalence of visual impairment is increasing, and the likelihood of increasing this trend is also higher. The adverse social and economic impact of visual impairment is profound. Poor and less educated people are more vulnerable as they neglect to care for their good health owing to financial reasons. Additionally, visual impairments and blindness intensify poverty and inequality by reducing employment opportunities and increasing medical spending.

Methods: The study used the unit data from the first round of the Longitudinal ageing study of India (LASI), 2017-18. LASI survey interviewed 73,396 middle-aged and elderly aged 45 years and above and their spouses, irrespective of age, across all the states and union territories in India. The main objective of the LASI survey was to understand the social, economic, and health of older adults (45+) in India. To fulfill the need of the study, bivariate analysis, age sex-adjusted prevalence, logistic regression, concentration index, and concentration curve is used.

Result: In India, among 45+ population 12.78% have distance vision loss, 31.63% have near vision loss, 1.63% have blindness and 35.95% have any of these visual impairments. Additionally, visual impairments increases with age, higher among rural inhabitants and females. These variations were significant, even controlling for other socioeconomic conditions. Study found a strong socioeconomic gradient for any visual impairment and each type of visual impairments. Each type of visual impairment was significantly higher among the poor. It was also higher among those with less educated. The concentration index and concentration curve suggest that each type of VI is concentrated among the poor. The socioeconomic and demographic pattern shows that distance vision loss was almost similar for both genders, while near distance was higher among females and blindness was higher among males. With age, distance vision loss increases by 10-fold among 75+ people, while blindness increases by 8-fold. Fourth, the state variation in visual impairment is also large in India which further intensify the inequality across India.

Conclusion: Although visual impairments are likely to increase with a graying population, this high number of untreated eye conditions indicates that eye health is not a priority in low & middle-income countries. People are often skeptical of even basic eye examinations as they worry about the costs of the subsequent screening and treatment program. Resulting higher number of avoidable visual impairments among low and middle-income countries. Given the high rate of undiagnosed and untreated visual impairments, there is a need to ensure adequate provision of diagnosis and treatment availability of spectacles/lenses to those in need. To deal with it, public health services from the primary, secondary, and tertiary levels may be integrated for effective care of growing, underdiagnosed and untreated visual impairments among older adults and elderly in India.

Keywords: Distance vision loss, Near vision loss, Blindness, NFHS, India

Results-Based Financing and Its Impact on Inequality of Opportunity in Maternal and Child Health Outcomes in Zimbabwe

PRESENTER: **Marshall Makate**, Curtin University

Background and motivation

Results-based financing (RBF) programs have gained traction in low- and middle--income countries as vital tools for enhancing health system efficiency and population health outcomes. Existing evaluations of these schemes have concentrated on exploring the effects on incentivised service indicators, with no studies examining the equity implications of these schemes. This study compares *ex-ante* inequality of opportunity in selected maternal and child health outcomes before and after the introduction of the RBF program in Zimbabwe, first piloted in July 2011 to March 2012 in two districts of Marondera and Zvishavane and later expanded to 16 other districts in March 2012 to June 2014. The programme encompassed all health facilities in these districts and included three major components: (a) results-based contracting; (b) management and capacity building; and (c) monitoring.

Data and methods

This study uses nationally representative Zimbabwe demographic and health surveys (DHS 1999, 2005, 2010, and 2015) matched with geographic location data. We estimate a standard difference-in-differences model complemented with kernel propensity score matching, exploiting geocoded data linking the respondent's proximity to health facilities and the timing of the program. The empirical analysis begins with propensity-score matching RBF districts to non-RBF districts based on socioeconomic characteristics. Using the dissimilarity index, the second step quantifies inequality of opportunity in selected maternal and child health outcomes across RBF and non-RBF districts. We then estimate a difference-in-differences model that exploits the spatial and temporal variation in program implementation dates across districts to identify the program's impact on ex-ante inequality of opportunity in selected maternal and child health outcomes. We performed a series of robustness and sensitivity checks.

Results

Our results indicate that the RBF was associated with a 3.3 percentage point reduction in ex-ante inequality of opportunity in delivery assistance by a health professional, a 7.3 pp reduction in inequality of opportunity in facility-based delivery, and a 47.1 pp reduction in child full immunizations. We also show that the RBF was associated with significant increases in inequality of opportunity in breastfeeding, child dietary diversity, stunting, and weight-for-height. Our findings are robust to several sensitivity checks.

Conclusion

The results have important implications for public health policies to improve equitable access to maternal and child health care services in low- and middle-income countries. While RBF may not have been designed primarily to address glaring inequality, our findings indicate that such policies could complement existing equity-enhancing initiatives and help equalise opportunities for women and children in low- and middle-income countries like Zimbabwe. There is a need for further research in other contexts to enhance the external validity of these findings.

Improving Equity in Access and Utilization of the Services: An Evaluation of How Well a Special Free Health Programme Targeted to Maternal and Child Health Services Performed in Nigeria?

PRESENTER: **Uchenna Ezenwaka**, University of Nigeria
AUTHORS: Tolib Mirzoev, Benjamin Chudi Uzochukwu, Obinna Onwujekwe

Background: Nigeria suffers a significant proportion of global maternal and child health (MCH) deaths due to poor access to and inequitable utilization of MCH services. To expand access to MCH services and improve health outcomes, particularly in rural communities, the Nigerian government implemented a novel, free MCH programme between 2012 and 2015. However, there is a gap in knowledge on whether and how these interventions improved access to and equity of MCH care. Hence, this study provides new knowledge on how the special programme fared to improve equitable access to and utilization of MCH services in Nigeria.

Methods: A cross-sectional study was undertaken in eight rural communities in Anambra state, southeast Nigeria. Data was collected from 471 randomly selected respondents using a pre-tested questionnaire. The respondents were women who either gave birth or were pregnant during the implementation of the free MCH programme. Data was analysed using univariate, bivariate and multiple regression analysis. Concentration index (C.I.) was computed to inform the equity analysis, based on a socio-economic status (SES) index.

Results: A total of 99% of the respondents received ANC, 82% received facility delivery (FD), whilst 87% received post-natal care (PNC) services during their most recent visits to the health facilities. There were statistically significant correlations between utilization of ANC and health workers accompanying pregnant women to the health facility ($p<0.00$); the cadre of health workers that attends to women at the facility ($p<0.00$); ever received assistance from village health worker (VHW) in accessing services ($p<0.00$); and receiving a conditional cash transfer (CCT) and Mama kits ($p<0.00$). The uptake of FD and PNC services was statistically significantly associated with the level of education of the respondents ($p<0.05$). In logistic regression analysis, access to ANC, FD and PNC were statistically significantly explained by educational level. All the SES groups had equitable access to ANC, FD, and child immunization.

Conclusion: There was high utilization of MCH services, particularly ANC. The absence of SES differences in the utilization of services indicates that the programme was equitable. However, since it was expected that the poor SES would have had more access relative to the need for the services and considering that they have more burden of MCH health problems compared to the better-off SES groups, the findings could be a case of inverse equity. Hence, concerted efforts should be sustained to ensure that MCH services are used more according to need particularly by the worse-off SES and other vulnerable sub-groups.

Keywords: Conditional Cash Transfer; Access; Equity; MCH; Maternal and Child Health; Utilization; SURE-P/MCH

1:30 PM –3:00 PM   MONDAY   [Health Beyond Health Care Services: Social And Related Determinants]

Cape Town International Convention Centre | CTICC 1 – Room 1.43
Mental Illness and Economic Outcomes in South Africa [MENTAL HEALTH ECONOMICS SIG]

MODERATOR: **Rowena Jacobs**, University of York

DISCUSSANT: **Susan Cleary**, University of Cape Town

Patient Costs and Economic Burden of Common Mental Disorders for People with Chronic Diseases in South Africa

PRESENTER: **Vimbayi Mutyambizi-Mafunda**, University of Cape Town

Background: There is limited evidence on the economic burden of depression and alcohol use disorders (AUD) for patients with chronic diseases in low-and middle-income countries (LMIC). We describe patient costs related to the utilisation of services and identify factors associated with the economic burden of untreated mental health disorders among patients with HIV and/or diabetes using government health services in the Western Cape province of South Africa.

Methods: We used baseline data from participants enrolled in a cluster randomised controlled trial. The sample comprised (N=1,340) patients classified as having risk of depression but no risk of AUD (*n*=689), no risk of depression but risk of AUD (*n*=221); or risk of depression and AUD (*n*=430). We measured total costs as the sum of 1.) direct patient costs (out-of-pocket (OOP) payments for transport to health services, user fees across a range of government and private providers, and healthcare products including special diets) and 2.) indirect patient costs (opportunity cost of time seeking care and lost income). We measured catastrophic costs as total costs above 10% of patient income. We applied a conceptual framework linking patient attributes and health seeking behaviour to economic burden to guide multiple linear regression analyses examining factors associated with economic burden.

Results: Mean monthly total costs per patient and direct costs as a percentage of total costs were ($9.79 [56%]; $5.98 [25%]; $7.15 [34%]) for depression, AUD, and AUD and depression groups respectively. While patients made regular use of routine diabetes/HIV clinics which are free at the point of use, visits to other providers were a key driver of patient costs; patients in the depression group reported more visits to private healthcare providers than patients in other groups (mean=0.57 [SE=0.11], *p*=0.0003). OOP payments were a large share of total costs across all groups, with significant expenditures on special diets by patients with depression compared to other groups (mean $1.72 [SE=0.37], *p*=0.0001). Indirect costs were not significantly different across mental health disorder categories. Regression analysis using OOP payments as the dependent variable showed a positive and significant association with urban location, higher educational attainment and ambulatory visits, and a negative association with the Alcohol Use Disorder Identification Test score (AUDIT). Using total costs as the dependent variable, positive and significant associations were evident for urban location, employment, and age (31-39 years), and a negative association with HIV status.

Conclusion: Results suggest a concerning economic burden in people with risk of depression and people with both risk of depression and AUD, and suggest that cost and time may present barriers to accessing care. Given that psychological treatments for depression and AUD are largely unavailable in the public system, improving access to care for the most vulnerable may require co-ordination of financial risk protection mechanisms alongside scale up of effective first line psychological treatments.

Socioeconomic Inequality in Depressive Symptoms: A Decomposition Approach

PRESENTER: **Amarech Obse**, University of Cape Town

Background: Depressive disorders have been among the leading causes of illness over the last three decades. While depression independently contributes to a significant global burden of disease, it also frequently co-occurs with other mental and physical illnesses, such as HIV/AIDS and diabetes. This study aims to assess inequalities in depressive symptoms and the predictors of these inequalities from participants enrolled in Project MIND (and MIND-ECON), a cluster randomized controlled trial (RCT) which assessed the effectiveness and cost-effectiveness of integrating mental health counselling into chronic disease care in the Western Cape Province of South Africa.

Methods: The Centre for Epidemiologic Studies Depression Scale (CES-D) score was used to measure depressive symptoms. Participants with a CES-D score ≥16 at baseline were included in this study. Living standards were measured using household wealth index. Inequalities were assessed at baseline and 24 months follow up both for the pooled and disaggregated data (intervention and control arm) using the concentration index (CI). Demographic and socioeconomic variables were used to decompose the concentration indices to assess factors that significantly contribute to these socioeconomic inequalities. The differences in inequalities between treatment arms is also decomposed based on the Oaxaca-Blinder technique to explain contributing factors to the change in inequality in depression between the baseline and 24 months follow up at the treatment arm.

Results: This study included 1119 participants with CES-D scores ≥16 at baseline; of whom 340 and 779 were at the control (treatment as usual) and intervention arm respectively. At the 24 months follow up, 857 of these participants were retained. Women accounted for 80% of the total sample at baseline and 59.2% were black. The mean CES-D score was 30.5 at baseline which decreased to 10.9 at the 24 months follow up. In the pooled data, there was a pro-rich inequality (CI=0.001; SE=0.005) in depressive symptoms at baseline, although insignificant which has shifted to a pro-poor inequality (CI=-0.039; SE=0.019) at the 24 months follow up which is marginally significant. Being black (56%) food insecure (33%), and unemployed (31%) increased inequalities in depression disfavoring the poorer at the 24 months follow up. In the analysis disaggregated by study arms, the concentration index of depression at the intervention site increased from -0.001 (SE=0.006) at baseline to -0.053 (SE=0.025) at the 24 months follow up. Further, decomposition of the change in inequality at the intervention site between baseline and the 24 months follow up showed that changes in the total elasticities of the predictors during the study period were the main (93%) and significant contributors to the changes in inequality.

Conclusion: The results of this study showed that while there was not significant difference in depression at baseline of the Project, depression became more prevalent among the poorer at the 24 months follow up. The main drivers of socioeconomic inequalities in depression were inequalities in race, food security status, and unemployment. The shift in depression inequality to the disadvantage of the poorer between study periods shows that participants with better socioeconomic status benefited more from the intervention.

The Impact of Mental Health Status on Employment, Income, Out of Pocket Payments for Healthcare and Household Spending Patterns in South Africa

PRESENTER: **Rowena Jacobs**, University of York

Background: Mental ill-health may adversely impact on a range of individual economic outcomes, including employment, earnings and out-of-pocket healthcare expenditures, with the most vulnerable socio-economic groups expected to be the most harmed. Many studies have provided supporting empirical evidence for this highly intuitive link by demonstrating a *correlation* between mental disorders and economic

deprivation and poverty. However, due to several methodological challenges the existing LMIC-focused evidence is scarce on the extent to which this relationship reflects a *causal* relationship from mental ill-health to economic outcomes.

Methods: The main econometric challenge in estimating this relationship is endogeneity due to reverse causality between mental health and economic outcomes. Mental health is measured as the change in common mental disorders (CMDs) such as depression (CES-D) and alcohol use disorders. We use the individual's household expenditure, employment status, income and out of pocket payments as measures of economic outcomes. We exploit the exogenous variation induced by the MIND intervention to address the problem of endogeneity, using the randomized intervention as an instrumental variable within a two-stage least squares model. In the first stage, we regress a binary variable of the intervention, on the change in CMDs. In the second stage we regress the change in CMDs on household expenditure, employment status, income and out of pocket payments for the individual. To address baseline imbalance in mental health outcomes, we utilize the panel structure of the data. For each outcome, we run regressions appropriate for the type of dependent variable (e.g. categorical, binary, continuous). We control for socio-demographic factors and other individual-level variables.

Results: Our preliminary benchmark OLS estimates show that an increase in depression is associated with an increase in household expenditure and a decline in employment. At the first stage, we find that those who are treated experience an improvement in depression as measured through the CES-D scale, but there are no effects on alcohol use. Second stage estimates do not show any effect of the change in depression and alcohol use (induced by the intervention) on the economic outcomes in our study. Overall, results show a positive effect of the intervention on depression for individuals with HIV or diabetes. We find this to be a longer-term impact with effects observed at the 12-month post-treatment interval. We do not find any significant effects of the change in CMDs on economic outcomes. We observe that the intervention reduces out of pocket payments, but this effect is only significant at the 10% level of significance.

Conclusion: This is one of the first studies that seeks to make causal inferences about the relationship between mental health and economic outcomes. Such causal evidence is needed to credibly inform public health policy about the true wider consequences of mental disorders and the benefits of measures to address the problem. One implication for the case for investment in mental health provision in South Africa and other resource constrained LMICs could be that public policy should focus on the early prevention of mental health problems.

1:30 PM –3:00 PM   MONDAY   [Cross-Cutting Themes And Other Issues]

Cape Town International Convention Centre | CTICC 1 – Auditorium 2
Applied Qualitative Methods for Cross-Cutting Themes

MODERATOR: **Joanna Coast**, University of Bristol

Prävi – Promoting and Inhibiting Factors of Video Consultations As Well As Useful Fields of Application: Qualitative Analysis

PRESENTER: **Klemens Höfer**, University of Duisburg-Essen
AUTHORS: Anke Walendzik, Jürgen Wasem, Theresa Hüer

Introduction: Particularly in rural regions in Germany, access to adequate outpatient care is in some cases impeded by a lower physician density and long travel distances. However, urban regions can also be affected by access obstacles, e.g. due to increasing waiting times. One care model that has the potential to remedy this situation is the implementation of video consultations.

Aim: The qualitative analysis presented here was carried out in the research project "Preference-based use of the video consultation in urban and rural regions", which is funded by the German Healthcare Innovation Fund. Its intention is to analyse the promoting and inhibiting factors of Video Consultations as well as useful fields of application. Within the scope of the project, a Mixed-Methods-Approach is used. The results of the focus group presented here provide the basis for designing surveys of patients and providers (n= ~65,500).

Method: Focus groups were conducted with insured people and providers from rural as well as urban regions in order to identify differences in needs and hopes of these two groups. Supplementary a focus group with representatives of health insurance funds was carried out. 48 individuals were included into the qualitative analysis. A team of moderators led the focus groups via videoconference based on a semi-structured discussion guide. They were audio-visually recorded and transcribed. The transcripts were analysed by using a qualitative content analysis methodically based on Mayring with the program MAXQDA.

Results: The majority of participants saw the greatest advantage of video consultation in the improved access to the service provider. Especially the potential improvement of the continuity of treatment was acknowledged, as patients can continue to be cared for in case of contagious illness or local absence. Some providers expressed frustration with technical difficulties. Furthermore, the health care service providers saw the loss of information due to the use of video consultation as an inhibiting factor. They cited routine appointments, among other things, as reasonable occasions. Participants were sceptical about diagnoses made via video consultation because of the lack of opportunity to perform a physical examination. Aspects such as improved access and continuity mainly benefit patients. Accordingly, attitudes towards video consultation are mostly more positive among insured people than among health care providers.

Conclusions: The results of the focus group suggest a potential for a high level of demand among the insured. This contrasts a low level of supply in the German health care system, only 37% of the health care providers offered video consultations in 2021. Accordingly, there could

be a discrepancy between the supply of and demand. To overcome this, it is important to convince healthcare providers to offer video consultations. In order to meaningfully supplement outpatient care even after the pandemic and to develop previously unused potential, for example for insured persons in rural regions, the advantages of video consultations need to be acknowledged. The definition of useful fields of application and monetary incentives appear to be conducive to this.

Women Leaders in Health Economics and Health Financing in Burkina Faso: What Determined Their Career Choice and What Challenges Do They Face?

PRESENTER: **Orokia Sory**, Recherche pour la Santé et le Développement (RESADE)
AUTHORS: Joël Arthur Kiendrébéogo, Issa Kabore

Introduction: Health systems in low- and middle-income countries face organizational and service management challenges that limit their performance. Recent studies suggest that further involvement of women in health governance and financing could better improve health systems performance, as women are present in all areas of life and generally have higher managerial soft skills such as sensitivity, empathy, intuition, benevolence, communication, and cooperation. This study focuses on the low representativeness of women in health system governance and specifically examines women's careers in health economics or health financing in Burkina Faso and factors that have influenced their careers.

Methods: This was a qualitative study, using a life history interview method. Data were collected in August 2022. We identified and interviewed four women trained in health economics or health financing on their personal and professional experiences that have influenced their career paths. The first woman was a policymaker at the Ministry of Health (MoH), the second was a former policymaker at the MoH and then worked at an NGO, and the other two were researchers. An inductive approach was used to analyze the data and the themes emerging as drivers of these women's careers were individual and family, educational, and social.

Results: At the individual and family level, these four women were eager since their younger ages to pursue long studies. All of them were morally and financially supported throughout their paths by their parents. They all received government scholarships to pursue higher education in medicine, law, sociology, and psychology, respectively, but not in health economics or health financing. Indeed, the training offer in health economics and health financing was limited in Burkina Faso and in Francophone Africa in general – these disciplines are relatively unknown. Therefore, their choice to study health economics or health financing was not made in advance. Three discovered these disciplines fortuitously on the internet while the last one was inspired by her male supervisor, himself a health financing specialist. The four of them found these disciplines attractive and innovative, even if the job opportunities after studies were not so obvious. Regarding the factors influencing their career paths, some women mentioned family constraints including child rearing, housework, and frequent travels within and outside the country, particularly when it comes to holding positions of responsibility. This situation, however, forced some to forego promotions to certain higher positions of responsibility.

Conclusion: The low representativeness of women trained in health economics or health financing in decision-making bodies can be mainly explained by social constraints and the lack of training and capacity building opportunities. There is a need for more training opportunities in health economics and health financing at the national level, with positive discrimination in favor of women through subsidized training fees. There is also a need to create spaces where women leaders and mentors can interact and share their experiences with younger women.

Measuring Consensus in the Perception of National Efforts to Harness the Benefits of a Demographic Dividend Provided By Local Experts in Six Sub-Saharan African Countries

PRESENTER: **Carolina Cardona**, Johns Hopkins University
AUTHORS: Steffany Vucetich, Jean Christophe Rusatira, Ian Salas, Oying Rimon, Saifuddin Ahmed

Background: The African region will double its population by 2050, and more than half will be below age 25. Under favorable policy conditions, these countries have a unique opportunity to boost their economy by harnessing the benefits of a demographic dividend (DD). In this study, we used innovative data that measured the level of national efforts (investments) implemented across six sectors. This study aims to assess whether higher consensus among local experts was translated into higher effort scores. Consensus could be an indicator of these countries' institutions strength and how this is translated into their economic development.

Methodology: We used cross-sectional data collected by the Demographic Dividend Effort Index (DDEI) from six Sub-Saharan African countries' sectorial experts. The DDEI measured the perception of experts who judged the details of their respective countries' efforts in setting a favorable policy environment to harness a DD. Experts worked in six sectors: family planning (FP), maternal and child health (MCH), education (ED), women's empowerment (WE), labour market (LM), and governance and economic institutions (GEI). Responses of the DDEI scores were recorded on a 10-point Likert scale. Each sectorial questionnaire was structured around five practice dimensions: policy, services and programs, advocacy, research, and civil society. We measured the consensus by computing an l-square measure, which is a normed measure of ordinal concentration ranging from 0 to 1. The closer to 1, the higher the consensus. This metric is better suited to measure consensus than the variance, given that the variance depends on the assumption that data is continuous. We also calculated Pearson correlations between the mean DDEI score and the consensus metric by question and country to assess whether the level of consensus was positively correlated with the level of national efforts.

Results: Our sample consisted of 73 Ethiopian, 69 Kenyan, 67 Nigerian, 54 Rwandan, 81 Senegalese, and 96 Tanzanian experts. Rwanda recorded the highest DDEI score (7.7), followed by Senegal (6.3), Tanzania (6.1), Kenya (5.8), Nigeria (5.5), and Ethiopia (5.4). Rwandans

also reported the highest levels of consensus, 0.816 on average, compared to the other five countries whose average level of consensus was 0.500. The pooled analysis showed that consensus was statistically significantly different across the six sectors (F-statistic = 11.6). The average level of consensus was highest for WE (0.582), and lowest for FP (0.531) and MCH (0.531). However, this pattern varied by country and sector. We found that Tanzania, Senegal, and Rwanda had a significant positive correlation in the FP and WE sectors. Senegal had a significant positive correlation in four sectors; however, Ethiopia had either a significant negative or non-significant correlation.

Discussion: Our findings suggest three typologies: countries with a significant positive correlation between the DDEI score and the level of consensus, countries with a significant negative correlation, and countries with a non-significant correlation. One potential explanation for these typologies could be the strength of institutions and programs in their respective sectors. It could be that countries with strong institutions and programs are more likely to have experts with homogenous perceptions.

1:30 PM –3:00 PM   MONDAY   [Demand & Utilization Of Health Care Services]

Cape Town International Convention Centre | CTICC 1 – Room 1.62
Access and Utilization of Healthcare

MODERATOR: **Mark Akanko Achaw**, Palladium International LLC

The Burden and Determinants of Indirect and Opportunity Costs Associated with Accessing Healthcare in Tanzania

PRESENTER: **Anna Laura Verjans**, Swiss Tropical and Public Health Institute
AUTHORS: Brady Hooley, Fabrizio Tediosi

Background – Countries in sub-Saharan Africa have committed to achieving universal health coverage by expanding health insurance to increase the accessibility and availability of healthcare services. While health insurance may reduce patients' direct out-of-pocket medical expenditures, they still incur substantial non-medical and opportunity costs associated with seeking care. For patients with NCDs, the need for regular medical consultations and prescription renewal exacerbate the burden of indirect care costs, especially when care is provided in a centralised manner. This work sheds light on the magnitude of indirect care costs for NCD patients relative to other patients and on which factors drive these differences. As various symptoms may limit labour market participation by patients with NCDs, the opportunity costs of living with an NCD can be substantial for the patients and society. Therefore, we also explore whether engagement in care is associated with patients' NCD-related work limitations.

Methods – In November 2020-January 2021, we invited outpatients from 35 health facilities across the Same and Kilombero districts of Tanzania to participate in a cross-sectional patient exit survey. We adopted the human capital method to estimate the non-medical and opportunity costs associated with seeking healthcare. We used multilevel linear regression to study non-medical costs as a function of chronic disease and health insurance status, while controlling for socio-demographics, accompaniment, facility level, facility proximity and the interaction between chronic disease status and seeking care at the hospital. We then used negative binomial regression to study NCD patients' self-reported number of days that their NCD prevented them from working as a function of the time since last care-seeking, being prescribed medicines during their last visit and having taken medicines in the last seven days, while controlling for socio-demographics.

Results – We recruited 1748 patients, of which 534 had an NCD. Hypertension was the most common condition, while 20% of NCD patients reported multimorbidity. Overall, the total non-medical costs (in USD) of accessing care was on average $2.21 ($0.059 – $27.14). NCD patients seem to incur significantly higher non-medical costs than other patients and on average incurred an opportunity cost of $10.19 ($0 - $59.34) over the last month due to illness. Multimorbidity, hypertension and health insurance status were associated with higher total non-medical costs, while being accompanied or visiting a hospital rather than a health center or dispensary had a similar effect. Hypertensive patients who visit the hospital incur on average 35% higher costs compared to those who access lower levels of care. Moreover, patients with comorbid conditions missed more workdays than other patients, as did those who are older, less educated or were prescribed medicines.

Conclusion – Accessing outpatient care in Tanzania bears substantial non-medical and opportunity costs, especially for NCD patients. Particularly those who seek hospital outpatient care spend more when seeking care despite being insured. To reduce these costs, we suggest that NCD care be decentralised and to limit self-referral to hospitals by incentivizing referral pathways or service provision at health centers, however warranting the same quality of care and availability of medicines.

Geographic Variation in Healthcare Utilization across Villages, Districts, and States in India: A Multilevel Modeling Analysis

PRESENTER: **Dorit Talia Stein**, Harvard University
AUTHORS: Rockli Kim, SV Subramanian, Sebastian Bauhoff

Background. Geographic variation in health service utilization points to possible inefficiencies or inequities in rates of healthcare use across geographic units. Health policies can mitigate or augment fundamental demand- and supply-side health system factors that affect healthcare utilization. Understanding the relative importance of different geographic levels on healthcare utilization variation can inform which administrative units to target for health system reform.

Research Question. Which geographic levels in India (including village, district, and state levels) have the greatest contextual effect on healthcare utilization variation over and above the effect of individual-level health status, and does this vary among those with and without health insurance coverage and over time?

Methods. We used data from two rounds of the nationally representative Indian National Family Health Survey (years 2015-16 and 2019-20). We specified a series of hierarchical, four-level random intercept logistic models for the probability of individual i in village j, district k, and state l utilizing a health facility or camp in the last three months for the full population, and among those with and without insurance coverage, for each survey wave. We calculated the variance partitioning coefficient at the state, district, and village level to quantify the proportion of total geographic variation in healthcare utilization attributable to each level. We additionally ran three-level models by state to quantify the magnitude of utilization variation at the village level within states.

Results. Villages contributed the most to healthcare utilization variation over and above the individual level in both survey waves, after adjusting for individual-level sociodemographic and health status covariates. In 2015-16, among the full population, 52.5% of total geographic variation was attributable to the village level, compared to 32.1% at the state level and 15.4% at the district level. In 2019-20, villages accounted for a higher proportion of variation (65.9%) and states accounted for a lower proportion of variation (18.3%) compared to in 2015-16. In both survey waves, between-village variation was higher for those reporting having insurance coverage compared to those without insurance, while the relative importance of between-state variation was higher for those without insurance. Within states, the magnitude of variation attributable to villages varied widely, and increased from 2015-16 to 2019-20.

Implications. Our findings suggest an important contribution of the micro-level context on healthcare utilization across India. We found villages are most important, followed by states, with districts contributing the least to utilization variation. Adjusting for individual level covariates in the full model did not change the proportion of variation attributable to higher levels (i.e. state, village, and district levels) which implies that the inequality or inefficiency in utilization variation (above the individual level) is independent of the composition of subnational units and is likely driven by context. These findings are important in a decentralized Indian health system where responsibility for healthcare delivery, supply side service readiness, and implementation of health insurance schemes is devolved to subnational administrative levels which may lead to differences in micro-level context that affect healthcare utilization, either directly via village-level supply-side factors or indirectly through state-level policies.

Healthcare Utilisation for the Rwanda Community Based Health Insurance (CBHI) Scheme

PRESENTER: **Regis Hitimana**, Rwanda Social Security Board (RSSB)
AUTHORS: Michael GONE, Mark Akanko Achaw, Enock Rwamuza

The CBHI scheme in Rwanda has provided financial protection for a majority of the informal sector against catastrophic health expenditure resulting in overall increase in healthcare utilization, with the population coverage increasing exponentially from 7% in 2003 to 87% of the targeted population in 2022. Despite the comprehensive benefit package and relatively low premiums of the CBHI, there are still 13% of the targeted population who are not enrolled in the scheme. It is assumed that households' healthcare utilization experiences influence their uptake of health insurance, hence this study was implemented to understand the healthcare utilisation experience among current CBHI and non-CBHI members.

The cross-sectional survey employed a mixed data collection methodology mainly questionnaire survey, Key Informant Interviews (KIIs) and Focus Group Discussions (FGDs). Applying rigorous sampling techniques (systematic and purposive), 6,086 households were surveyed across the 30 districts of Rwanda and 20 FGDs and 11 key informant interviews were conducted in selected districts. The survey sample size was calculated with a Deff =1.5 (design effect); P = 0.50; Z = 1.96 at 95% Confidence Interval; e= 0.05 margin of error, and α = 0.1. Some of the broad questions asked included: (1) What are the reasons why some people have never enrolled in the CBHI, (2) why have former CBHI members stopped renewing their membership.

The findings show that about 83.4% of CBHI households had at least one member seeking healthcare services in the past one year compared to 44.7% of previous CBHI members, and 34.7% of the respondents who have never enrolled in the CBHI. CBHI households visited health facilities about 3.6 times in the previous year compared to 2.4 and 1.7 times among the previous and the never enrolled CBHI households respectively. 14.1% of the never enrolled households reported to have visited a private clinic in the past one year, compared to 2.1% of previous CBHI members and 0.5% of current CBHI members. CBHI members paid 55.6% of the total amount non-CBHI members pay for drugs/medicines. In addition, when seeking healthcare services, the transport expenses as a percentage of total drugs cost for CBHI members was 45.5%, compared to 19.1% for those who have never enrolled to the CBHI. 54.1%, 36.1% and 20.1% of respondents mentioned long waiting times, medicines unavailability and long distances respectively as challenges encountered when accessing healthcare services, with 8.2% mentioning that they did not know that CBHI members can access specialized services when needed. The general findings show that CBHI members access more healthcare as well as pay less out of pocket for health services compared to non-CBHI members.

Following the study, to increase utilisation of healthcare services and the CBHI enrolment, the Government of Rwanda will have to improve the geographical access to both public and private healthcare facilities, improve availability of drugs in healthcare facilities, reduce waiting times, increase public awareness of CBHI benefits package and reduce out-of-pocket expenditures by CBHI members.

Cape Town International Convention Centre | CTICC 2 – Freesia

Advances in Modelling Methods

MODERATOR: **Carlos Adrián Rojas-Roque**, Health Technology Assessment and Health Economics Department, Institute for Clinical Effectiveness and Health Policy (IECS)

New Innovations Require Innovative Health Economic Modelling Approaches

PRESENTER: **Zanfina Ademi**, Monash University

AUTHOR: Jedidiah Morton

OBJECTIVES: Many health economic approaches regarding the primary prevention of atherosclerotic cardiovascular disease (ASCVD) remain limited. In particular, the causal processes underlying risk for ASCVD are scarcely incorporated in health economic models, likely underestimating the benefits of primary prevention, especially when initiated at younger ages. We present here methods to integrate the causal pathophysiology of ASCVD into health economic models of ASCVD via Mendelian Randomisation, focusing on the example of the causal effect of cumulative exposure to low-density lipoprotein-cholesterol (LDL-C) on risk for ASCVD.

METHODS: In this macrosimulation model, age and sex-specific estimates of ASCVD risk can be adjusted for an individual (or group of individuals) by modelling lifetime LDL-C trajectory and adjusting the risk estimate, using estimates of effect size from Mendelian Randomisation, based on deviation from the mean cumulative LDL-C from the entire sample. For example, the relative risk for ASCVD per mmol/L reduction in mean cumulative LDL-C is given by 0.48, and risk estimates can be adjusted via the formula: $R_a = R \times 0.48^{(LDL\mu - LDL\tau)}$, where R_a is the adjusted individual age-specific rate, R the original age- and sex-specific rate for the whole population, LDL_μ the mean cumulative LDL-C for the sample at that given age, and LDL_τ the mean cumulative LDL-C for the individual or group. Because risk for ASCVD is proportional to mean cumulative LDL-C, and not instantaneous LDL-C in most other health economic models, the causal cumulative effect of LDL-C on ASCVD is integrated into the model, and thus any intervention acting to lower LDL-C can be modelled to have cumulative benefits. In this way, these models can act as the best available evidence for interventions when randomised trials are unable to be conducted (due to prohibitive follow-up time and costing as is necessary for most primary prevention).

RESSULTS: Using this method, when LDL-C is lowered by 51.5% from ages 30, 40, 50, and 60 years, the lifetime risk of myocardial infarction or coronary death in the UK Biobank population is lowered from 15% in the original sample (i.e., no LDL-C lowering) by 8.0% (relative risk reduction (RRR): 52.4%), 6.5% (RRR: 42.1%), 4.5% (RRR: 29.3%), and 2.7% (RRR: 17.3%) respectively. These differences occur is despite the fact that on-treatment LDL-C is the same for all interventions by age 60, highlighting the utility of including the causal effect of risk factors in the modelling approach. These differences also had substantial impact on years of life lived, quality-adjusted life-years gained, and healthcare costs associated with myocardial infarction, with important corresponding implications for health economic analyses.

CONCLUSION: Incorporating disease biology into health economics could be a powerful way to improve primary prevention of ASCVD and provide novel cost-effectiveness evidence, especially as healthcare continues to become more expensive and efficient allocation of resources becomes more of a priority. Indeed, continuing the current approach to primary prevention of ASCVD will greatly limit the population benefits of newer therapeutics by hindering access to these therapies, curbing their use in those patients who stand to benefit most.

How Early Health Economic Modelling Can Help to Detect Effectiveness-Gaps: An Example on the Care Pathway of Large Non-Pedunculated Colorectal Polyps

PRESENTER: **Femke Jacobs**, Radboud Institute for Health Sciences, Radboud University Medical Center, Nijmegen, The Netherlands

AUTHORS: Sjoerd Koers, Geert Bulte, Jurgen Fütterer, Maroeska Rovers, Tim Govers

BACKGROUND

Early health economic modelling is a method that can be used to identify effectiveness-gaps of a clinical pathway, where new innovations have the potential to improve health care. Such a model can guide decisions regarding further research and development of early-stage innovations, before any data on their clinical effectiveness is even available. This facilitates more focussed use of time and resources. Optical coherence tomography (OCT) is an example of an early-stage imaging innovation that is suggested to improve the in vivo diagnosis and treatment of colon polyps. The aim of this study was to develop an early health economic model that assesses effectiveness-gaps for pOCT in the care pathway of large non-pedunculated colorectal polyps (LNPCPs).

METHODS

A decision-analytic model was developed to assess the potential value of OCT in improving the LNPCP health care pathway. It was assumed that OCT could improve the diagnosis by increasing the detection rate of malignant LNPCPs. Treatment was assumed to be improved by a better lesion margin assessment that results in a reduced recurrence rate. In the decision-analytic model different scenarios were simulated that reflect hypothetical improvements in the recognition of malignant LNPCPs or hypothetical reductions of recurrence rates after treatment. Input data was derived from a literature search and expert opinion. The model was built from a health care perspective. Outcomes were costs, quality-adjusted life-years (QALYs) and the number of treatments. The impact of uncertainty was analysed with sensitivity analyses.

RESULTS

Base case analyses showed that in case of a perfect detection of malignant LNPCPs as compared to standard of care, maximum costs of OCT for potential cost-effectiveness are €165. In case of the headroom of the treatment scenario, in which the absence of recurrences was simulated, maximum costs to reach potential cost-effectiveness were €500. The latter scenario resulted in the prevention of 17 surgeries in 1000 patients in 5 years. Sensitivity analyses showed that variation in the costs of the OCT device had the highest influence on incremental costs, while variation of the post-surgical mortality rate had the highest influence on incremental effects.

CONCLUSIONS

Our early economic model provided insight into the potential value of applying OCT during diagnosis and treatment of LNPCPs and identified areas for further research. The model showed that improving treatment and therefore reducing recurrence rates had the highest impact on the maximum costs of the device. However, as only a part of patients seems to benefit from additional screening, further research into the preselection of patients that are expected to benefit from pOCT imaging is an important prerequisite for reaching cost-effectiveness.

Cost-Effectiveness of Kidney Transplantation from Donors at Increased Risk of Blood-Borne Virus Infection Transmission: A Tale of Two Decision-Models – Markov Versus Microsimulation

PRESENTER: **Karan Ketan Shah**, NHMRC Clinical Trials Centre, The University of Sydney
AUTHORS: James A Hedley, Melanie Wyld, Angela Webster, Kristy Robledo, Rachael Lisa Morton

Background

Various economic modelling techniques have been used to assess the cost-effectiveness of kidney transplantation strategies. However, commonly used cohort-based Markov models maybe inadequate due to the complexity of the donor-recipient clinical pathway. Microsimulation models address several limitations, providing a potentially valuable modelling approach for complex interventions.

Aim

To determine differences between cohort-based Markov and microsimulation approaches when applied to the cost-effectiveness of kidney transplantation from donors at increased risk of blood-borne viruses (BBV). The differences in absolute and incremental costs, QALYs, and cost-effectiveness of kidney transplantation strategies, as well as the computation time of each modelling approach, were compared.

Methods

A cohort-based Markov and a microsimulation model were developed to compare costs and quality-adjusted life years (QALYs) of (i) accepting kidneys from potential donors with increased risk of blood-borne virus (BBV) transmission due to a history of Hepatitis C (HCV), Hepatitis B (HBV), Human Immunodeficiency Virus (HIV) or behavioural risk factors (new strategy), versus (ii) declining them (current strategy). Our model ran simulations over a 20-year time horizon for patients wait listed for a deceased donor kidney transplant. The model structures were framed similarly regarding time horizon, discounting, and clinical pathway. The cohort model was created in TreeAge; the microsimulation model was developed in R. The microsimulation model was run for 100,000 individuals.

Results

Over a 20-year time horizon, the new strategy generated a greater cost-saving of $35,747 in the microsimulation model compared with a cost-saving of $19,214 in the Markov model. However, the new strategy generated 0.15 lower QALYs in the microsimulation model compared with QALY gains of 0.08 observed in the Markov model. The total costs for the new and current strategy were $29,246 and $12,714 lower in the microsimulation model, compared with the Markov model. The QALYs generated were 2.50 and 2.27 lower for the new and current strategy using microsimulation compared with the Markov model. Although the new strategy had a similar result of cost-savings in both microsimulation and Markov models, the results for QALY gains were different. The Markov model was computationally faster and took seconds to produce the results, while the microsimulation took an hour and a half to generate results.

Discussion

The choice of modelling technique is crucial as it affects the decision outcomes in economic evaluation. The Microsimulation model was computationally slower and more complex to develop. However, as it simulates the impact of strategy on individual trajectories rather than the deterministic mean response of a homogenous cohort, it may be a favourable modelling choice. However, this model is limited to only random variation of the individuals and ignores parameter uncertainty. The cohort-based Markov model was simpler to implement, computationally faster and considers parameter uncertainty through probabilistic sensitivity analysis. However, it ignores the random variation of individuals and other modelling-associated challenges, such as the memoryless assumption and a health state-explosion when modelling complex clinical pathways. The preliminary results of the Markov model were more congruent with clinical expectations, however, the uncertainty in the cost-effectiveness conclusion remains under investigation.

Cost-Effectiveness of TB Diagnostic Technologies in Ethiopia: A Modelling Study.

PRESENTER: **Lelisa Fekadu Assebe**, UIB

Background

Tuberculosis (TB) represents a large public health threat globally. Effective and efficient rapid diagnostic technologies are important for the early detection and treatment of TB. Despite the lack of evidence regarding the impact on resources, the national TB diagnostic algorithms propose using rapid TB diagnostics as a primary test for TB, whenever possible. The purpose of this study is to evaluate the cost-effectiveness of WHO-approved rapid TB/MDR diagnostics in comparison to the widely used, diagnostic technique (i.e., smear microscopy) in Ethiopia.

Method

A hybrid Markov model for hypothetical adult cohort of presumptive TB cases was constructed to estimate the cost-effectiveness of rapid TB/MDR diagnostics in comparison to the existing diagnostic method (smear microscopy). Four TB diagnostic strategies were evaluated: X-pert MTB/RIF, Truenat, chest X-ray screening followed by X-pert MTB/RIF, TB LAMP, and smear microscopy. For each TB diagnostic strategy compared to next best alternative, incremental costs per DALY averted of less than three times Gross Domestic Product (GDP) per capita are considered cost-effective. Estimates of transition probabilities, costs, utilities of health states were obtained from secondary sources. The analysis is carried out from health system perspective. A probabilistic sensitivity analysis is performed to check the robustness of the result.

Result

The incremental cost-effectiveness ratios for the TB LAMP and X-pert MTB/RIF compared to smear microscopy were $271 and $274 per DALY averted, respectively. The cost-effectiveness of these intervention was less than half of Ethiopia's GDP per capita, they were both deemed highly-cost-effective. Additionally, CXR-ray screening followed by an X-pert MTB/RIF test is cost-effective (ICER $1,662 per DALY averted).

Conclusion

The scale-up of TB LAMP and Gene X-pert as a primary diagnostic test in high-load health facilities is very cost-effective intervention, which also enhances TB case finding and early treatment. Improved funding for these technologies might increase access, close the TB detection gap, and ensure effective treatment of patients.

1:30 PM –3:00 PM   MONDAY   [Health Care Financing & Expenditures]

Cape Town International Convention Centre | CTICC 1 – Room 2.46

Financial Protection: Getting through the Storm [FINANCING FOR UHC SIG]

MODERATOR: **Aparnaa Somanathan**, World Bank

ORGANIZER: **Rouselle Flores Lavado**, World Health Organization

DISCUSSANT: **Owen O'Donnell**, Erasmus University Rotterdam; **Karen Grepin**, The University of Hong Kong

Global and Regional Trends in Catastrophic and Impoverishing Health Spending
PRESENTER: **Gabriela Flores**, World Health Organization

Financial protection lies at the core of universal health coverage (UHC) and represents one of the final coverage goals of the health system. Within the Sustainable Development Goals monitoring framework, it is tracked with indicators 3.8.2. These indicators are defined as the populations using more than 10 and 25 percent of their household budget for out-of-pocket (OOP) health spending and thereby incurring what is referred to as catastrophic OOP spending levels. In addition, the populations pushed and further pushed below different international poverty lines by OOP spending, namely the extreme poverty line of PPP2017$2.15 per person per day, the typical lower middle income country poverty line of PPP2017$3.65 per person per day, and the country specific relative poverty line of 60 percent of median consumption. Using data from over 700 household surveys, until 2017, rates of medical impoverishment were continuously declining a result of global poverty eradication efforts, the prevalence of catastrophic spending was on a steady upward trajectory in most world regions. This study will provide new estimates of trends in catastrophic and impoverishing health spending until 2019 and include now- and forecasted estimates for years after the onset of the COVID-19 pandemic for household survey data are still scarce but for which substantive increases in both catastrophic spending rates and medical impoverishment have been predicted. The proposed presentation will describe and contextualize these latest trends and the now- and forecasts in indicators of financial hardship as well as discuss the methodologies underlying them.

Persistent Out-of-Pocket Health Expenditures in Four African Countries
PRESENTER: **Rocio Garcia Diaz**, Tecnologico de Monterrey
Objectives:

We analyze households' OOP health payments for various periods using panel data from Uganda, Malawi, Nigeria, and Tanzania. We identify households with catastrophic and impoverishing health payments to develop measures of persistent health payments for the medium- and

long-term that reflect the chronicity of health spending among families. We believe that time in terms of duration is an essential analytical component for understanding the experience of impoverishment attributed to OOP health payments.

Methods

We use both theoretical and empirical methods to analyze health expenditure chronicity and its determinants. We utilize the three most used metrics for health systems performance to describe household's vulnerability attributed to persistent health payments households face: (i) out-of-pocket expenditures, (ii) catastrophic healthcare expenditures, and (ii) impoverishing effect of out-of-pocket expenditures. We first explain the structure of the panel and attrition rates to identify longitudinal weights in the sample to explore changes in two periods of time by using transitional matrices. Then, we provide a methodology for evaluating persistent catastrophic health payments that specifically incorporates more extended periods into the analysis. It includes crucial information on the incidence of OOP health payments and its depth across households but also considers its persistence. For identifying families with persistent health expenditures, we define a time-mean share health expenditure to identify households in different categories in terms of catastrophic and impoverishing effects over time.

Results

The attrition rate is high in all the panels we analyze. As expected, the longer the panel, the higher the attrition rate. Uganda's panel contains six waves and the highest attrition rate (53%). At the same time, Malawi and Nigeria's panels have three waves with an attrition rate of around (30%). Transitional matrices pose the challenge of defining the two periods relevant to the analysis. When we performed transitional matrices every two periods, we can identify that families are more likely to get out of catastrophic or impoverishing situations (around 79%) than get in (about 15%). Using all the information in the matrix, we can identify households in four categories: (i) those that never experienced catastrophic or impoverishing situations (range from 40% to 50%); (ii) those with persistent catastrophic or impoverishing estimators (range from 12% to 15%); those with transient catastrophic or impoverishing outcomes (ranging from 30% to 40%) and (iv) chronic catastrophic and impoverishing outcomes (less than 5% in all panels). The magnitude of these categories' variation is mainly due to the threshold used in the analysis. Still, it consistently points towards the vulnerability of some groups that faces constant high out-of-pocket health expenditures. We decompose the measures into geographic, demographic, and income quantiles subpopulations to identify those households.

Assessing the Equity and Coverage Policy Sensitivity of Financial Protection Indicators in Europe

PRESENTER: **Jonathan Cylus**, London School of Economics

Objectives: Universal health coverage (UHC) means everyone can use quality health services without experiencing financial hardship. Progress towards UHC is typically monitored using financial protection indicators that report the share of households experiencing catastrophic or impoverishing out-of-pocket payments. There are a range of indicators available and different regions and stakeholders make use of different indicators. The WHO Regional Office for Europe has developed its own capacity-to-pay indicator of catastrophic health spending using a food, housing, and utilities approach) to monitor financial protection, but it is not known how sensitive this indicator is to variations in coverage policies.

Methods: We use harmonised household budget survey data from 27 EU countries and estimate the risk of experiencing catastrophic health spending conditional on household characteristics and coverage policy (the way in which health coverage is designed and implemented). We focus on the design of co-payment policy for outpatient prescriptions because outpatient medicines are the main driver of catastrophic health spending in Europe and globally. We then calculate a household's predicted probability of incurring catastrophic health spending to see if this probability varies depending on the coverage policies in place.

Results: With the food, housing and utilities approach, the use of any or a combination of highly protective co-payment policies (low fixed co-payments rather than percentage co-payments, exemptions for low-income households and income-related caps on co-payments) is associated with a reduced risk of catastrophic health spending, particularly among poorer households. There are statistically significant reductions in the predicted risk of catastrophic spending as the number of protective co-payment policies increases, particularly when compared to scenarios with no protective co-payment policies in place. This suggests the food, housing and utilities approach is sensitive to pro-poor coverage policies and a useful indicator of health system equity and progress towards UHC.

1:30 PM –3:00 PM   MONDAY   [Economic Evaluation Of Health And Care Interventions]

Cape Town International Convention Centre | CTICC 2 – Daisy

Economic Evaluations of Interventions in an Ageing Population

MODERATOR: **Angela Devine**, Menzies School of Health Research

Cost-Effectiveness of a Multicomponent Lifestyle Intervention Against Cognitive Decline and Dementia in an at-Risk-Population in Germany – Results from the Agewell.De-Trial

PRESENTER: **Christian Brettschneider**, University Medical Center Hamburg-Eppendorf

AUTHORS: Elzbieta W. Buczak-Stec, Hans-Helmut König, Melanie Luppa, Susanne Roehr, Thomas Frese, Jochen Gensichen, Walter E. Haefeli, Wolfgang Hoffmann, Hanna Kaduszkiewicz, Birgitt Wiese, Steffi G. Riedel-Heller

Background and Objectives

Dementia represents a major challenge to global health. With projected trends in population ageing and growth, the number of people with dementia is expected to increase. However, evidence suggests that there are potentially modifiable risk factors for dementia, such as depression, malnutrition, smoking, excessive alcohol consumption, physical inactivity or social isolation. Further, it has been suggested, that addressing those factors, may reduce the dementia prevalence and may delay the dementia progression. On the other hand, there is limited and conflicting evidence on whether the complex lifestyle interventions, which address multiple modifiable risk factors at the same time, have a positive impact on participants' cognitive functioning. Further, the evidence is lacking on whether such prevention interventions are cost-effective. Therefore, the aim of this study is to investigate whether the multicomponent lifestyle intervention against cognitive decline (*AgeWell.de* clinical trial) is cost-effective.

Research Design and Methods

For this study, we used data form the multi-centric, two arms, cluster-randomized control trial (*AgeWell.de* trial). *AgeWell.de* is a first multicomponent lifestyle intervention trail against cognitive decline in Germany. The study was conducted at five study sites in Leipzig, Kiel, Greifswald, Munich, and Halle. Eligible participants were recruited by the General Practitioners, were 60 years and older, and had an increased dementia risk at baseline (Aging, and Incidence of Dementia/CAIDE Dementia Risk Score $\geq$ 9). Participants were randomly assigned to the advanced (A) or basic (B) intervention and were followed up for 2 years. The (A) intervention included, among others, physical activity enhancement, cognitive training, monitoring of vascular risk factors, optimization of medication and social activity enhancement. The (B) intervention (control group) included general health advice.

We conducted a cost-effectiveness analysis. Health care use and the number of visits during 24 months follow up were measured using the Questionnaire for Health-Related Resource Use in Older Population (FIMA). Treatment costs comprised, among others, outpatient and inpatient care, emergency services, psychotherapy, rehabilitation, and long-term care. Costs were valued using specific German unit costs. QALY (based on EQ-5D-3L) were used as a measure of health effects. Differences between interventions in terms of sectoral and total costs were analysed using GLM models. All models were adjusted for e.g., sociodemographic factors, depression, self-rated health. Incremental cost-effectiveness ratios (ICER) were calculated, and net benefit regressions was conducted to determine the uncertainty of the point estimates of the ICER.

Results

In total, data were available for 752 participants, 358 belongs to the intervention group (average age 69.0 (SD 4.9) years) and 394 to the control group (68.9 (SD4.9) years old). Preliminary results showed, that the ICER= 13,567€ / QALY. Over 24 months, additional costs (823€) and additional effects (0.01 QALY) were found in the intervention compared to the control group (however, they were not statistically significant; *p=.530*).

Discussion and Implications

The analysis revealed that the intervention *AgeWell.de* was unlikely to be cost-effective in preventing dementia risk in older adults.

Health-Economic Evaluation of Orthogeriatric Co-Management for Patients with Pelvic or Vertebral Fragility Fractures

PRESENTER: **Espen Henken**, Institut für Gesundheitsökonomie und Versorgungsforschung, Universitätsklinikum Hamburg-Eppendorf

AUTHORS: Claudia Konnopka, Hans-Helmut König

Fragility fractures pose an increasing challenge on healthcare systems of aging societies. To address the special needs of geriatric fracture patients in Germany, orthogeriatric co-management (OGCM) contributes comprehensive geriatric assessments and inpatient rehabilitation starting few days after fracture treatment. Yet, most of the research on OGCM focused on hip fractures while results from other severe fractures are rare. Thus, we conducted a health-economic evaluation of OGCM for the treatment of pelvic and vertebral fractures.

In this retrospective cohort study, we used health and long-term care insurance claims data of persons insured in Germany's largest association of statutory health insurance companies. We included geriatric patients with an inpatient treatment of pelvic or vertebral fractures in 2014-2018. We assigned patients to OGCM or non-OGCM group on hospital level, i.e. if the index hospital was able to offer OGCM. We compared life years gained (LYG), fracture-free life years gained (FFLYG), healthcare costs from a payer perspective, as well as cost-effectiveness within a 1-year follow-up. We applied entropy balancing to address the lack of randomization and used weighted gamma and two-part models. We calculated incremental cost-effectiveness ratios (ICER) and cost-effectiveness acceptability curves.

We included 24,137 cases of patients with pelvic (68.8% in the OGCM, 31.2% in the non-OGCM group) and 38,984 with vertebral fractures (70.1% OGCM, 29.9% non-OGCM group). For both fracture cohorts, total, index stay, and inpatient costs were significantly higher in the OGCM than in the non-OGCM group. Index hospital stays were significantly longer and subsequent stays in a rehabilitation facility shorter in the OGCM than in the non-OGCM group in both cohorts. There were no differences between both groups for neither effectiveness measure in both cohorts. The ICER was €133,455/LYG and € 89,506/FFLYG in the pelvic fracture cohort while treatment in an OGCM hospital was dominated by treatment in a non-OGCM hospital in the vertebral fracture cohort for both effectiveness measures. A 95% probability of treatment in an OGCM hospital to be cost-effective was not exceeded for neither effectiveness measure nor cohort for a willingness-to-pay of up to €150,000.

The results suggest that treatment of pelvic or vertebral fractures in OGCM hospitals was not likely to be cost-effective for a reasonable willingness-to-pay. However, the assignment of patients to OGCM or non-OGCM group on hospital level might have led to an underestimation of the effect of OGCM as not all patients in the OGCM group might have received OGCM.

The Direct Costs of Hip Fracture Care in South Africa: A Public Healthcare System Perspective

PRESENTER: **Nyashadzaishe Mafirakureva**, University of Sheffield
AUTHORS: Farhanah Paruk, Bilkish Cassim, Mkhululi Lukhele, Celia Gregson, Sian Noble

Background

Fragility fractures, sustained from a force that would not ordinarily result in a fracture, pose a major public health problem due to high morbidity, mortality, and costs. Fragility fractures commonly occur in the context of multiple comorbidities and/or frailty. The most common fractures caused by osteoporosis include hip, spinal, and forearm fractures. Hip fractures (HFs) in particular, are associated with high levels of morbidity, prolonged hospital stays, increased healthcare resources utilization, and mortality, with 13% dying within a month of fracture. The worldwide average health and social care cost in the first year post hip fracture was US$43,669 per patient in a 2017 systematic review, with inpatient care costing US$ 13,331. Costs were highly variable, reflecting variation in methodology, elements of care and patient populations included.

Fragility fractures are an emerging healthcare problem in Sub-Saharan Africa (SSA), with significant increases projected over the next few years, largely driven by the growing current and projected number of older adults (age ≥60 years) with prolonged life expectancy and the associated multiple comorbidities. Despite the reported current and projected clinical burden of fragility fractures, including HFs, there have been no studies published to date quantifying fracture-associated costs within SSA. Data on costs associated with HFs are important for quantifying demands on healthcare services, informing accurate cost-effectiveness analyses, and for guiding policy decisions on priority setting, budgeting and planning.

We estimated direct healthcare costs of HF management in the South African (SA) public healthcare system.

Methods

We conducted an ingredients-based costing study to estimate costs per patient treated for HF across five regional public sector hospitals in KwaZulu-Natal (KZN), SA. Two hundred consecutive, consenting patients presenting with a fragility HF were prospectively enrolled. Resource use including staff time, consumables, laboratory investigations, radiographs, operating theatre time, surgical implants, medicines, and inpatient days were collected from presentation to discharge. Counts of resources used were multiplied by relevant unit costs, estimated from KZN Department of Health hospital fees manual 2019/20, in local currency (South African Rand, ZAR), and converted to 2020 US$ prices. Generalised linear models were used to estimate total covariate adjusted costs and cost predictors.

Results

The mean unadjusted cost for HF management was US$6,935 (95% CI; US$6,401-7,620) [ZAR114,179 (95% CI; ZAR105,468-125,335)]. The major cost driver was orthopaedics/surgical ward costs US$5,904 (95% CI; 5,408-6,535), contributing to 85% of total cost. The covariate adjusted cost for HF management was US$6,922 (95% CI; US$6,743-7,118) [ZAR114,696 (95% CI; ZAR111,745-117,931)]. After covariate adjustment, total costs were higher in patients operated under general anaesthesia [US$7,251 (95% CI; US$6,506-7,901)] compared to surgery under spinal anaesthesia US$6,880 (95% CI; US$6,685-7,092) and no surgery US$7,032 (95% CI; US$6,454 -7,651).

Conclusion

Direct healthcare costs following a HF are substantial: 58% of the gross domestic per capita (US$12,096 in 2020), and six-times greater than per capita spending on health (US$1,187 in 2019) in SA. As the population ages, this significant economic burden to the health system will increase. Further research is required to evaluate direct non-medical, and the indirect costs incurred post HF.

The Impact on Healthcare Use and Costs and Health-Related Quality of Life of Physical Activity Among Older People: A Cross-Sectional and Longitudinal Analysis

PRESENTER: **Beatriz Rodríguez-Sánchez**, University Complutense of Madrid

Background: Lifelong physical activity (PA) life is associated with numerous health benefits, being a protective factor against the onset of chronic diseases and being associated with lower healthcare expenditures. The health benefits of PA could extend into older ages, as there is

evidence pointing to its contribution to healthy aging, preventing the onset of disability, morbidity and premature death. However, among older populations, studies on whether these health benefits translate into a reduction in the use of healthcare resources and their associated costs are limited.

Aim: The main objective of this study is to explore the effects of different levels of physical activity, as well as sedentary behaviors, measured with specific age-adjusted thresholds, on the use of healthcare resources and their associated cost and on the health-related quality of life among older Spanish adults.

Methods: Data from the Toledo Study of Healthy Aging (TSHA) will be used, an observational study designed to deepen research on aging with three available waves. In the TSHA, physical activity (PA) and sedentary behaviors (SB) were measured using an ActiTrainer accelerometer. Each valid minute of wearing time will be classified based on metabolic equivalents (METs) as the following intensity categories: SB (<1.5 METs in a lying or sitting position), Light Physical Activity, LPA, (1.5-2.99 METs) and moderate to vigorous PA, MVPA (≥ 3 METs). Specific cut-off points for older populations will be applied to classify the minutes per day spent in each intensity. The main outcomes of interest refer to healthcare resources use (probability of hospital admission, number of admissions, the average length of stay and the costs of hospitalization, as well as the number of drugs on a daily basis and the probability of polypharmacy) and health-related quality of life (HRQoL), which was measured using the multi-attribute utility questionnaire known as EQ-5D-3L. Generalized linear models will be performed to assess cross-sectional and longitudinal associations, as well as isotemporal substitution models, which allowed to estimate whether participating in activities at one specific level of intensity necessarily implies reducing time at another.

Results: Five hundred twelve subjects from the TSHA had available data (78.08 ± 5.71 years of age; 54.3% women). MVPA was associated with lower healthcare use, both at the cross-sectional level and at follow-up. The isotemporal substitution showed that reallocating 1 h/day of MVPA displacing SB was associated with a lower likelihood of being admitted to hospital within the same year (OR 0.84) and at follow-up (OR 0.76), as well as shorter hospital admissions and lower costs (-240€/year/person at the cross-sectional level and -538€/year/person at follow-up). Significant associations were also found for the number of drugs and and HRQoL. The reallocation of 1 h/day SB only yielded a significant lower hospitalization risk by almost 10% when it was substituted with MVPA, but did not show any association when it was substituted with LPA.

Conclusions: An increase in MVPA replacing SB and LPA was associated with a reduction in healthcare use and better quality of life. LPA did not show any significant effect.

1:30 PM –3:00 PM   MONDAY   [Health, Its Distribution And Its Valuation]

Cape Town International Convention Centre | CTICC 1 – Room 1.42

Health and Wellbeing Outcome Measurement: International Applications

MODERATOR: **Lazaros Andronis**, University of Warwick

Informal Caring for Elderly or Disabled in the Families and Carers' Subjective, Affective, and Financial Well-Being: Findings from Fifteen Waves of an Australian Population-Based Panel Study

PRESENTER: **Rezwanul Rana**, Macquarie University
AUTHOR: Syed Afroz Keramat

Objective: The caregivers experience stress and burden resulting from the rigorous activities of caregiving, causing a negative impact on their physical, psychological, and social lives. We aim to investigate the impact of informal caregiving on caregivers' subjective, affective, and financial well-being in Australia.

Methods:

We utlilised data from the fifteen waves (2006 to 2020) of the Household, Income and Labour Dynamics in Australia (HILDA) Survey. The dependent variables for the study are the respondents' subjective, affective, and financial well-being. Subjective well-being is measured through a single-item (life satisfaction) question: "All things considered, how satisfied are you with your life?". The responses were taken on a scale of 0-10, with a higher number indicating more life satisfaction. Affective well-being is measured through the five-item subscale "Mental Health" of the SF-36 Health Survey. MHI-5 index score ranges between 0-100, with a higher score indicating a better state of mental health. The financial well-being of the respondent was measured from the response to the question: "All things considered, how satisfied are you with your financial situation?". The responses were taken on a scale of 0-10, with a higher number indicating more financial well-being.

The primary variable of interest is informal caregiving. This study defines carers by time utilisation. Respondents in the HILDA Survey were asked, "How much time would you spend on caring for a disabled spouse or disabled adult relative, or caring for elderly parents or parents-in-law in a typical week?". The outcome variable informal caregiving was classified as non-carer, lighter caring (<5 hours/week), moderate caring (5–19 hours/week) and intensive (20 or more hours/week).

We constructed an unbalanced panel data consisting of 192,104 person-year observations from 26,666 unique individuals. We fitted fixed-effects ordered logistic regression model, and panel fixed-effects regression to check the effect of informal caregiving and carers' well-being.

Results: We found that moderate (-0.09 points) and intensive caring (-0.39 points) has a significant negative effect on carers' subjective well-being. We also revealed that moderate (-0.77 points), and intensive caring (-2.09 points) are reduced affective well-being. Besides, our results showed that light (-0.07 points), moderate (-0.11 points), and intensive caring (-0.14 points) negatively impact financial well-being.

Conclusion: A higher caregiver burden correlates to the poorer subjective, affective, and financial well-being of caregivers in Australia. These findings call for more attention to be paid to caregivers with a significant burden of care.

Is Time a Gift for Health and Well-Being? The Impact of Time Allocation on Adaptation to Breast Cancer Diagnosis

PRESENTER: **NI GAO**, University of Aberdeen
AUTHORS: Mark Harris, Mandy Ryan, Suzanne Robinson, Richard Norman

Background: The theory of the hedonic treadmill states that people adapt to positive and negative life events such that their subjective well-being returns to its baseline levels over time. Empirical studies however suggest adaptation can be both complete and incomplete. Factors, such as personality, age, and gender, affect the magnitude of adaptation. One driving factor that has not been examined is time allocation. Unlike genetics and demographics that are relatively stable across the life course, individuals can deliberately change when and how they devote time to activities. If time allocation can determine whether, when and to what extent, adaptation occurs, encouraging healthier or discouraging unhealthier time allocation may provide a sustainable and efficient way to reconstruct health and well-being following health shocks.

Objective: To examine whether different time allocation patterns lead to different magnitude of adaptation among women diagnosed with a breast cancer diagnosis.

Methods: Using Australian Longitudinal Study on Women's Health, we included 471 women diagnosed with breast cancer, and 833 women without a cancer diagnosis as a comparison. We defined health and well-being as SF-6D, Physical and Mental Component Scores (PCS and MCS) and life satisfaction. We defined complete or incomplete adaptation as health and well-being fully or partially returning to baseline levels following breast cancer diagnosis.

Using event study design, we first examined i) *Do different time use patterns lead to different magnitude of adaptation?* We classified time use patterns into: Class 1 ('*household-leisure centred*'), Class 2 ('*household centred*') and Class 3 ('*work centred*'). We then examined ii) *Do different types of paid work lead to different magnitude of adaptation?* We classified paid work into full-time paid work, part-time paid work and zero-hour. We finally examined iii) *Does different intensity of physical leisure lead to different magnitude of adaptation?* We classified physical leisure into '< 3 hours per week', '3-10 hours per week' and '>10 hours per week'.

Results: *'Work centred'* (Class 3) time use pattern and full-time paid work accelerate adaptation, with SF-6D and MCS returning to baseline levels 3 years after breast cancer diagnosis. However, *'Household centred'* (Class 2) and part-time paid work decelerate such adaptation, with SF-6D and MCS remaining at low levels 9 years after breast cancer diagnosis. *'Household centred'* and part-time paid work accelerate adaptation of PCS, whilst *'work centred'* time use pattern and full-time paid work decelerate such adaptation. Intensive physical leisure ('>10 hours per week') decelerates adaptation, with SF-6D, PCS and MCS staying at low levels 9 years after breast cancer diagnosis. Heterogeneous analysis suggests incomplete adaptation mainly comes from women with 'severe' breast cancer diagnosis. Time use patterns, paid work and physical leisure have no significant effect on adaptation of life satisfaction.

Conclusion: Time allocation on daily activities is associated with different magnitude of adaptation. Healthier time use on daily activities may accelerate adaptation, whilst unhealthier time use may decelerate adaptation. Incomplete adaptation is affected by severity of illness; more resource should be allocated to those with severe illness to achieve complete adaptation.

Differential Reporting Error in Health Conditions By Education Levels Among Older Adults in India

PRESENTER: **Anna Choi**, Sejong University
AUTHORS: Arnab K Basu, Nancy H Chau, T.V. Sekher

In this study we examine the role of differential reporting error in explaining the health-education gradient among older adults in India. Previous research has explored similar questions primarily in developed countries. Cramm and Lee (2014) found that low education level was significantly related to not engaging in moderate level of physical activity and smoking status among older adults in India.

We use the first wave data from Longitudinal Ageing Study in India (LASI) that contains self-reported and objective measures of health conditions and behaviors such as high blood pressure, physical activity and depression. LASI contains a nationally and state representative sample of adults 45 and older in India. We plan to examine other health conditions and behaviors like diabetes, obesity and smoking when the other parts of biomarker data is released. Our sample contains 64,866 adults.

Respondents reported whether or not they were ever diagnosed with high blood pressure, whether they have depression, or whether they engaged in physical activity in the past month and whether or not they walked yesterday. We considered the respondent to have high blood pressure with the following measurement: average systolic 140 mmHg or higher and average diastolic 90mmHg or higher. Using the CES-D questionnaires in the survey, if the respondent had a score of 10 or above, we considered the respondent to have depressive symptoms. We proxy for the objective measures of walking based on the walking speed from the timed walk (1m/s or greater) (Middleton et al., 2015).

The main specification is as follows (probit):

Reporting error (dependent variable) = $\alpha + \beta Educ_i + \delta X_i + \varepsilon_i$

We have three different measures of reporting error, one that measures accuracy (whether the objective measurement matches self-report or not) and the other two measures the direction of error (false negative and positive). The main explanatory variable is education level and the omitted reference category is middle or high school graduates. We created an indicator variable for no schooling, less than middle school, middle or high school graduate, college graduate and post-graduate degree. In addition, we control for the number of words recalled correctly as a proxy for cognitive ability. X is a vector of individual characteristics. In some models, we control for health insurance status and health care utilization in the past year.

Older adults with no schooling and less than middle school education report high blood pressure, depression and walking less accurately compared to those with middle or high school education. The results are the same after controlling for income, health insurance coverage and health care utilization. Those with no schooling and less than middle school education are 3 and 2 percentage points less likely to accurately report high blood pressure respectively. College educated are 8 percentage points less likely to false negatively report high blood pressure than those with middle or high school education. Those with no schooling and less than middle school education are 14.4 and 7 percentage points more likely to report having no high blood pressure when the objective measurement says otherwise.

Times Trends of Atopic Dermatitis Among the Chinese Population, 1990-2019: A Joinpoint and Bayesian Age-Period-Cohort Analysis

PRESENTER: **Jingjing Zhou**, School of Public Health and Management, Guangzhou University of Chinese Medicine
AUTHORS: Huijing Chen, Shanshan Liang, Ailing Liu, Chengcheng Li, Shangcheng Zhou

Background: Atopic dermatitis (AD) has become a serious public health problem. As a common chronic inflammatory skin condition, it has the topmost burden among all skin diseases and its' burden is related to socioeconomic development status.

Objective: This study investigated time trends of AD burden and compare them by gender, investigated the independent effects of age, period, and cohort on the AD prevalence from 1990 to 2019 in China, compared these effects by gender, and then predicted the future burden from 2020-2030 by gender and age groups.

Methods: The data were obtained from the Global Burden of Disease, Injuries, and Risk Factors Study 2019 (GBD 2019). We used the Joinpoint regression model to calculate the annual percentage change (APC) in AD prevalence, the age-period-cohort analysis (APC) to estimate the independent effects of age, period, and cohort, the Bayesian age-period-cohort model (BAPC) to predict the epidemic of AD in 2020-2030.

Results: There were 35.584 million AD cases in China in 2019. The ASPR was 2460.183 (per 100,000 population), with 1847.290 (per 100,000 population) in men, and 3097.672 (per 100,000 population) in women. From 1990 to 2019, the ASPR of AD fluctuated. The periods of 2017-2019 were "joinpoint" for both men (APC: 0.71%) and women (APC: 0.40%). The APC Model showed that the prevalence of AD was associated with age, being higher in the 1 to 4 years old and age groups older than 50 years old. The cohort effect reached a peak in the 2015-2019 cohort. Within 2030, the predicted age-standardized incidence rate (ASIR) of AD was 3.3‰ in men and 5.5‰ in women.

Conclusion: There are substantial variations in burden due to AD between males and females and in different age groups. Given the increasing burden of AD in China, researchers should pay attention to it, and help policymakers and researchers identify the most important modifiable risk factors and take measures to reduce the AD burden, particularly in children and older adults.

1:30 PM –3:00 PM   MONDAY   [Health Care Financing & Expenditures]

Cape Town International Convention Centre | CTICC 1 – Room 2.64-2.65

Immunization Financing: Improving Equity, Targeting, and Sustainability [IMMUNIZATION ECONOMICS SIG]

MODERATOR: **Ulla Griffiths**, UNICEF

Comparing Multivariate with Wealth-Based Ranking for Computing Inequity in Access to Child Immunization Services in India over Time

PRESENTER: **Bryan Patenaude**, Johns Hopkins University

AUTHORS: Salin Sriudomporn, Deborah Odihi, Joshua Mak, Gatien de Broucker

Background

Health equity is a priority for India and numerous studies demonstrate that mean levels of vaccination coverage mask significant sub-national inequities, which persist for reasons linked with multiple socio-demographic, geographic, and supply-side barriers to access. Despite these multiple contributing dimensions, most inequity metrics only examine disparities along one dimension, such as wealth or urban/rural status, which may mask persistent disparities correlated with multiple dimensions. Our study utilizes the Vaccine Economics Research for Sustainability & Equity (VERSE) toolkit to compare measures of wealth-based inequity with a composite multivariate measure of inequity for fully-immunized status across 3 rounds of India's National Family Health Survey (NFHS).

Methods

The VERSE tool produces a composite equity concentration index (CI) and absolute equity gap (AEG) based on this index, which, in its ranking procedure, accounts for multiple factors influencing equity in vaccination coverage, including maternal education level, sex of the child, household wealth, urban/rural designation, state of residence, and insurance coverage. To focus on inequities and not inequalities, age of the child is utilized to control for need by matching child age with the national immunization schedule recommendations. The VERSE equity tool is then applied to three rounds of India's NFHS conducted between 2005-2021 to compare changes in the level of inequity in fully-immunized status that is captured using only a wealth-based CI vs. using the composite ranking criteria to generate a CI. For consistency across years, fully-immunized is defined as having received all recommended doses of BCG, DTP, Polio, and Measles vaccine appropriate for the current age of the child included in the NFHS, according to India's national immunization schedule.

Results

Across the three rounds of the NFHS spanning 2006, 2016, and 2021 the wealth-based CI for fully-immunized status was 0.062, 0.042, and 0.021, respectively with a corresponding AEG of 41.1, 18.7, and 5.3 percentage points. Utilizing composite ranking, the CI for fully-immunized status was 0.273, 0.140, and 0.101, respectively with a corresponding AEG of 56.6, 37.1, and 22.1 percentage points. Over this same time period, fully-immunized coverage was 40.4, 54.1, and 47.9 percent, respectively.

Conclusion

While both composite and wealth-based CIs show improvement in inequities over time for India, wealth-based measures of inequity show a decline in the AEG between the poorest and richest quintiles of 87.1% (from 41.1 to 5.3 percentage points) between 2006 and 2021, while composite metrics indicate that this gap has only reduced by 61% (from 56.6 to 22.1 percentage points). The existing coverage gap in 2021 is approximately 4 times larger when measured utilizing composite ranking than when measured utilizing wealth alone (5.3 percentage points vs. 22.1 percentage points). As such, closing the coverage gap between the richest and poorest is unlikely to eliminate persistent socio-demographic inequities in vaccine coverage in India. The results suggest that pro-poor interventions and programs utilizing needs-based targeting based on poverty should consider expanding their targeting criteria to include other dimensions to reduce inequities. Additionally, a composite metric should be considered when setting targets and measuring progress toward reducing inequities in vaccination coverage.

Mapping the Pathway Towards Sustainable Immunization Financing: Insights into Nigeria's Continued Vaccine Financing in Light of Its Transition from GAVI's Support

PRESENTER: **Kikelomo o Lambo**, Clinton Health Access Initiative

Background

In 2001, the Federal Government of Nigeria (FGoN) partnered with Gavi to strengthen immunization coverage. Prior to the country's transition, Gavi had financed vaccine procurement (71%, $518,008,692) and non-vaccine operations, including health system strengthening (29%, $214,121,634) for a total contribution of $732,130,326[1]. The financing provided by Gavi supported the introduction of life-saving vaccines, including the Pentavalent Vaccine, IPV, and PCV, across Nigeria.

With the rebasing of the economy in 2018, Nigeria entered into an accelerated transition, having exceeded the Gross National Income (GNI) per capita threshold for support of $1,580 for three consecutive years. During this period, the FGoN committed to annually increasing vaccines' co-financing by 10% until 2028. This was estimated to amount to $1,945,949,675.58 by 2028[2]. Since this commitment, Nigeria has successfully met this financial commitment, despite global health challenges such as COVID-19, tighter fiscal space, and reprioritization of missed communities. This study explores how Nigeria has successfully increased the immunization program budget and documents lessons learned for other countries in transition.

Methodology

A desk review was conducted to assess the collective efforts of key stakeholders and the role of advocacy toward ensuring a stronger focus on sustainable immunization financing and increased budgetary allocation to health. An analysis of the FGoN allocation to health and PHC

(2002-2022) was conducted to determine trends and sources of immunization financing. A review of novel processes and tools post-transition was also conducted to estimate their impact on the country's financing success in the last four years in meeting its co-financing obligation.

Results

Nigeria's sustained immunization co-financing benefited from the 92% increased allocation to health from NGN356bn in 2018 to NGN682bn in 2022[3] achieved through advocacy to high-level stakeholders, including the office of the presidency. Additionally, optimized processes, such as including a budget line for vaccine financing in the National budget, the switch in forecasting methods, and a revision of the forecast timeline to align with national budget timelines, also play a significant role. The Inter-Ministerial Vaccine financing committee, a coordination platform led by the NPHCDA with membership cutting across MoH, MOF, Budget Office, and development partners, provided a platform for continuous stakeholder engagement. Finally, findings also show that introducing novel tools such as the vaccine financing plan, vaccine financing outlook, vaccine financing trackers, and vaccine financing process map provided visibility and contributed to change. The above-ensured efficiency in costing, budgeting, approvals, and timely disbursement of funds.

Conclusion

Since the transition, Nigeria has increased its co-financing for immunization by 32.4%[4]. Strong advocacy and political commitment played a vital role in making change happen. These processes have aided the institutionalization of immunization financing, built resilience into sustaining financing in light of COVID, and refocused on missed communities. Timely forecasting and developing an annual vaccine financing plan continue to guide stakeholders through this process. Lastly, a strong accountability framework reviewed annually aids the tracking of progress.

[1] Nigeria | Gavi, the Vaccine Alliance

[2] Nigeria Strategy for Immunization and PHC System Strengthening (NSIPSS).

[3] Gazetted annual appropriation act of FGoN

[4] CHAI Financial Analysis

Provider Financial Incentives for HPV Vaccination: Pervasiveness and Clinic Staff Eligibility

PRESENTER: **Justin G Trogdon**, University of North Carolina at Chapel Hill
AUTHORS: Kathryn Brignole, Tara Queen

Background: The use of financial incentives to providers to increase quality and/or lower costs has increased as pay-for-performance has proliferated. While some quality metrics targeted in pay-for-performance schemes include HPV vaccination, little to no information exists on the extent to which financial incentives are used to promote HPV vaccination.

Objective: This study is one of the first to report the extent to which financial incentives for clinics and clinical staff are used to promote HPV vaccination. We also report the likelihood of eligibility to receive financial incentives by clinical staff role.

Data: In 2022, we conducted a national survey of clinical staff working in primary care clinics that provided HPV vaccination to children (N=2,527). WebMD Market Research recruited participants through their Medscape Network. Respondents were 1) certified to practice in the US; 2) practiced as a physician, physician assistant (PA), nurse practitioner, advanced practice nurse (APN) including nurse practitioner, registered nurse (RN), licensed practical/vocational nurse (LPN/LVN), medical assistant (MA), or certified nursing assistant (CNA); 3) worked in pediatrics, family medicine, or general medicine specialties; and 4) had a role in HPV vaccination for children ages 9 through 12 years. We set quotas for roughly equal numbers of pediatricians, family physicians and other physicians, PAs and APNs, RNs, and MAs/CNAs. The response rate was 57% (AAPOR response rate 3). The University of North Carolina Institutional Review Board approved the study protocol.

Methods: The primary outcome was a mutually exclusive categorical variable that captured the type of quality metrics for which financial incentives had been used in the past year: HPV vaccine, other pediatric vaccinations, other quality metrics, or none. The secondary outcome was an indicator variable for whether the respondent was, or would be, eligible for a financial incentive. We estimated a multinomial logistic regression model for the primary outcome and a logistic regression model for the secondary outcome. Models adjusted for characteristics of the clinic (rurality, specialty, number of clinics in the system, ownership structure, number of prescribers, % of children using Vaccine for Children, and number of patients ages 9-12) and of the respondent (training, gender, race/ethnicity, and years in practice).

Results: Only 8% (N=193) of respondents had financial incentives for HPV vaccine in their clinics. Clinics that were part of a healthcare system were more likely to have used financial incentives for HPV vaccine: relative to clinics not in a system, clinics in a system of 5 or more clinics had an odds ratio (OR) = 2.06 (95% confidence interval [CI] 1.40, 3.03). Clinics that saw more children were more likely to have used financial incentives for HPV vaccine: relative to respondents seeing 0-9 children per week, respondents seeing 50 or more children per week had an OR = 2.64 (95% CI 1.47, 4.72). Physicians were more than twice as likely than other roles to be eligible for financial incentives (e.g., physician assistant OR = 0.40 [95% CI 0.28, 0.59]).

Conclusions: There is opportunity to extend the use of financial incentives in primary care to promote HPV vaccination.

The Costs of Deploying and Maintaining Digital Health Interventions to Improve Immunization and Vaccine Logistics Data Management in Low- and Middle- Income Countries. a Multi-Country Study in Guinea, Honduras, Rwanda and Tanzania.

PRESENTER: **Maria Verykiou**, SDA Bocconi University

AUTHORS: Carlo Baldassarre Federici, Marianna Cavazza, Flaminia Sabbatucci, Claudio Jommi, Claire Hugo, Stefano Malvolti, Carsten Mantel, Viviana Mangiaterra, Aleksandra Torbica, Nyanda Elias Ntinginya, Jeanine Condo, Alexandre Delamou, Erin Ferenchick, Edith Rodriguez, Luis Castillo

Background

Evidence-based healthcare requires high-quality and readily-accessible data. Recent years have seen a proliferation of projects in low- and middle-income countries promoting the deployment of Digital health interventions (DHIs) to improve the management and utilization of health information. Electronic immunization registries (eIRs) and electronic logistics management information systems (eLMIS) have been implemented in several countries to support better immunization services within the Expanded Programme for Immunization. Yet, few of these systems have been evaluated to date and evidence is still sparse on their cost of implementation or their impact on national or external budgets. This study contributes to filling this gap by estimating the initial expenditures and routine operational costs for one integrated eIR-eLMIS in Tanzania, the eIRs in place in Rwanda and Honduras, as well as an eLMIS of Guinea.

Methods

The analysis took the perspective of the third-party payer, including both national governments and external donors. The cost of deploying the DHIs was estimated by collecting financial reports from the implementers and other secondary sources. Routine operational costs were estimated using activity-based costing and tracing direct and indirect costs to a set of pre-specified activities related to the management of immunization and vaccine logistics data. Primary data were collected through questionnaires in all countries from a total of . Comparisons with paper-based registries were done using a cross-sectional design whenever possible or a pre-post comparison alternatively.

Results:

Honduras, Tanzania and The context, timeline and strategy of implementation of the systems varied across the countries, with upfront implementation expenditures between USD 45K and 12.6M covered almost entirely by external donors. Most of the initial expenditures were related to training of healthcare staff and purchasing of equipment. The yearly routine cost per health facility of managing immunization or vaccine-logistics data was estimated between USD 200 and 1,850. Compared to paper-based systems, savings were observed in Tanzania (USD -1,307), but not elsewhere. The continued operation of paper registries after the implementation of the DHIs, and the limited use of the electronic data for reporting or decision-making, were two of the main factors contributing to higher costs. Several shortcomings in terms of human resources, trainings, IT infrastructure, and equipment were observed which hampered the widespread adoption of the DHIs and negatively impacted the perceived trust in the quality of the electronic data.

Conclusions

By improving the quality and accessibility of data, eIR and eLMIS systems have the potential to optimize healthcare worker performance and provision of care, and to lower costs. Nonetheless, savings are unlikely to be generated unless the switch to electronic registries is complete, eliminating duplication of work, and the electronic data is incorporated into decision-making processes . Further investments are required to ensure an enabling environment for the continued use of the systems, all of which need to be considered by countries when deciding on the adoption of these solutions.

1:30 PM –3:00 PM   MONDAY   [Demand & Utilization Of Health Care Services]

Cape Town International Convention Centre | CTICC 1 – Room 1.61

Experimental Evidence on the Effectiveness of Health Interventions and Payment Schemes

MODERATOR: **Marcos Vera-Hernández**, University College London (UCL)

The 2019-2025 Bundle Payment Experiment in France: Why Do Hospitals Volunteer?

PRESENTER: **Noémie Malléjac**, EHESP (The French School of Public Health)

AUTHOR: Nicolas Sirven

Background: In many countries, in order to align the interests of multiple providers, policies have encouraged integrated care teamwork by implementing bundled payment. In France, under the current fee-for-service model, hospitals, physicians, and post-acute care providers are paid separately for services provided. This payment approach can lead to excessive, inappropriate, and fragmented care, with little incentive for care coordination and communication across different providers. The implementation of bundle payment in France is preceded by a period of experimentation from 2020 to 2025 for which hospitals have volunteered. These hospitals also participate in the development of the funding model in a principle of co-construction.

Objective: The objective of this study is to determine whether hospitals volunteering to take part in the recent bundle payment experiment in France (a.k.a. the experimenters) display specific characteristics. Our main assumption is that they differ from non-volunteers with specific attributes associated with the aim to maintain or develop a competitive advantage.

Methods: Using a unique set of health claims and administrative data covering the whole range of French hospital over time, we aim at determining the existence and magnitude of a selection effect in levels and trends and how these characteristics can be linked to a strategic behaviour for hospitals to volunteer. First, we use cross sectional data in 2019 to determine which time variant and time invariant characteristics are predictive to be a volunteered hospital. Second, we exploit panel data from 2015 to 2019 to find out which time variant characteristics to the volunteered status by adjusting for hospital and local care supply characteristics.

Results: The results of the analysis show that the experimenters are specific. They display higher performance measures (volume, productivity, attractiveness, quality) and give a more important role to cooperation with providers of the care pathway. Most of the differences observed at the start of the experimentation in 2019 appear to have been present since at least 2015, suggesting that the organizational costs of the transition to a bundle payment-funding scheme were notably already partially absorbed before entering the experimentation. Nevertheless, experimenters increased their patient volume and productivity more strongly than the others did over the period, thereby accentuating their competitive advantage.

Conclusion: Our results suggest potential additional cost of scaling up the experiment to all hospitals. A selection effect amongst the volunteers risks creating inequalities in performance between experimenters and the others; the former having also gained a competitive advantage from participation in the programme through a windfall effect and thus consolidated innovative positions in the past. Public policy implications are further discussed.

Empowering Adolescent School Girls with Skillz: 6-Month Follow-up Results from a Cluster Randomized Trial in Lusaka, Zambia

PRESENTER: **Calvin Chiu**, University of California, Berkeley
AUTHORS: Chama Mulubwa, Boyd Mkandawire, Maggie Musonda, Ntenje Katota, Jenala Chipungu, Carolyn Bolton, Jenny Liu

Though low-cost, effective HIV prevention and modern contraceptive products are available, demand among adolescent girls and young women in sub-Saharan Africa remains limited. This is especially problematic given adolescent girls' disproportionately high risk of HIV infection and unintended pregnancy that lead many to drop out of school. Effective interventions to address risky sexual behavior and increase uptake of HIV prevention and modern contraceptive products among adolescent girls are lacking.

Using a cluster-randomized controlled trial across 46 schools in Lusaka, Zambia, we evaluate the impact of SKILLZ, a peer-led demand generating sports-based program for empowering adolescent girls, developed and implemented by Grassroot Soccer. SKILLZ consists of i) 12 after school sessions of soccer-based comprehensive sexuality and sexual and reproductive health education delivered by young adult mentors known as "Coaches", ii) a large community-based "graduation" soccer event where HIV testing and contraception are made available, and iii) community-based distribution of contraceptive products via the SKILLZ Coach and referrals to youth-friendly clinic services as required. We randomly sampled 2,154 Grade 11 girls from school rosters and surveyed them at Baseline, 6, and 12-months to measure self-reported sexual and reproductive health knowledge and uptake of HIV prevention and sexual and reproductive health products and services. Surveys were self-administered to limit social desirability bias given the sensitive nature of certain questions. We estimated linear difference-in-difference models on our primary outcomes – uptake of HIV testing and any contraceptive methods within the last 6 months. As robustness checks, we additionally included school and individual fixed effects separately, estimated ANCOVA models, and estimated alternative p-values from randomization inference. Further, we disaggregated contraceptive uptake by specific methods, and examined the impact on adoption and discontinuation separately.

About 90% of surveyed girls in schools assigned to the treatment arm participated in SKILLZ, attending 6.59 (SE: 4.30) out of 12 sessions on average. SKILLZ substantially increased both uptake of HIV testing and contraception at 6-months. From a Baseline of 37%, SKILLZ increased HIV testing by 27 percentage points (95% CI: 0.201, 0.340). This is robust to the inclusion of age and either school or individual fixed effects, ANCOVA models with or without imputation for missing values at Baseline, and p-values from randomization inference. SKILLZ increased adoption of HIV testing by 20 percentage points (95% CI: 0.157, 0.251) and reduced discontinuation by 4 percentage points (95% CI: -0.066, -0.012). From 20% at Baseline, SKILLZ increased contraception uptake by 12 percentage points (95% CI: 0.049, 0.195). This is robust to the inclusion of age and school fixed effects, ANCOVA models and p-values from randomization inference, but not to the inclusion of individual fixed effects. SKILLZ increased adoption of contraception by 7 percentage points (95% CI: 0.022, 0.118) and decreased discontinuation by 2 percentage points (95% CI: -0.035, -0.001). Research into understanding potential treatment mechanisms is ongoing as we explore potential treatment heterogeneity and changes in sexual and reproductive health knowledge and beliefs around stigma and social norms. Upcoming analysis of the survey data at 12-months will examine the persistence of treatment effects.

The Effect of Chronic Disease Management Programme on Diabetic Mellitus Complications: Cluster-Controlled Intervention in Indonesia's National Health Insurance

PRESENTER: **Mahlil Ruby**, BPJS Kesehatan
AUTHORS: Suciati Mega Wardani, Gregorius Virgianto Arpuji Anggoro Putro, Hasbullah Thabrany

The Effect of Chronic Disease Management Programme on Diabetic Mellitus Complications: Cluster-controlled Intervention in Indonesia's National Health Insurance

Background: The growing population living with chronic conditions requires efficient intervention and effective care. The prevalence of Diabetic Mellitus (DM) and its complication continued increasing since 2007 to 2013 according to Indonesia's health research data (from 1,1% to 2,1%). Disability Adjusted Life Years (DALY) of DM increased from being the tenth in 2006 into third rank in 2016. Meanwhile, heart disease and stroke was the leading causes of DALY at first and second rank, respectively. DM has become a critical health problem in Indonesia with increasing health spending related to the cost of its complication. There were only few studies that have reported the effectiveness of disease management program targeting patients with chronic diseases. This study aimed to evaluate the Indonesia's National Health Insurance (NHI) DM program and examine the effect of this program on health care utilization.

Method: Linear regression is applied on health care utilization data from 2017 to 2021 of the Indonesian NHI that includes 876.751 DM patients with 26.524 patients (3,03%) in intervention group and 850.227 (96,97%) in control group. Only patients diagnosed with DM was included and those diagnosed with hypertension was excluded. Effects of the program were evaluated based on health care utilization of DM's complication. This study will compare the effect of disease management program between the intervention group and the control group in each cluster of patients with DM's complication (stroke, kidney failure, and heart disease), and also those who died. Patients in the intervention group were considered exposed to a disease management program where they received education on DM prevention and had their health status monitored in addition to routine care while and patients in the control group received only routine care.

Finding: The effect of the DM management program appears to have a significant effect on the intervention group compared to the control group (p<0,01 and Cl=99%). Furthermore, the disease management program intervention showed a strong correlation with health care utilization of stroke ($\beta=0,827$, p<0,01), kidney failure ($\beta=0,723$, p<0,01), heart disease ($\beta=0,923$, p<0,01), and death cases ($\beta=0,623$, p<0,01). Disease management program appears to have a significant impact on health care services related to heart disease and stroke.

Conclusion: Chronic disease management program on DM patients appears to have significant effect on intervention and control group. Findings emphasize the value of intervention and the need for policies to support and improve the disease management program. Through clustering the DM complication in our analysis, we developed a more target evidence-based intervention. It is hoped that strengthened the role of primary care and strategic health purchasing may improve the impact and quality of promotive and preventive intervention program on chronic disease patients.

Keywords: Chronic Disease Management; Diabetes Mellitus; Health Care Utilization

When Patients Are Uninformed: Evidence from a Patient Information Provision Experiment in Ghana

PRESENTER: **Edward Asiedu**, University of Ghana
AUTHORS: Kathrin Durizzo, Isabel Guenther

Objective: Many people are still pushed into poverty due to high health spending, especially in sub-Saharan African countries. To progressively reduce financial access barriers to health services and to achieve Universal Health Coverage, many governments implemented social health insurance schemes. Studies show that the insurance scheme decreased out-of-pocket expenditures (OOPE). Yet, other studies indicate that insured patients still have to pay for covered services at the point of care, disregarding that health insurance should cover those services. Additionally, qualitative and descriptive studies find that the financial pressure on the health care providers and the patients' uninformedness leads to unauthorized charges, unfair treatment of insured patients, and less availability of medicine and services. To date, little is known about the mechanism and how patient uninformedness contributes to these issues.

Method: In our study, we explore how the information provided to the patients affects (i) OOPE, (ii) insurance literacy, and (iii) health care provision. We conducted a randomized controlled trial (RCT) in 43 primary health facilities in the South of Ghana and randomly assigned 2,220 patients to receive an information treatment before entering the health facility. The patients receive either a verbal control message about a non-health insurance related information or one of four verbal treatment messages consisting of a general or a patient specific health insurance coverage information. Both cases are also supported by the distribution of an insurance membership handbook to take home.

Result: We find that providing information about the benefits package led to a substantial OOPE reduction for insured patients of up to -38%. The findings from insurance literacy highlight that it is particularly challenging for patients to remember detailed items of the coverage package. We only find an improvement of up to 40% for simple knowledge questions. Providing information about the benefits package led to no robust effects on health care provision. Interestingly, the four different information treatments did not significantly differ from each other in their effectiveness in reducing OOPE or increasing insurance literacy.

Discussion: In a health insurance scheme where patients are poorly informed about the insurance benefit package, the provision of fundamental information about the health care benefits package can contribute to an improvement in financial protection without harming the quality of health care. Costly interventions such as the distribution of insurance membership booklets led to no additional benefit, highlighting that more research needs to be done on best practices to improve insurance literacy.

Cape Town International Convention Centre | CTICC 2 – Nerina
Economics of Tuberculosis Detection and Prevention

MODERATOR: **Lucy Cunnama**, Health Economics Unit and Division, University of Cape Town, South Africa

ORGANIZER: **Martin Harker**, London School of Hygiene & Tropical Medicine (LSHTM)

DISCUSSANT: **Gesine Meyer-Rath**, Health Economics and Epidemiology Research Office, University of the Witwatersrand; **Plaxcedes Chiwire**, Maastricht University, CAPHRI

Costs Incurred By Individuals Receiving Tuberculosis Treatment in Low- and Middle-Income Countries: A Meta-Regression Analysis of 20 Nationally-Representative Patient Cost Surveys

PRESENTER: **Allison Portnoy**, Harvard University

Background: The combined effect of reduced ability to work and high treatment costs can have major implications for the households of tuberculosis (TB) patients, as the large majority of TB patients are working-age adults and predominantly come from poor households with limited resources to cope with interruptions in income and unanticipated healthcare expenditures. Estimates of the costs faced by individuals receiving TB treatment are critical for quantifying the household economic burden caused by TB disease. While some countries have conducted national surveys of TB patient costs, these data only cover a fraction of low- and middle-income countries (LMICs). In this study we synthesized data from 20 nationally-representative surveys to quantify the household economic burden of TB in LMICs.

Methods: Between 2015 and 2021, 20 LMICs conducted national surveys of costs faced by TB patients and their households using standardized methods developed by the World Health Organization Global TB Programme. These surveys collected representative data on direct medical costs, direct non-medical costs (travel, accommodation, food, nutritional supplements), and indirect costs (income loss experienced by patients during TB care) incurred before and during the TB disease episode, as well as basic clinical and demographic information and self-reported household income reported as either annual household income or expenditure. We extracted data from these cost surveys and developed a Bayesian meta-regression approach to estimate per-patient costs by cost category (direct medical, direct non-medical, indirect), country, drug-resistance status, and income quintile. We summarized results (in 2020 USD) by cost category and analytic stratum, and estimated the proportion of households experiencing catastrophic costs due to TB (defined as costs greater than 20% of annual household income).

Results: For 2020, average direct medical costs per patient across 135 LMICs were estimated to be $236 ($219–255), direct non-medical costs were $374 ($363–385), and indirect costs were $435 ($415–456), for an overall per-patient cost of $1045 ($1010–1082). The highest estimated per-episode total patient costs were in the region of the Americas, followed by the European region, Western Pacific region, Eastern Mediterranean region, African region, and Southeast Asian region. Estimated proportions of TB households experiencing catastrophic costs decreased with increasing wealth: 72.4% (95% uncertainty interval: 71.4–73.4%) in the poorest quintile; 55.3% (54.1–56.5%) in the poorer quintile; 44.4% (43.4–45.9%) in the middle quintile; 38.7% (37.1–40.3%) in the richer quintile; and 35.0% (33.8–36.2%) in the richest quintile.

Conclusions: Despite TB treatment being free in many countries, most TB patients face significant costs during TB treatment. A substantial fraction of TB-affected households experiences catastrophic costs due to TB, particularly in poorer income quintiles. TB patient cost estimates are necessary to improve measurement of economic and financing analysis related to TB, and to contribute to global efforts for policy and programmatic action. The results of this analysis provide estimates of per-episode costs of TB care and the proportion of TB patients and their households facing catastrophic costs due to TB that may be useful for countries that have yet to conduct a national survey.

Multicomponent Strategy with Decentralized Molecular Testing for Tuberculosis in Uganda: A Cost and Cost-Effectiveness Analysis

PRESENTER: **Hojoon Sohn**, Seoul National University

Background: Decentralized molecular testing for tuberculosis (TB) could reduce missed diagnoses and losses to follow-up in high-burden settings. Until recently, this strategy was largely infeasible owing to the lack of inexpensive, durable, and battery-powered molecular testing platforms. The XPEL-TB trial is a highly pragmatic cluster randomized trial of a multicomponent strategy that includes decentralized molecular testing using the GeneXpert Edge system in Ugandan primary care facilities that perform fewer than 150-250 tests for TB annually. In this study, we empirically evaluated the cost and cost-effectiveness of the XPEL-TB strategy compared to the centralized testing strategy using the hub-and-spoke model.

Methods: We conducted costing and cost-effectiveness analyses nested in a pragmatic cluster randomized trial of on-site (decentralized) versus hub-and-spoke (centralized) testing for TB with Xpert MTB/RIF Ultra (Xpert) in 20 Ugandan community health centers. We collected empiric data on the cost of the XPEL-TB strategy (decentralized Xpert testing, workflow re-design and performance feedback) and routine TB testing (on-site smear microscopy with specimen transport for centralized Xpert testing) from the health system perspective. Time-and-motion studies were performed to estimate activity-based service costs. Cost-effectiveness was assessed as the incremental cost (2019 US dollars) per TB diagnosis and per 14-day treatment initiation. Our primary cost outcomes were the per-patient and per-test costs of the two

strategies. The primary cost-effectiveness outcome was the incremental cost per incremental patient with bacteriologically confirmed TB disease initiating treatment within 14 days of initial presentation to the clinic. Multiple sensitivity analyses (one-way, probabilistic, and scenario analyses) were performed to estimate the uncertainties in our trial-based estimates of cost and cost-effectiveness.

Results: The study population contained 4,867 women and 3,139 men. On a per-test basis, the cost of decentralized ($20·46, range: $17·85 - $25·72) and centralized ($18·20, range: $16·58 - $24·25) Xpert testing was similar. However, decentralized testing resulted in more patients receiving appropriate Xpert testing (99% vs 42%), so per-patient cost of decentralized testing was higher: $20·28 (range: $17·68 - $25·48) vs $9·59 (range: $7·62 - $14·34). The XPEL-TB strategy was estimated to cost $1,332 (95% uncertainty range: $763 – $5,558) per incremental TB diagnosis and $687 ($501 – $1,207) per incremental patient initiating TB treatment within 14 days. Cost-effectiveness was reduced in sites performing fewer than 150-250 tests annually.

Implications: The XPEL-TB strategy facilitated higher rates of Xpert testing for TB at a similar per-test cost and modest incremental cost per TB diagnosis and treatment initiation. Our findings support the expansion of national and donor budgets for TB diagnosis to enable scale-up decentralized molecular testing using a single-module device similar to GeneXpert Edge – along with appropriate implementation supports – in high-burden clinics with sufficient testing volume (at least 150-250 TB tests annually) in settings similar to Uganda.

Decentralizing Paediatric Tuberculosis Diagnosis Services to District Hospital-Level or Primary Health Centre-Level in Six High Burden Countries: A Cost-Effectiveness and Budget Impact Analysis

PRESENTER: **Martin Harker**, London School of Hygiene & Tropical Medicine (LSHTM)
AUTHORS: Marc d'Elbée, Nyashadzaishe Mafirakureva, Peter Dodd

Background: Childhood tuberculosis (TB) remains extensively underdiagnosed, with only 450,000 cases being reported in 2021 of an estimated global total of 1.2 million (39%). Of 210,000 annual deaths, 96% are estimated to occur in untreated children.

Diagnostic services and expertise, including respiratory specimen collection for rapid molecular testing and chest X-ray (CXR), are often located in few tertiary-level facilities, restricting access, while screening patients to actively seek TB is rare. WHO has recently recommended decentralization of TB services to improve access to diagnosis and treatment but evidence on cost-effectiveness is lacking.

Children do not easily produce sputum. Alternative samples that can be tested now include nasopharyngeal aspirate (NPA) and stool, but their cost-effectiveness is unknown. CXR is a useful tool, but available only in some hospitals and its interpretation is challenging.

We sought to assess the cost-effectiveness and budget impact of improving childhood TB diagnostic approaches, focused at district hospital (DH) or primary health centre (PHC) level.

Methods: The TB-Speed Decentralization study (NCT04038632) randomized two health districts each in Cambodia, Cameroon, Côte d'Ivoire, Mozambique, Sierra Leone and Uganda to implement a comprehensive diagnostic approach at either PHC- and DH-level (PHC-focused strategy), or at DH-level only (DH-focused strategy). This comprised symptom screening all child outpatients, followed, for children with presumptive TB, by clinical evaluation, Xpert Ultra molecular tests on NPA and stool samples, and digital CXR. In the DH-focused strategy only screening was at PHC, with children referred to DH for testing and diagnosis. In the PHC-focused strategy evaluation, Xpert testing and diagnosis were at the PHC, with referral to DH only if CXR was required.

We built a decision-tree model comprising patient care pathways for the two intervention strategies and a simulated current standard-of-care strategy (SOC). Before-and-after data from the Decentralization study were used to parameterise patient flows and outcomes. Diagnostic accuracy was taken from published meta-analyses and expert opinion was used to inform the SOC. Costs were estimated by ingredients-based costing, using unit costs collected in each country. We calculated discounted costs (2021 US$) and disability-adjusted life years (DALYs) for each strategy from a health system perspective. We calculated budget impact over five years of nationwide implementation of either DH-focused or PHC-focused strategies, including equipment rollout and training.

Results: Both the DH- and PHC-focused strategies were more expensive but more effective than SOC, identifying and treating more cases of TB and so averting deaths and DALYs. ICERs for DH-focused versus SOC ranged from $263 (Cambodia) to $342 (Côte d'Ivoire) per DALY averted. PHC-focused was dominated by DH-focused. Results were sensitive to TB prevalence and discount rates. Budget impact analysis showed implementation would cost between $10M (Sierra Leone) and $49M (Mozambique) for DH-focused or $11M (Sierra Leone) to $134M (Uganda) for PHC-focused.

Conclusions: Implementing systematic child TB detection at DH-level may be cost-effective compared to current care in some countries, depending on TB prevalence and the cost-effectiveness threshold adopted. Substantial sums would be needed to implement nationwide, although benefits could be increased by adopting further interventions utilising the same equipment.

New Tuberculosis Vaccines: The Potential Cost and Cost-Effectiveness of Vaccination with M72/AS01$_E$ and BCG-Revaccination Tuberculosis Vaccines in India and South Africa

PRESENTER: **Rebecca Clark**, London School of Hygiene & Tropical Medicine
Background: Tuberculosis is a serious health issue causing substantial morbidity and mortality worldwide. An estimated 10.6 million people developed tuberculosis disease in 2021, and 1.6 million people died. Collectively, India and South Africa accounted for 31% of cases and

36% of deaths globally. Novel vaccines or vaccination strategies will likely be key to eliminate the burden of tuberculosis. M72/AS01$_E$ and BCG-revaccination of adolescents/adults have both recently completed Phase IIb trials, and vaccine developers and implementers require estimates of their likely health and economic impact. We estimated the potential cost and cost-effectiveness of vaccination with BCG-revaccination and M72/AS01$_E$ vaccines in India and South Africa and investigated the impact of variation in delivery strategies and vaccine profile.

Methods: We developed separate age-stratified compartmental tuberculosis models for India and South Africa and calibrated to country-specific epidemiologic data to simulate current trends to 2050 assuming no-new-vaccine introduction. We simulated vaccines with characteristics informed by clinical trial data; a Basecase M72/AS01$_E$ vaccine with 50% prevention of disease efficacy with 10-years average protection, efficacious with any infection status at vaccination introduced in 2030 routinely to age 15 (80% coverage) and as a campaign for ages 16-34 (70% coverage, repeat campaign in 2040) with two doses at $2.5 USD per dose, and a Basecase BCG-revaccination vaccine with 45% prevention of infection efficacy with 10-years average protection, and efficacious with no current infection at time of vaccination introduced in 2025 routinely to age 10 (80% coverage) and as a campaign for ages 11-18 (80% coverage) with repeat campaigns in 2035 and 2045 with one dose at $0.17 per dose. We varied product and implementation characteristics univariately to explore uncertainty in vaccine profile and decisions regarding delivery.

We calculated incremental costs for each vaccine scenario compared to the no-new-vaccine baseline from the health system perspective. We calculated disability-adjusted life years (DALYs) as well as budget impact and cost-effectiveness outcomes such as incremental cost per DALY averted.

Results: In both India and South Africa, M72/AS01$_E$ vaccines were predicted to avert more tuberculosis cases and deaths by 2050 compared to BCG-revaccination scenarios. Both M72/AS01$_E$ and BCG-revaccination scenarios are likely to be highly cost-effective in both countries. Due to the higher assumed cost-per-dose ($2.5 vs $0.17) and requiring two doses per course, M72/AS01$_E$ vaccines were estimated to be around four times more expensive and have cost-effectiveness ratios around three to seven times greater than BCG-revaccination in both countries, but nearly all scenarios were cost-effective at the lowest threshold. Both vaccines are likely to have lower cost-effectiveness ratios in South Africa compared to India due to the higher tuberculosis burden, and vaccine roll out was likely 20 times more expensive per year in India due to population size.

Implications: Novel tuberculosis vaccines with characteristics similar to BCG-revaccination and M72/AS01$_E$ are likely to be highly cost-effective in both India and South Africa and have the potential to have a substantial positive impact on the tuberculosis burden in both countries**.**

1:30 PM –3:00 PM   MONDAY   [Health, Its Distribution And Its Valuation]

Cape Town International Convention Centre | CTICC 1 – Room 1.41

Applications of Capability Measurement in Health Economic Analysis

MODERATOR: **Irina Kinchin**, Trinity College Dublin

ORGANIZER: **Paul Mitchell**, University of Bristol

DISCUSSANT: **Paula Lorgelly**, University of Auckland | Waipapa Taumata Rau

The Poor and the Healthy: Unpacking Health Capability in Rural Senegal
PRESENTER: **Marion Coste**, Aix Marseille Univ.

Motivation: Who should be the target of health policy and interventions in sub-Saharan Africa? Despite the well-documented relationship between economic resources and health outcomes, recent evidence shows that people with health needs are majoritarily not found in poor households. In this paper, I addresses the following research question: can a multidimensional model of health capability unpack the relationship between household poverty and individual health needs, and inform the role played by empowerment?

Methods: A structural equation modelling (SEM) strategy is used to simultaneously estimate health status, access to health care, and empowerment as latent variables interacting in a multidimensional model of health capability (Prah Ruger, 2010). The empirical application relies on individual survey data collected among individuals living in the Niakhar Health and Demographic Surveillance System (HDSS) in rural Senegal (the ANRS12356 AmBASS survey).

Results: The final model presents very satisfactory goodness-of-fit measures (CFI & TLI> 0.98 and RMSEA=0.028). Results highlight significantly differentiated needs across health capability dimensions. Access to healthcare is impeded in individuals living in households with relatively worse living conditions, in rural villages and in individuals without sole ownership of a field for farming; health status is suboptimal in older individuals, members of large households, and in households with fewer agricultural resources; and empowerment is lower in younger, single, childless, educated individuals, those living in households with more agricultural or monetary resources. Woman and permanent residents are shared features for shortfalls in empowerment and health status, and intrinsic motivation for health is predictive of optimality in both access to healthcare and empowerment. Focusing on poverty, I find that individuals living in resource-rich households

are more likely to experience lower levels of empowerment, while reporting better health, and optimal access to health services. In contrast, empowerment increases with individual earnings, and is significantly associated with improved health status. These results are robust to alternative specifications of the measurement model, to alternative interactions among health capability dimensions, as well as to estimations in subpopulations, or using binary variables for dimensions of poverty.

Discussion: This study provides a missing piece to reconcile evidence that empowerment contributes to improved health outcomes and well-being, and that individuals experiencing health needs do not necessarily live in the poorest households. This paper accounts for the existence of intra-household inequality, and recognizes the necessity to integrate the multidimensionality of poverty at the individual level. These results also provide evidence to back the claim that one policy, for example towards the 'poor' households, necessarily fails to address significant deficits in health capability dimensions. Finally, these results reaffirm that it is imperative to develop multidimensional and individual level measures of poverty, and to account for (inequalities in) empowerment in the design of health policy and interventions. A SEM-based model offers a way forward to incorporate the complexity of health capability into policy and intervention design for effective health promotion.

Using the Capabilities Approach to Assess the Wellbeing and Mental Health of People Living with HIV/AIDS in Uganda: A Cluster-Randomsised Controlled Trial.

PRESENTER: **Dr. Giulia Greco, PhD**, London school of hygiene and tropical medicine
AUTHORS: Barbra Elsa Kiconco, Dr. Yoko Laurence, Patrick Tenywa, Melissa Neuman, Isaac Sekitoleko, Wilber Ssembajjwe, Kenneth Roger Katumba, Helen Weiss, Eugene Kinyanda

Mental health problems are the leading cause of disability globally. However, only 10 percent of those with mental disorders are getting treatment. On average, countries spend less than 2 percent of their national health expenditure on mental health. Mental health problems are linked to different challenges beyond health and thus affect human development in many ways: educational attainment, economic productivity and employment, and social relations are affected.

In Uganda, 30% of adults with HIV suffer from depressive disorders. People with HIV and with depressive disorders experience rapid HIV disease progression, higher mortality, poor adherence to HIV treatment, and increased risky sexual behaviour. Thus, they are more vulnerable and isolated. The HIV+D cluster-randomised trial tested the effectiveness and cost-effectiveness of integrating collaborative care of depression into routine HIV services in Uganda. This study presents the advantages and challenges of using a capability-based measure alongside the HIV+D trial.

In economic evaluation, the most widely used measures for estimating the 'Q' of the QALY are preference-based health-related instruments such as the EQ-5D. However, the EQ-5D has been shown to have limited usability in mental health research. In the HIV+D trial, quality of life was measured using 3 instruments: the standard EQ-5D-5L, subjective wellbeing measures (life satisfaction and happiness), and the capability-based OxCAP-MH, which had never been used in Uganda or in the region.

This study followed the Translation and Linguistic Validation process of the OxCAP-MH, which was developed following the international principles of good practice for translation as per the International Society for Pharmacoeconomics and Outcomes Research's standards.

A 5-item Likert scale was used for the Ox-CAP MH Luganda version. It is scored between 0 and 100 with 0 indicating less capabilities and 100 more capabilities. These scores were obtained by adding the scores for each item response for each individual patient. Convergent validity was tested between OxCAP-MH the EQ-5D-5L (Uganda tariffs).

The translated OxCAP-MH Luganda Version is both culturally and linguistically appropriate for the Ugandan context. Moderate correlation was found between OxCAP-MH and EQ-5D-5L and EQ-5D VAS scores, indicating that the instruments are measuring different constructs, and thus are complementary. Data analysis is currently ongoing and will be completed by March 2023. Preliminary evidence suggests that the OxCAP-MH can be used as an additional tool for the measurement of health-related quality of life outcomes in people living with HIV and/or with comorbid depression.

The results show that quality of life measured with three different instruments (EQ5D, OxCAP-MH, and subjective wellbeing) has improved for those people who received the HIV+D intervention, compared to those in the control clusters, and that the positive effects are sustained overtime. The presentation will discuss the pros and cons of using each measure.

Were Reductions in Capability Equally Distributed in the General Adult Population during the First Year of the COVID-19 Pandemic? An International Survey from the UK, Australia and the Netherlands

PRESENTER: **Paul Mitchell**, University of Bristol
AUTHORS: Mickael Hiligsmann, Rachael Lisa Morton, Samantha Husbands, Joanna Coast

Background

Research related to the COVID-19 impact on the general population has largely focused on direct health impacts of this infectious disease, where age, gender, ethnicity and pre-existing health conditions played an important role in the health risks associated with COVID-19 infection. Capabilities were not just restricted by the COVID-19 pandemic itself but also by the associated social restrictions that were used to control the spread of COVID-19. Whilst there is good evidence about health impacts, it is less well understood if general population

capability levels were impacted equally, or whether certain sections of society saw a disproportionate impact on their capabilities relative to the rest of the general population.

Aim

This study ascertains the extent to which different groups of the general population were disproportionately impacted during the first year of the COVID-19 pandemic.

Methods

A cross-sectional online panel survey in Australia, the UK and the Netherlands was conducted from 26 January – 2 March 2021. National samples aimed to be representative of the adult (18+) general population in each country in terms of age, gender, ethnicity, region and education. Respondents completed three versions of the ICECAP-A adult capability wellbeing measure, that consists of five capability attributes (stability, attachment, autonomy, achievement and enjoyment) across four levels (ranging from no, a little, a lot and full capability). The three ICECAP-A versions were: 1. "at the moment", 2. "during the initial coronavirus restrictions in April 2020", and 3. "before the coronavirus in February 2020". Participants also completed a range of socio-demographic and COVID-19 related questions. A Dutch translation of the ICECAP-A was used in the Netherlands. Population values were used to estimate ICECAP-A summary scores on a 0-1 no capability – full capability scale. Preliminary analysis involving paired t-tests was used to compare the change in ICECAP-A summary scores across population groups from the pre-COVID retrospective completion with the two other ICECAP-A completions. Further analysis is exploring inequality between population groups in greater detail, focusing both on detailed analysis across the five ICECAP-A questions, and the ICECAP-A summary scores.

Results

There were 1,017 respondents in the UK, 1,011 in Australia and 1,017 in the Netherlands. There were unequal drops in average general population capability levels between countries from pre-COVID-19 capability levels, with the UK seeing comparatively larger falls in average capability wellbeing levels during the first year of COVID-19. Preliminary results suggest that across all three countries, females, and households without children, had larger falls in capability during COVID-19 restrictions when compared to males and households with children, respectively. The full results of this study will be completed and presented at the conference.

Discussion

Preliminary results suggest that there is variability in the losses of capability during the first year of the COVID-19 pandemic both between and within countries. Full analysis of this data will shed greater light on these variations. This analysis will provide useful guidance for decision makers in the additional support that is required for some population groups to reduce capability inequalities during social restrictions in future pandemics.

1:30 PM –3:00 PM   MONDAY   [Health Beyond Health Care Services: Health Behaviors]

Cape Town International Convention Centre | CTICC 1 – Room 1.64
The Intended and Unintended Consequences of Health Policies

MODERATOR: **Alexander Ahammer**, Johannes Kepler University Linz

ORGANIZER: **Analisa Packham**, Vanderbilt University

DISCUSSANT: **Joseph J. Sabia**, San Diego State University; **Matthew Harris**, The University of Tennessee

Accessing the Safety Net: How Medicaid Affects Health and Recidivism
PRESENTER: **Analisa Packham**, Vanderbilt University
We estimate the causal impact of access to means-tested public health insurance coverage (Medicaid) on health outcomes and recidivism for those recently released from incarceration. To do so, we leverage a policy change in South Carolina that allowed for automatic Medicaid re-eligibility status for previously incarcerated individuals. Using linked administrative data on crime, health, and economic outcomes, we find that even when ex-offenders experience an increase in access to Medicaid, take-up and prescription use does not change, compared to other ex-offenders that did not experience automatic re-enrollment. Our findings suggest that health insurance re-enrollment without counseling may not be enough to change behavior for vulnerable populations.

Can Anti-Vaping Policies Curb Drinking Externalities? Evidence from E-Cigarette Taxation
PRESENTER: **Joseph J. Sabia**, San Diego State University
Teenage drinking is a top public health concern, generating social costs of over $28 billion per year, including substantial external costs associated with alcohol-related traffic fatalities. At the same time, the high rate of electronic cigarette ("e-cigarette") use among teenagers has become a public health concern, with state and local policymakers turning to e-cigarette taxes as a tool to curb consumption. This paper is the first to explore the spillover effects of e-cigarette taxes on teenage drinking and alcohol-related traffic fatalities. Using data from five

nationally representative datasets (the state and national Youth Risk Behavior Surveys, the Behavioral Risk Factor Surveillance Survey, the National Survey on Drug Use and Health, and the Fatality Analysis Reporting System) spanning the period 2003-2019, and a difference-in-differences approach, we find that a one-dollar increase in e-cigarette taxes is associated with a 1-to-2 percentage-point reduction in the probability of teenage binge drinking, and a 0.4 to 0.6 decline in the number of alcohol-related traffic fatalities per 100,000 16-to-20-year-olds in a treated state-year. A causal interpretation of our estimates is supported by (1) event-study analyses that account for heterogeneous and dynamic treatment effects, and (2) null effects of e-cigarette taxes on non-alcohol-related traffic fatalities.

Regulating Addictive Prescription Drugs

PRESENTER: **Alexander Ahammer**, Johannes Kepler University Linz
AUTHOR: Analisa Packham

Opioids are increasingly misused in combination with benzodiazepines to achieve an even stronger high. In 2012, Austria severely restricted access to the most potent and, at the time, most frequently abused benzodiazepine -- flunitrazepam. In this paper we use administrative data to identify a sample of opioid users and study their responses to this reform. We find that: (1) while flunitrazepam prescriptions declined substantially, prescriptions of other benzodiazepines increased, and (2) the reform had lasting negative effects on employment outcomes and increased healthcare utilization among opioid users. This suggests that regulating single drugs can have detrimental effects in the presence of substitutes.

The Anatomy of U.S. Sick Leave Schemes: Evidence from Public School Teachers

PRESENTER: **Matthew Harris**, The University of Tennessee

This paper studies how U.S. employees use paid sick leave. The most common U.S. sick-leave schemes operate as individualized credit accounts---paid leave is earned over time and unused leave accumulates, producing an employee-specific "leave balance." We construct a unique administrative dataset containing the daily balance information and leave behavior of 982 public school teachers from 2010 to 2018. We have three main findings: First, we provide evidence of judicious sick-leave use---namely, teachers use more sick leave during higher flu activity---but no evidence of inappropriate use for the purposes of leisure. Second, we find that leave use is increasing in the leave balance with an average balance-use elasticity of 0.45. This relationship is strongest at the very bottom of the balance distribution. Third, we find that a higher leave balance reduces the likelihood that a teacher works sick ("presenteeism"), especially during flu season. Taken together, these results suggest that a simple alteration to the current sick-leave scheme could reduce the likelihood of presenteeism, thereby lowering infection risk in schools, with few adverse consequences.

1:30 PM –3:00 PM   MONDAY   [Supply And Regulation Of Health Care Services And Products]

Cape Town International Convention Centre | CTICC 1 – Room 2.44-2.45

Focusing on Health Professionals Behaviour and Care

MODERATOR: **Izabela Jelovac**, GATE UMR CNRS 5824

Physician As Chronic-Disease Patient: Evidence from First-Ever Stroke

PRESENTER: **Yajie Wang**, Peking University
AUTHORS: Kamhon Kan, Junjian Yi, Ye Yuan
Physician as chronic-disease patient: Evidence from first-ever stroke

We study factors contributing to proper chronic disease management by investigating the differences in health outcomes and care-seeking behaviors between physicians and nonphysicians after each patient's first-ever stroke. We exploit the sudden and unpredictable timing of the first-ever stroke, track each patient five years before and after their first-ever stroke, and adopt a difference-in-differences method in analyses. Our empirical setting is Taiwan's healthcare system, under which public health insurance coverage is universal and cost-sharing is low. Analyzing the full-population electronic medical records from 1996 to 2011, we have three notable findings.

First, a substantial gap exists between physician and nonphysician patients in survival and health outcomes after their first-ever stroke. After controlling for the patient's age of onset and the severity of the first-ever stroke, physicians experienced significantly lower mortality and recurrence rates than nonphysician patients. Also, they had a lower frequency of outpatient visits, lower probability of hospitalization, and lower overall medical expenditure in the first five years. These differences in health and health behaviors arise sharply after the onset of stroke and persist for years but do not exist before the onset. Such a pattern also exists between physicians' spouses and nonphysicians.

Second and relatedly, the physician-nonphysician gap in stroke management can be attributed to information and income, although cost sharing was low and access to care was easy. After restricting to a group of nonphysician patients that are similar in pre-stroke income- and health-related characteristics as physician patients, the post-stroke physician-nonphysician gap is reduced by about half compared to the baseline but remains statistically significant. In addition, comparing physicians from the cerebrovascular department and physicians from other medical departments, the gap in post-stroke health outcomes remains statistically significant, suggesting the role of disease-specific information rather than general medical knowledge in stroke survival and management.

Third, physicians were more likely to experience their first-ever stroke in lower severity than nonphysicians but spent substantially more on treating their first-ever stroke. In particular, physicians were more likely to treat their first-ever stroke in an outpatient setting rather than

through hospitalization, more likely to receive treatment in higher-tiered hospitals, and more likely to be treated by higher-quality physicians. These results imply a clear physician's information advantage in detecting and treating the first-ever stroke.

Our findings suggest that earlier detection of diseases, general and disease-specific information on disease treatment and management, and income-related health behaviors are three crucial factors that explain the persistent gap in chronic disease management between physicians and nonphysician patients.

The Impact of Care Continuity on Health Care Use and Costs: Evidence from Movers

PRESENTER: **Anna Nicolet**, Unisanté Lausanne, University of Lausanne
AUTHOR: Joachim Marti

Background and objective As healthcare expenditures continue to increase worldwide, strategies are needed to ensure healthcare is delivered in an efficient and sustainable way. Continuity of care (COC) reflects the stability of relationships between providers and patients and is associated with greater trust better overview of complex patient pathways, and potentially better use of healthcare resources. In this study, we use rich individual-level claims data to study the impact of COC on health care costs and exploit individuals moving to regions with greater COC in a quasi-experimental framework.

Methods We used data on 240'000 insured individuals aged 50+ for the period 2015-2018, obtained from one of the largest Swiss health insurance company. We use the Bice-Boxerman index of COC in primary care based on visits to general practitioners as our measure of COC. We focus on primary care as general practitioners often act as gatekeepers and are more likely to have a care coordination role. The main utilization outcome variables were visits to the healthcare providers, the number of healthcare providers, and number of annual hospitalizations. For costs, we focused on total healthcare costs reimbursed by basic health insurance, and such components as inpatient, ambulatory care and medication costs. To identify the causal effect of COC on utilization and costs, we exploit the fact that some individuals move across Medstat regions (i.e. statistical areas with typically 3'500 – 10'000 inhabitants) with different levels of COC.

Results COC varied from 0.86 to 0.92, while mean total costs varied from 9,768 CHF to 8,129 CHF (highest vs. lowest COC tercile). Results from differences-in-differences regression, controlling for age bins, calendar year fixed effects, fixed effects for years relative to move, morbidity status, deductible level, and type of insurance model provide evidence that moving to a region with higher COC reduced the healthcare utilization (e.g., 0.04 in annual hospitalizations, 0.23 in visits to primary care providers, 0.05 in number of unique providers). However, during the post-move years, there was an increase of 740 CHF in total costs, 159 CHF in medication costs, 703 CHF in ambulatory care costs, and decrease of 90 CHF in inpatient care costs.

Conclusions Our results provide additional evidence that better COC is associated with lower healthcare utilization– this is an especially important finding in a highly fragmented health care systems like Switzerland, and in view of upcoming policy discussions to implement generalized gatekeeping in the country. The increase in costs, observed right after the move was not surprising, as according to the event study design, the sharp rise within 1–2 years post-move could lead to a new equilibrium in the long-term. As COC is a multifaceted construct, future research and policy makers should obtain evidence not only on the longitudinal COC, covered in the current work, but also informational (e.g., electronic health records promotion) and interpersonal COC (established patient-provider relationships). The mechanisms behind the effects identified in this work should also be further investigated.

The Effect of Large-Scale Doctors' Turnover on Health Care in Low- and Middle-Income Countries - Quasi-Experimental Evidence from Brazil

PRESENTER: **Stefan Sliwa Ruiz**, University of Groningen
AUTHORS: Malte Becker, Rudi Rocha, Thomas Hone

This paper studies the effect of a large-scale doctor turnover on health care utilization, health outcomes, and the adaption of health care services in Brazil. We leverage a unique shock in Brazil's public primary care sector that led to the exit and replacement of more than 8,000 primary care doctors. Our identification relies on the variation in municipalities' exposure to the turnover and on the exogenous timing of the event. We document a significant and meaningful decrease in primary care utilization, especially with respect to chronic conditions: the most affected municipalities experienced a drop of more than 20\% in primary care consultations of chronic diseases, which persisted until the end of our sample period over a year later. However, we do not find evidence for immediate health detriments for the local populations as there are no effects on hospitalization and mortality. While primary care centers adopt to the turnover by de-prioritizing care for chronic conditions, patients seem to partly substitute primary care center treatments with higher emergency room visits. Overall, we argue that the exit and turnover of Cuban doctors resulted in a fragmentation of the Brazilian health care system, decreasing efficiency and exacerbating the burdens of chronic diseases in in the long term, particularly in rural municipalities.

1:30 PM –3:00 PM   MONDAY   [Economic Evaluation Of Health And Care Interventions]

Cape Town International Convention Centre | CTICC 2 – Orchid
Challenges of Antibiotic Resistence

MODERATOR: **Nichola Naylor**, London School of Hygiene & Tropical Medicine (LSHTM)

Assessing for Antimicrobial Resistance in Health Economic Evaluations: A Review of the Challenges and Opportunities of Economic Modelling

PRESENTER: **Nicolas Iragorri**, University of Toronto

Background: Antimicrobial resistance (AMR) poses a global threat to population health and healthcare systems. Economic evaluations allow for estimating health outcomes and costs associated with interventions and technologies that aim to mitigate the effect of AMR. However, evaluating this impact poses a challenge, mainly due to a lack of consensus on the associated costs and outcomes related to AMR.

Objective: This study seeks to review model-based health economic evaluations that have accounted for AMR, to identify the current challenges encountered and potential methods to overcome them.

Methods: We conducted a scoping review following the Arksey and O'Malley framework. We searched EMBASE (Excerpta Medical Database), MEDLINE, CINAHL, Econlit, Health Technology Assessment Database, and the NHS Economic Evaluation Database, from inception to September 31, 2022. We excluded reviews, burden-of-illness studies, and budget impact analyses. Included studies were model-based economic evaluations that considered AMR as a model input, an externality, a monetary or opportunity cost, or a direct/indirect outcome (primary or secondary). Challenges and methodological suggestions were narratively synthesized.

Results: A total of 5,299 records were identified. After the title and abstract search, 141 records were included for full-text review, of which 54 model-based economic evaluations were included in the review. The most commonly reported costs associated with AMR were avoidable screening, diagnosis, and treatment costs. Health outcomes included mortality rates, total resistant infections, and quality-adjusted life years. Modelling techniques included decision trees (n=18), Markov models (n=10), and dynamic transmission models (n=10). Thirty-six studies (67%) considered existing AMR as prevalence inputs (i.e., assumed constant through time). Sixteen studies (33%) incorporated acquired AMR as a time-varying outcome that depended on natural AMR emergence, treatment discontinuation, and disease-specific transmission rates.

Conclusions: Most economic evaluations failed to consider emerging or acquired resistance. If AMR is not conceptualized as a time-dependent phenomenon, the value of population-level and preventive interventions will likely be underestimated. Therefore, dynamic transmission modelling techniques are recommended to account for disease transmission, antibiotic consumption, and selection pressure and their effect on AMR through time. Additionally, the time horizon of the evaluations should span across multiple generations to appropriately capture the long-term threats of AMR. Finally, evaluations throughout multi-generation time horizons require extensive sensitivity analyses around the discount rates, to ensure that future outcomes associated with AMR are weighted appropriately.

Keywords: Antimicrobial resistance, community-acquired infections, economic evaluations, dynamic transmission models

The Value of New Antibiotic Treatment Strategies in Zhejiang Province, China

PRESENTER: **Yang Wenqianzi**, Zhejiang University
AUTHORS: Zhen Xuemei, Yang Danhong, Chen Yixi, Dong Peng, Amer Al-Taie, Dong Hengjin

Objectives The rising antimicrobial resistance (AMR) and the difficulty in developing new antibiotics are causing a global public health problem. This analysis aims to better understand the clinical and economic value of new antibiotic treatment strategies, in order to provide information for clinical and policy decision makers on antibiotic utilization.

Methods We applied a published and validated dynamic disease transmission and cost-effectiveness model of AMR with a 10-year time horizon and discount rate of 5% to evaluate the clinical and economic outcomes of introducing a new antibiotic, namely,Ceftazidime/Avibactam (CAZ-AVI) for treating AMR infections in Zhejiang Province, China. Together with piperacillin-tazobactam (pip/taz) and meropenem, we explored the impact of six treatment strategies and the population-wise health benefits across three common infections (complicated intra-abdominal infection (cIAI), hospital-acquired/ventilator-associated pneumonia (HAP/VAP) and infections with limited treatment options (LTO)), caused by three common pathogens (*Escherichia coli, Klebsiella spp., and Pseudomonas aeruginosa*). These treatment strategies included 1)current treatment strategy (pip/taz and meropenem, no CAZ-AVI), 2)CAZ-AVI at the third line, 3)CAZ-AVI at the second line, 4)CAZ-AVI at the first line, 5)first line diversity (i.e. equal pip/taz and CAZ-AVI at the first line; meropenem at last line) and 6)all-lines diversity (pip/taz, meropenem and CAZ-AVI used randomly and only once). The data with a total of 10,905 patients were collected from a tier-3 hospital from 2018 to 2021.

Results Under the current reatment strategy, the hospital length of stay (LOS) and costs over 10 years were estimated to be 1,588,763 days and £477,174,264, respectively, associated with 142,999 quality-adjusted life-years (QALYs) lost, resulting in the resistance of pip/taz and meropenem being 41.97% and 49.90% respectively. In contrast, the other five treatment strategies all have shown improved outcomes, among which the "all-lines diversity" carried the greatest benefit, saving £201.49 for each additional QALY gained. with the net monetary benefit being £3,026,817,615.

Conclusions Introducing CAZ-AVI had positive impact on clinical and economic outcomes for treating AMR, and diversifying the antibiotics early might yield the best benefits.

Optimizing Antibiotics Consumption in Low-Income Countries: A Field Experiment Among Community Pharmacies in Nepal

PRESENTER: **Prajwol Nepal**, University of North Carolina

AUTHOR: Yubraj Acharya

Background. Antimicrobial resistance (AMR) is a major threat to global health associated with an estimated 4.95 million deaths in 2019. In low-income countries, a key driver of AMR is the easy access to antibiotics without prescription from community pharmacies and the resulting overconsumption of antibiotics. Interventions to optimize the dispensing of antibiotics by community pharmacies—in a manner that only needy patients receive it—are critically needed. These interventions may involve addressing demand-side pressure from patients. However, the effect of demand pressure on pharmacists' dispensing behavior has not been rigorously documented. Using a randomized controlled trial (RCT) involving standardized patients (SPs), we assessed the effect of three interventions (two targeted to pharmacies and one to patients) on pharmacies' antibiotics dispensing behavior in Nepal.

Methods. We provided training on AMR to a random sample of pharmacies in Kathmandu. Following the training, incognito SPs visited the pharmacies acting as a parent of an under-five child with a non-severe, viral case of either diarrhea or upper respiratory tract infection (URTI). The SPs presented the case, answered any follow-up questions, and recorded whether the pharmacy provided an antibiotic (primary outcome; binary) and the number of follow-up questions the pharmacist asked and the time spent at the pharmacy (secondary outcomes; continuous). We varied demand pressure by having the SPs ask either for "some medicine" (low pressure) or for "an antibiotic" (high pressure), allowing us to assess the effect of demand pressure.

At the pharmacy level, we randomly assigned the pharmacies to one of three arms: (1) a control arm; (2) a feedback arm, in which pharmacies received customized feedback on their antibiotics dispensing rates based on a baseline survey; and (3) a social commitment arm, in which pharmacies signed a pledge to dispense antibiotics only with prescription; and received a certificate attesting to their role as "AMR Champions". These setting-customized interventions were designed together with local stakeholders based on our previous studies which identified the need for feedback and social recognition as critical determinants of pharmacies' behavior.

Key Findings. Our analytic sample consisted of 427 SP-pharmacy interactions (112 pharmacies x 4 SPs). The pharmacies provided antibiotics in 92% and 19% of SP visits for diarrhea and URTI, respectively. In 41% visits, the pharmacies gave antibiotics without asking *any* follow-up question and the SP-pharmacist interactions exceeded one minute in only 48% of visits. Overall, pharmacies were 15 percentage points (pp) more likely to dispense antibiotics under the high demand pressure scenario (*p*<0.001). The effect of demand pressure was higher for URTI (35 pp, *p*<0.001) than for diarrhea (6 pp, *p*=0.56). Among the pharmacy-level interventions, feedback yielded a suggestive 8 pp reduction in dispensing rates (p=0.06), while the social commitment intervention was ineffective.

Policy implications. Inappropriate dispensing of antibiotics is extraordinarily high in Nepal. Pressure from patients increases such dispensing, pointing to the need for population-based interventions. Customized feedback to pharmacies on dispensing behavior can also be effective. Further research is needed on potential complementarities between community-based and pharmacy level interventions.

Cost and Cost-Effectiveness of [^{18}F]FDG-PET-CT Compared with CT for Persistent or Recurrentneutropenic Fever in High-Risk Patients

PRESENTER: **Kim Dalziel**, The University of Melbourne

AUTHORS: Michelle Tew, Abby Douglas, Jeff Szer, Ashish Bajel, Simon Harrison, Shio Yen Tio, Leon Worth, Rodney Hicks, David Ritchie, Monica Slavin, Karin Thursky

Background

A recent multicentre randomised trial (the PIPPIN study) demonstrated that, compared to standard of care computed tomography (CT) imaging, 18F-fluorodeoxyglucose positron-emission tomography in combination with low dose computed tomography (FDG-PET/CT) was associated with a higher rate of rationalisation of broad-spectrum antimicrobials to narrower spectrum or no agents in high-risk patients with persistent and recurrent neutropenic fever. Demonstrated cost effectiveness would provide important supportive evidence to convince decision makers of the value of expanding the use of FDG-PET/CT as a diagnostic tool for this high-risk population. We conducted an economic evaluation from a health care perspective alongside the clinical trial comparing between the FDG-PET/CT group and standard CT group from randomised scan up to a follow-up time of 6 months.

Methods

Case report forms were used to collect resource utilisation data (antimicrobials administered, blood cultures, diagnostic biopsies, bronchoscopies, radiologic procedures) and hospitalisation duration. All resources were costed based on unit costs retrieved from as the literature for neutropenic fever hospitalisation costs episodes and Australia's Medicare Benefits Schedule.

Effectiveness was measured as number of patients with antimicrobial rationalisation and quality-adjusted life years (QALYs) derived from patient-reported trial-based health-related quality-of-life. Generalised linear models (GLM) were used to analyse costs and outcomes. Incremental cost-effectiveness ratios (ICERs) were calculated between the two cohorts as the mean cost difference between the two cohorts divided by the difference in outcomes. The ICER can be interpreted as the cost per patient with additional antimicrobial rationalisation and cost per QALY gained. To account for sampling, we performed bootstrapping with 1000 replications using the recycled predictions method.

Results

On average, patients in the FDG-PET/CT group had a smaller number of diagnostic imaging, invasive diagnostic and microbiology pathology tests. ICU admission and hospitalisation costs were the main contributors to the total cost, costing $49,354 [SD 58,054] and $52,689 [SD 51,167] in the FDG-PET/CT and standard CT groups, respectively. The adjusted health care costs were lower in the FDG-PET/CT group (mean $49,563; 95%CI 36,867, 65,133) compared to the standard CT group (mean $57,574; 95% CI 44,837, 73,347). The magnitude of differences in QALYs between the two groups was small (0.001; 95% CI -0.001, -0.001). When simulated 1000 times, our analysis showed that across both outcomes FDG-PET/CT was the dominant strategy as was cheaper and had better outcomes than the standard CT group in 74% of simulations.

Conclusions

FDG-PET/CT is cost effective when compared to standard of care CT for investigation of persistent/recurrent neutropenic fever in high-risk patients. This analysis should provide further support for incorporation of FDG-PET/CT into clinical guidelines and for decision makers to support funding.

1:30 PM –3:00 PM   MONDAY   [Health Care Financing & Expenditures]

Cape Town International Convention Centre | CTICC 1 – Room 2.63

How Are Countries Overcoming Barriers to Achieve UHC? [FINANCING FOR UHC SIG]

MODERATOR: **Christabell Abewe**, World Health Organization

Impact of Mobile Phone Renewal Option on Enrolment on National Health Insurance Scheme in Ghana

PRESENTER: **Eugenia Amporfu**, University of Cape Town

Abstract

Ghana introduced the National Health Insurance Scheme (NHIS), as the healthcare purchasing tool, in 2003 to provide financial protection to its population. The percentage of population that was covered by the NHIS stood at 40 for many years, implying that millions of Ghanaians were not benefiting from the services of the NHIS. Besides, increasing the number of beneficiaries on the scheme is important for the sustainability of the scheme as it ensures cross subsidization between the low risk and the high risk as well as between the rich and the poor. Thus, the sustainability of the NHIS depends largely on continuous enrolment on the scheme. For this reason, Ghana's National Health Insurance Authority (NHIA) introduced Mobile Phone Membership Renewal Option (MPRO) in 2018. However, there has not been any independent study to evaluate the impact of the MPRO on the coverage of the NHIS. The objective of this study is to examine the impact of MPRO on enrolment on NHIS in Ghana.

Methodology

The study collected data from NHIS members and Non-NHIS members in Greater Accra Region, Ashanti Region and Northern Region. The study administered questionnaire to 840 non-NHIS members and 612 NHIS members. The treatment group was those enrolled prior to introduction of MPRO in 2018 and otherwise, control group. MPRO was coded as 1 for Pre-2018 was 0 for post -2018. The questionnaire was reliable with overall Cronbach's alpha of 0.776 and was valid based on content validity via expert views. The estimation was done with Difference-in-Difference (DID) technique. To obtain a more efficient results, this study controlled for age, gender, educational attainment, location or place of residence, employment status, household monthly expenditure, and household Size of the respondents. All the diagnostic test of DID such as parallel trend and counterfactual assumptions were satisfied.

Results

The introduction of MPRO has improved enrolment in NHIS by 25 percent. Disaggregation across the three regions shows increase in enrolment by 23 percent, 21.2 percent, 31.8 percent in Greater Accra Region, Ashanti Region and Northern Region respectively. Enrollment in rural and urban communities has increased by 27.4 percent and 25.2 percent respectively.

Conclusion

National Health Insurance Authority should sustain the Mobile Phone Registration Option through regular mass education and service innovation. Much attention should be given to intensive mass education about benefits of MPRO in rural and undeveloped communities.

Subjective Strain and Role of Medical Loan Accumulation Among Breast Cancer Patients: A Study from a Public Tertiary Cancer Center in Mumbai, India

PRESENTER: **Soumendu Sen**, International Institute for Population Sciences

AUTHORS: Sanjay K Mohanty, Tabassum Wadasadawala

Background

Breast cancer is the most common malignancy among women in India. The financial consequences of a cancer patient are hazardous in nature. Due to the high cost of treatment and lower coverage of health insurance in India, cancer patients often face high catastrophic health expenditures along with high out-of-pocket payments. Cancer patients working before the diagnosis, have to resign or have to take extended leave from their current employment. Previous studies revealed that cancer patients and survivors due to their deteriorated financial as well as health conditions, fall into debt and are often forced to borrow money and seek financial help, sell their assets, liquidate their savings to finance their healthcare costs. To our knowledge, no studies have ever examined the intensity of medical debt of cancer patients in India using empirical datasets. This study aims to provide a comprehensive scenario of debt and loans taken for cancer treatment and its role in incurring subjective strain among cancer affected households in India.

Data and Methods

The study used primary data from 500 breast cancer patients seeking treatment at the country's largest cancer treatment facility, Tata Memorial Hospital (TMH), Mumbai from June 2019 to July 2021. The study has obtained approval from the institutional ethics committee of the TMH and is registered on the Clinical Trial Registry of India (CTRI/2019/07/020142). First, this study predicts the mean amount of loan and socio-economic variation of loan amount by using two-part model. Second, the study used subjective strain as another outcome variable and ordered logistic regression was employed to get the significant predictors.

Results

More than half of the patients (54.5%) experienced subjective strain following a cancer diagnosis. The subjective strain was significantly higher among patients with younger age (<45 years), belonged to rural and slum areas, were diagnosed with cancer for more than two months, had no health insurance, travelled more than 2000 kilometers to get treatment at TMH. Factors significantly associated with increased subjective strain were older patients (OR: 1.64; 95% CI:1.08-2.48), patients taken any loan (OR: 2.36; 95% CI: 1.52-3.68), travelled more than 2000 km (OR: 3.08; 95% CI: 1.60-5.91). On the other hand, approximately two in five breast cancer patients had taken any loan for their treatment. The predicted amount of loan was higher among advanced stage patients (for stage III- $1506 & stage-IV-$1424), belonged to urban area ($1623), had higher education attainment ($1865). The significant predictors of availing loan were patients with no education level (OR:2.18; 95% CI: 1.06-4.51), travelled distance more than 500 kms (OR:2.59; 95% CI: 0.97-6.9) and over 2000 kms (OR: 2.91; 95% CI:1.5-8.49) and had higher stage of cancer (for stage III- OR:1.75; 95% CI:1.12-2.72 and for stage IV- OR: 2.4; 95% CI:1.25-5.89).

Conclusion

Cancer related subjective strain is very common among breast cancer patients. Breast cancer screening initiative is strongly recommended as early stage is associated with lower subjective strain. These findings from the study will help inform targeted measures across the health care systems and patients to alleviate the financial hardship.

Does Development Assistance for Health Matter to Financial Risk Protection? An Analysis across 159 Household Surveys, 2000-2016

PRESENTER: **Jacopo Gabani**, University of York
AUTHORS: Marc Suhrcke, Sven Neelsen, Patrick Eozenou, Marc-Francois Smitz

ABSTRACT

INTRODUCTION: Universal Health Coverage (UHC) is a widely accepted objective among entities providing development assistance for health (DAH) and DAH recipient governments. One key metric to assess progress with UHC is financial risk protection, but evidence on the extent to which DAH promotes financial risk protection (and hence UHC) is scarce.

METHODS: Our sample is comprised of 65 countries whose DAH per capita is above the population -weighted average DAH per capita across all countries. The sample comprises a total of 1.7 million household level observations, for the period 2000-2016. We run country and year fixed effects regressions, and pseudo-panel models, to assess the association between DAH and three financial risk protection measures: catastrophic health expenditure (defined as out-of-pocket health expenditures larger than 10% of total household expenditures ['CHE10%']), out-of-pocket health expenditure as a share of total expenditure ('OOP%'), and impoverishment due to health expenditures, at the 1.90 US$ per day poverty line ('IMP190').

RESULTS: Overall, DAH investment does not appear to be significantly associated with financial risk protection outcomes. However, in both fixed effects and pseudo-panels regressions, a 1 US$ increase in DAH per capita improves at least one financial risk protection outcome for the poorest household quintile within countries (IMP190: -0.05 percentage points, p<0.1; in pseudo panel models, CHE10%: -0.12 percentage points, p<0.01). DAH also improves most financial risk protection outcomes when it is largely channelled via government systems (i.e., when it is "on-budget") (CHE10%: -0.68 percentage points, p<0.05; in pseudo-panel models, CHE10%: -0.14 percentage points, p<0.01). Several robustness checks confirm these results.

DISCUSSION: DAH investments require careful planning to improve financial risk protection. For example, positive DAH effects for the poorest quintiles of the population might be driven by DAH targeting poorer populations health expenditures and doing so effectively. Our

results also suggest that channelling more resources via governments might be considered as a promising avenue to enhance the positive impact of DAH on financial risk protection.

Attempt Re-Examine Universal Health Coverage Financed By Income Tax Revenues in Côte d'Ivoire

PRESENTER: **Olivier Zohore Koudou**, University Félix Houphouët Boigny of Abidjan Côte d'Ivoire

Background: After the return to political stability and peace in 2012, universal health coverage (UHC) has been an area of focus for the government and the private sector alike in Côte d'Ivoire. Given that resource-poor people cannot afford out-of-pocket health expenditures, or can pay for them only by sacrificing other priorities, a health financing system under which people are required to pay for use directly is one of the major barriers to reaching UHC. Although cost sharing is necessary to prevent the overutilization of health services arising from the potential problem of moral hazard, universal coverage is more likely to be reached when the out-of-pocket ratio for direct payment is sufficiently low.

Objective: Our paper studies the impact of tax-financed universal health coverage schemes on macroeconomic aspects of labor supply, asset holding, inequality, and welfare, while taking into account features common to developing economies, such as informal employment and tax avoidance, by constructing a dynamic stochastic general equilibrium model with heterogeneous agents. Agents have different education levels, employment statuses, and idiosyncratic shocks. This paper tries to fill the research gap by exploring the following questions. First, what is the impact on individuals in terms of their optimal decisions for labor supply and asset holdings? Second, what are the impacts on inequality and social welfare? Third, what are the different impacts at both the aggregate and disaggregate levels?

Methods: To quantitatively answer these questions, the paper adopts a modern dynamic stochastic general equilibrium framework, which is being increasingly used for the study of social security and public finance. Broadly, the paper aims to provide a rigid framework for evaluating such socioeconomic policies that can help policy makers to understand the impacts across different social groups, as well as the aggregated outcomes.

Result/conclusion: Given three tax financing options, calibration results based on the Ivorian economy suggest that the financing options matter for outcomes both at the aggregate and disaggregate levels. Universal health coverage, financed by labor income tax revenue, could reduce inequality due to its large redistributive role. Social welfare cannot be improved when labor decisions are endogenous and distortions are higher than the redistributive gains for all tax financing options. In the absence of labor supply choice, mild welfare gains are found. In a broader sense, the paper aims to provide a frame for policy evaluation of socioeconomic policies from both macro and micro perspectives, taking different social groups into consideration.

1:30 PM –3:00 PM   MONDAY   [Health Beyond Health Care Services: Social And Related Determinants]

Cape Town International Convention Centre | CTICC 1 – Room 2.61-2.62
Adverse/Significant Life Events

MODERATOR: **Aisha Moolla**, The SAMRC/Wits Centre for Health Economics and Decision Science (PRICELESS SA)

Does a Higher Minimum Wage Reduce Inequalities in Mental and Physical Health

PRESENTER: **Heather Brown**, Lancaster University

Background: Poverty is a major contributing factor to poor health leading to increased morbidity and mortality. The circumstances in which a person grows up, lives, and works can have a profound effect on their current and future health and prosperity. There is a strong socioeconomic gradient in both life expectancy and healthy life expectancy. In-work poverty has been on the rise in the UK. Between 2004/2005 and 2014/15 the percentage of households in poverty where at least one person was working grew from 12.4% to 15.7%. Factors which have contributed to this rise include high costs of rental housing and changes to the social security system specifically the rollout of Universal Credit. The UK has higher than average inequalities in health as measured by life expectancy compared to other countries in the OECD. To tackle low pay, in 1998 the National Minimum Wage Act set the first national minimum wage in the UK which came into force in April 1999. In 2016, the government introduced the National Living Wage, a higher wage floor for over-25s with a stated goal to reach 60% of median earnings by 2020. However, this wage does not account for the cost of living. The voluntary Living Wage, often referred to as the Real Living Wage and promoted by the Living Wage Foundation, is based on the wage needed for people to meet daily costs of living such as purchasing food or emergency expenditures such as a new washing machine or a broken boiler. To date there is a gap in the evidence on how these different wage floors are associated with inequalities in health.

Aim: I investigate inequalities in mental and physical health by pay. Differences by wage floors (e.g. Minimum Wage, National Living Wages) and by individual characteristics are explored.

Method: Data is used from the British Household Panel Survey from 1999 (when a minimum wage was first introduced) to 2008. We then use the successor survey Understanding Society from 2009 to 2020. An interrupted time series approach is employed to explore how introduction of different wage floors (Real living wage from 2011/12, National living wage from 2015) impact on inequalities in mental and physical health measured by the SF-12 between those in receipt of minimum wage, those receiving a 100-120% of the minimum wage, and

those in the top 20% of income earners. Differences by marital status, number and age of children, educational attainment, occupation, region.

Preliminary Results: Preliminary results suggest that inequalities in mental health in particular decrease with a higher minimum wage. Higher minimum wages reduce inequalities for single mothers and those with dependent children.

Conclusions/Next Steps: Understanding how different wage floors impact on health on average and for specific population groups is important for developing future policy including social security policy to reduce health inequalities and improve productivity. These findings may be generalizable across many high-income countries

Intimate Partner Violence and Children's Health Outcomes

PRESENTER: **Mireia Jofre-Bonet**, Office of Health Economics
AUTHORS: Victoria Serra-Sastre, Melcior Rossello-Roig

In this paper, we study whether there are spillover effects of l Intimate Partner Violence (IPV) on children's health. We use data from the Millennium Cohort Study (MCS), a survey following nearly 19,000 children born in the UK in 2000-2001 that includes information on mothers' being subject to IPV. We use waves 3, 4 and 5 of the MCS when children were aged 5, 7 and 11. Our sample includes all children for whom the main respondent was the biological mother, representing approximately 80% of the sample. We control for the child's characteristics (age, gender, low birth weight and BMI), maternal-related variables (age, education, ethnicity, employment, marital status and health) and household variables (number of people living in the household, living in a council house and income). We first use the sample with all households and then restrict the sample to those families where both biological parents cohabit. This allows assessing whether the effect varies according to family structure. Results suggest that living in a violent domestic environment has negative externalities on a child's health. Children witnessing IPV are 5 percentage points less likely to have excellent health. These findings are robust to the definition of IPV and the sample used.

The Aftermath of Crime: Indirect Exposure to Homicides, Maternal Stress, and Newborn's Health

PRESENTER: **Bernard Moscoso**, CIEC - Espol Polytechnic University, Escuela Superior Politécnica del Litoral

The aftermath of crime: Indirect exposure to homicides, maternal stress, and newborn's health

Direct exposure to violence has been associated with severe damage to fetus health conditions including birth weight, preterm incidence, cognitive capacity, and negative neurodevelopmental consequences (WHO, 2013; IACHR, 2019; Walsh et al., 2019). However, little is known about how maternal stress and fear generated by violent crimes can damage fetal health. The objective of this paper is to examine the indirect effects of violent crimes on newborns' health in Ecuador. For this, I explore whether the indirect exposure of a mother to homicides during pregnancy can affect newborn health outcomes.

I combine the newborns registry, which contains mothers' home address during pregnancy, and the national homicides registry, which contains geographical coordinates of homicides that occurred in Ecuador, both for the years 2015 to 2017. In this period, nearly 200,000 newborns were born to mothers living within 1 kilometer of recorded homicides. To deal with endogeneity with respect to crime exposure, I employ a difference-in-differences specification that compares the difference between being exposed or not exposed to a homicide during pregnancy, relative to being exposed or not exposed to a homicide within the 9 months following the birth of the newborn. This approach enhances the comparability among treated and controlled group of mothers, assuming that the determinants of crime occurring in the mothers' surroundings are similar for treated and comparison groups. The second identification strategy considers a sub-sample of mothers (nearly 10% of all mothers) that had more than one child during the period 2015 to 2017 and controls for the maternal fixed effects.

The results show that exposure to homicides during pregnancy generates a birth weight deficit of 20 grams, compared to newborns exposed to homicides post-pregnancy, across mothers living in municipalities where homicides are not frequent. Moreover, once controlled by the maternal fixed effects, I find that newborns exposed to homicides have a birth weight deficit of up to 101 grams, compared to their non-exposed siblings. Additional analysis shows that the health effect of indirect exposure to homicides is attenuated in the case of mothers that were exposed to other episodes of violence before the pregnancy. In particular, the effect size is reduced by nearly 2.1%, suggesting that mothers exposed to violence before pregnancy were in a better position to deal with this emotional shock.

These results confirm the hypothesis that maternal stress, due to the presence of homicides in the mother's surroundings, impairs negative effect on newborn's health at birth. This result is statistically significant when estimating the effect among those living in a neighborhood where the frequency of homicides is infrequent. The hypothesis of attenuation effects when mothers are frequently exposed to violence in the past is confirmed, in which mothers exposed to violence before pregnancy cope with the stress generated by homicides during pregnancy. Overall, results obtained in this research highlights that social and health policies should take advantage of mother's ability to cope with stress, through the establishment of maternal health services.

Marriage Market Induced Health Investments in Women: Evidence from a Regression Discontinuity Design in India

PRESENTER: **Khalid Imran**, University of Cologne
AUTHORS: Johannes Schmieden, Daniel Wiesen

As a tool for fighting against child marriage, most countries have set a legal age for marriage which has successfully reduced its incidence. These laws are implemented strictly, and most parents wait to reach their daughter at the legal marriage age to avoid legal complications. So, individuals enter the marriage market for the first time at the legal marriage age set by the government. The entrance to the marriage market is assumed to greatly impact an individual's socioeconomic, physical, and mental condition. As healthy women have higher demand than malnourished ones in the marriage market, parents may take special care just before entering that market. We studied the research question concerning whether there is a marriage market-induced health investment in female health when they enter to the marriage market. We investigate how the common health indicators differ immediately before and after unmarried women reach the legal marriage age. We tried to capture how smooth health investment is in women's lives and whether they need external financial intervention to support their health needs at any point. Using the unmarried sample (17 to 19 years) from the Indian demographic and health survey(DHS)-2019/20 and employing the regression discontinuity method, we found evidence in favor of our hypothesis that there is a marriage market-induced health investment in Indian women. Our cut-off is the age of legal marriage, which was 18 during the survey period. Our regression discontinuity estimate shows that the body mass index is significantly 0.381 higher for those women who have just reached the marriage market than those who have not got there yet. We found this jump in BMI is also significant for the rural and non-rich samples. We found positive and significantly higher hip and arm circumferences for those who entered the marriage market. The blood glucose level is higher when our women enter the marriage market, but it is only significant for the urban sample. We found a significant reduction in blood hemoglobin levels for the non-rich sample to the right side of the cut-off or the age of the marriage market entrance. Our study contributes to the literature of health economics concerning women's health at the legal marriage age. It has high policy relevance as two of the world's most populous developing countries, India and Indonesia, have recently altered their legal marriage age for women. After this change, unmarried women will stay longer years at home, and marriage market-induced health investment will happen more lately in her life. Given the high rates of malnutrition and the trend of early marriage in the developing world, it is unclear if adequate attention is paid to women's nutritional and health needs, particularly in the years before marriage. The government should introduce programs that smooth the health investment and break the marriage market-induced investment in women's life.

1:30 PM –3:00 PM   MONDAY   [Supply And Regulation Of Health Care Services And Products]

Cape Town International Convention Centre | CTICC 1 – Room 2.41-2.42

The Economics of Telehealth Platforms in Low- and Middle-Income Countries: Adoption, Provider Choice, and Health Effects

MODERATOR: **Nicholas Stacey**, SAMRC Centre for Health Economics and Decision Science - PRICELESS SA

DISCUSSANT: **Catherine Goodman**, London School of Hygiene & Tropical Medicine (LSHTM); **Manoj Mohanan**, Duke University

The Impact of a Large-Scale Telemedicine Platform on Covid Outcomes in India

PRESENTER: **Karishma D'souza**, University of North Carolina Chapel Hill

Anecdotally, telemedicine played an important role during the Covid-19 pandemic by increasing access to medical consultations and other services. Yet, quantitative evidence on the impact of telemedicine platforms on population-level Covid outcomes is limited. In this study, we sought to estimate the effect of Project StepOne – a large-scale telemedicine platform providing Covid-specific care in India during the pandemic – on Covid case counts and fatality rates across the states in which they operated. StepOne leveraged a network of volunteer doctors, paramedics, and non-doctor volunteers, to provide Covid telehealth consultations. Through partnerships with state and local governments, StepOne provided need-based triaging of Covid positive patients across home isolation, Covid care centers (government created centers for isolation), and hospitals based to reduce the burden on an overstretched healthcare system. To identify the causal effects of the program, we use a difference-in-difference approach using variation in the growth of StepOne over time and across geographic regions. We find that the program had a statistically significant effect on covid case counts.
Technology innovation enabled StepOne, a low-cost, non-profit, telemedicine platform that emerged during Covid to address the Covid induced surge in healthcare demand. StepOne provides an ideal setting for the study of telemedicine as it allows for the evaluation of a large-scale network, with a focused agenda (Covid care) that can be tied to specific and clear health outcomes that go beyond healthcare utilization. The evaluation of StepOne will provide evidence on the feasibility of a volunteer telemedicine network in supplementing the health care system during large scale health crises. The low cost, flexibility, and ease of assembling StepOne may also make it a relevant model for not just future pandemics but also other large public health emergencies, such as natural disasters where telemedicine might be applicable.

Performance Incentives and Demand-Side Marketing to Promote Technology Adoption in Healthcare

PRESENTER: **Sean Sylvia**, University of North Carolina at Chapel Hill

The adoption of new technologies within health systems is often restricted by path dependance and existing incentives facing healthcare providers misaligned with adoption. We conducted a randomized trial to evaluate approaches to encourage the use of a suite of digital health tools among village doctors in rural China. A government pilot program provided village doctors with equipment and training to access a digital health platform allowing them to consult urban physicians on patient cases via telemedicine and use an AI-based diagnostic support tool. Despite large-scale investment in the program, use by village doctors was minimal in an initial phase. Working with the public health system, we designed a randomized trial across 144 villages to test the effectiveness of two approaches to encourage take-up. Villages were randomly assigned to a pure control group or one of four treatment groups: 1) training and platform access ("access") only; 2) access +

monetary incentives which paid village doctors a fixed capitation fee for each patient visit for which they used the platform; 3) access + demand-side marketing in which an information campaign provided information to village residents of the new "digital kiosk" program available at the clinic; and 4) access + the combination of both incentives and demand-side marketing. We find that monetary incentives and demand-side marketing alone had little effect on uptake, while incentives combined with demand-side marketing moderately increased utilization on average. There was little evidence of short-run effects of any approach on health outcomes or costs.

Provider Choice and User Willingness to Pay for Telehealth Care

PRESENTER: **Nicholas Stacey**, SAMRC Centre for Health Economics and Decision Science - PRICELESS SA

Private telehealth services have emerged in South Africa as in many other settings in the wake of the COVID crisis. The sustainability and eventual impact of these services remains to be determined. Their eventual role will be determined by user demand and valuation of the care offered. Given the importance of relationship between provider and patient, how patients choose or are matched with providers could have significant impacts on demand for these services. However, how patients are matched to providers also has significant implications for the scheduling of consultations and contracting of providers on these platforms. To investigate this issue, we conduct a survey experiment among potential users of private telehealth platforms. We randomize respondents to one of 3 treatments varying the mode of choice of provider. In the first treatment respondents are offered a voucher where no information on doctors is provided. In the second treatment, respondents are offered a voucher where a list of available doctors is provided. In the third treatment, respondents are offered a voucher where they are provided with a list of available doctors ranked based on their rating of a set of hypothetical doctor profiles. Respondents' willingness-to-pay for their respective vouchers is elicited by an incentivized multiple price list exercise. We do not find significant differences in willingness-to-pay across mode of choice. This suggests that demand for telehealth care is less sensitive to provider choice model, and that the aggregate characteristics of telehealth care may be more important than the specific provider consulted with.

1:30 PM –3:00 PM   MONDAY   [Health System Performance]

Cape Town International Convention Centre | CTICC 1 – Room 1.44

Investing Efficiently in Primary Health Care: Lessons from Mixed-Methods Analyses in Five Low- and Middle-Income Countries [HEALTH SYSTEMS' EFFICIENCY SIG]

MODERATOR: **Anna Vassall**, London School of Hygiene & Tropical Medicine (LSHTM)

ORGANIZER: **Fiammetta Bozzani**, London School of Hygiene & Tropical Medicine (LSHTM)

DISCUSSANT: **Felix Masiye**, University of Zambia; **Genevieve Aryeetey**, University of Ghana; **Edwine Barasa**, KEMRI Wellcome Trust Research Programme,Nairobi

Defining Efficient Performance in Primary Health Care – Lessons from the Selection of Country 'Exemplars'

PRESENTER: **Fiammetta Bozzani**, London School of Hygiene & Tropical Medicine (LSHTM)
AUTHORS: Edwine Barasa, Anna Vassall

The Exemplars in Primary Health Care (PHC) study aims to identify the drivers of efficient performance in positive outlier countries (the 'exemplars'), that have achieved and/or sustained higher levels of improvement in PHC outcome indicators per unit of spend compared to other low- and middle-income countries (LIMICs). We sought to develop an approach based on routine data that accounts for multiple decision-making criteria and amenable to deriving transferable lesson.

Performance improvement and health expenditure were analysed over the period from the year 2000 to 2018. Exemplar countries were shortlisted for inclusion using a multi-stage approach, with each stage reflecting different selection criteria. In the first stage, all countries classified as LIMICs in the year 2000 were ranked according to their technical efficiency as an indicator of overall health system performance. A stochastic frontier analysis was carried out, regressing a published metric of health services coverage, the Universal Health Care Effective Coverage Index, against total health expenditure (THE) and the 60 countries with the smallest gap to the frontier in 2018 were retained. In the second stage, the analysis was restricted to the tracer PHC outcome measures included in the coverage index: three doses of the diphtheria-tetanus-pertussis vaccine; family planning demand met with modern methods; four antenatal visits; tuberculosis mortality-incidence ratio and lower respiratory tract infection mortality-incidence ratio in children under the age of five. The measures were regressed against THE and countries in the bottom quartile of regression residuals for at least three indicators were excluded. In the third stage, we assessed the equity of PHC performance by excluding countries in the bottom quartile of out-of-pocket expenditure as a proportion of THE and of a published index of inequality in childhood immunisation coverage. In the final stage, we focused on the applicability of findings to a wide range of settings, and excluded countries with a population under 5 million, THE per capita above US$800 (PPP), under-5 mortality rate below 60 per 1,000 live births and in the bottom quartile for the voice, accountability and corruption indices published by the World Bank.

A stratified sampling algorithm was developed to select five exemplars out of the final shortlist of 24. Countries were first grouped according to their trajectory over time towards the efficiency frontier into: (a) countries that sustained performance by increasing THE; (b) countries that improved performance by increasing THE; (c) countries that improved performance despite constant or fluctuating THE. Exemplars were selected to have a representative range of improvement trajectories, geographical regions and levels of THE per capita. The final selection included Zambia, Bangladesh, Ghana, Rwanda and Peru.

Using System Dynamics Modelling to Unpack Drivers of Primary Care Efficiency at National Level in Peru

PRESENTER: **Andres Madriz-Montero**, London School of Hygiene and Tropical Medicine

Mixed-methods analyses of the published literature, policy documents, key informant interviews and time series performance and resource use data are a common approach for identifying the interventions and sub-systems that drive health system performance, efficiency and equity at the national level. In addition to identifying drivers, the Exemplars in Primary Health Care (PHC) study sought to understand the sequencing of investments over time and the dynamic interactions leading to impact, in order to derive transferable lessons.

The study used Group Model Building (GMB), a qualitative system dynamics modelling technique for mapping system complexity, to generate hypotheses around the pathways of action through which reforms and interventions identified using mixed methods improved PHC system performance. This presentation will describe the approach and results from Peru, where GMB activities took place over two days of workshops held in Lima in October 2022. Participants included national-level PHC stakeholders (Ministry of Health officials, academics, international institutions representatives) on the first day; and sub-national and service-level stakeholders (health department directors and service providers) on the second day. During the workshops, stakeholders were asked to create a timeline of the key reforms and interventions in the PHC space over time, to validate results of our mixed-methods analysis. Causal loop diagrams (CLD) depicting the system and its complex interactions were then elaborated, highlighting the feedback loops leading to improved performance. Finally, the key reforms and interventions from the timeline were nested onto the CLDs to generate hypotheses on their mechanisms of action. Scripts were developed based on best practices for structured and standardized GMB sessions. The CLDs were processed using Vensim software and merged into a single model that was validated at a follow-up virtual meeting with all stakeholders.

The GMB exercise was guided by the WHO's PHC monitoring framework, that was used to interpret results. In Peru, feedback loops improving system performance were found in the areas of:

- **Governance**, where political commitment, multi-sectoral targets and coordination, and citizen empowerment and advocacy contributed to the prioritization of PHC;
- **Information systems**, where data availability enabled strategic planning and linking financing to performance;
- **Financing**, where a focus on equity and financial protection increased access to health care, and financial incentives improved human resources retention.

Key reforms and interventions that operated through these mechanisms included the comprehensive and social health insurance schemes (SIS and AUS); conditional cash transfers covering basic child health services and nutrition (JUNTOS); performance-based budgetary programs across the health sector; and annual national surveys.

The reforms and interventions in PHC in Peru evolved over time, interacting with one another and changing in response to modified circumstances. The use of system dynamics modelling enabled us to begin untangling these complex relationships over time to identify patterns and mechanisms that may be applicable in other settings.

Econometrics and Qualitative Analyses to Unpack Drivers of Efficiency at the District Level in Rwanda

PRESENTER: **Beatrice Amboko**, KEMRI Wellcome Trust Research Program

AUTHOR: Rose Nabi Deborah Karimi Muthuri

Attaining Universal Health Coverage (UHC) requires understanding the drivers of efficient performance within a health system. The Exemplars in Primary Care (PHC) study employed a mixed-methods approach, including desk reviewes, key informant interviews and descriptive time series data analyses, to identify key reforms and interventions in the PHC space over time. Qualitative system dynamics modelling was then used to generate hypotheses around their pathways of action, to understand how investments over time improved efficient performance at the national level. In this presentation, we will describe how these hypotheses were validated using district level data through econometric and qualitative analyses, focusing on the work in Rwanda as a case study.

Firstly, we investigated the level and drivers of district health system technical efficiency in all 30 districts in Rwanda using a stochastic frontier analysis (SFA). A composite coverage index (CII) was computed using data from all districts across 10 coverage indicators: modern family planning methods, four antenatal care visits, skilled birth attendance, second dose of measles vaccination, Bacille Clamette-Guerin vaccination, third dose of diphtheria-tetanus-pertussis vaccination, oral rehydration solution usage, care-seeking for childhood fever, tuberculosis treatment success and insecticide-treated bednets usage for children under 5. Subsequently, we computed the technical efficiency scores for each district, based on the CII and four input variables: number of health facilities, clinical and non-clinical staff, and total health expenditure. After ranking districts based on technical efficiency, tobit regression was used to identify the drivers. Finally, two of the top performing districts (the 'exemplars') were matched to two districts with lower technical efficiency scores (the comparators). The four districts were visited to collect quantitative and qualitative data around the PHC sub-systems (governance, financial and information flows, human resources, organization of service delivery) identified as key to improvement over time from the national-level analyses.

The average CCI score of the 30 districts in Rwanda was 74.4% (SD: 2.76; range: 66.5-79.1). The mean technical efficiency score was 96.7% (SD: 0.52; range: 95.6-97.5). The SFA revealed five statistically significant drivers of Rwanda's district health system technical efficiency: number of PHC facilities, health insurance coverage, literacy rate, bed occupancy rate, and proportion of people with access to water and sanitation.

PHC performance improvement in Rwanda was attributed to the following core drivers emerging from the qualitative analysis we carried out namely: prioritization of PHC, financing mechanisms, decentralization, community health systems, learning health systems, health commodity and equipment availability, donor coordination, and health facility functioning. The interplay of these core drivers explain the way Rwanda has improved their PHC system and enhanced efficiency.

Drivers of Efficiency at Different Stages of Health System Maturity: A Cross-Country Synthesis of Mixed-Methods Analyses from the Exemplars in Primary Health Care Study

PRESENTER: **Edwine Barasa**, KEMRI-Wellcome Trust Research Programme
AUTHOR: Anna Vassall

This cross-country synthesis provides high-level insights on the drivers of primary health care (PHC) efficiency at different stages of health system maturity across five Exemplar countries – Zambia, Peru, Ghana, Rwanda, and Bangladesh.

We used a published measure of effective coverage, the Universal Health Care Effective Coverage Index, as a proxy of health system maturity. The index combines country level indicators for key preventative and curative services covering a range of communicable and non-communicable diseases. Countries were categorised into baseline (0-20% effective coverage), foundational (21-40%), advanced (41-60%), and optimised health systems (>60%). The trajectory of Exemplar countries across maturity stages was analysed between the years 2000 and 2018. The WHO's PHC monitoring framework was used to structure the analysis of sub-system drivers of efficient performance. Countries' effective investments in different sub-systems (governance, financing, human resources etc.) over time were identified through document reviews, key informant interviews and descriptive time-series and econometric analyses.

Based on the maturity model, Ghana and Rwanda transitioned from foundational to advanced health systems in the mid-2000s while Zambia did so after 2010. Bangladesh and Peru had an advanced and an optimised system, respectively, throughout the analysis period. We found baseline systems to be characterised by resource scarcity and reliance on grassroots community structures to provide essential PHC services. Transitions to foundational systems were driven by governance and financing reforms (decentralization, sector-wide approaches to coordinate different financing sources) aimed at building resources, while delivering cost-effective interventions close to the population through outreach. For example, community health workers in Bangladesh were essential to achieving >90% immunization coverage by 2010.

Evolution to advanced systems were enabled by investments in demand generation, including a commitment to financial protection to increase access, and in information systems to improve strategic planning. For example, Ghana and Peru established successful national health insurance systems, expanding eligibility over time as resources were consolidated. In Zambia, the availability of electronic data enabled the introduction of performance-based contracting, tying resource allocation to districts to performance. This platform was used later on for a successful large-scale pilot of performance-based financing at the facility level, which showed that financial autonomy increased job satisfaction among health workers. In Rwanda, performance-based financing was found to increase usage and quality of child and maternal health services. A focus on PHC services quality distinguished health systems moving towards, or sustaining, optimisation. An example of the evolution of financing tied to performance is Peru's performance-based budgeting reform, which set detailed targets for all budgetary programs within the health sector.

Our analysis uncovered similarities in the sequencing of investments on different sub-systems of PHC among countries that otherwise differ in demographic and socio-economic characteristics and disease burden. For given levels of effective coverage, health expenditure per capita and the contribution of different financing sources varied across countries, but drivers of coverage were similar. We conclude that it is possible to derive transferable lessons from our Exemplars analysis that may be useful to other countries seeking to achieve value for money in improving PHC services coverage.

1:30 PM –3:00 PM   MONDAY   [Economic Evaluation Of Health And Care Interventions]

Cape Town International Convention Centre | CTICC 2 – Protea

Meta-Analysis of Economic Evaluations of Vaccines to Support Decision-Making Process [IMMUNIZATION ECONOMICS SIG]

MODERATOR: **Philipp Lambach**, Immunization, Vaccines and Biologicals (IVB) Department, World Health Organization, Geneva, Switzerland

DISCUSSANT: **Sheetal Silal**, Modelling and Simulation Hub, Africa (MASHA), University of Cape Town (UCT)

Concept of Meta-Analysis of Economic Evaluation

PRESENTER: **Raymond Hutubessy**, Immunization, Vaccines and Biologicals (IVB) Department, World Health Organization, Geneva, Switzerland
AUTHOR: Nathorn Chaiyakunapruk

Meta-analysis of economic evaluation (MAEE) studies is a novel method to quantitatively summarize economic evidence. The Immunization and Vaccine-related Implementation Research Advisory Committee suggested that MAEEs may be useful for providing decision-makers with

clear policy recommendations and could facilitate decision-making in countries where context-specific economic evaluations are not available. There is an extra layer of complexity in preparing data for MAEE from multiple studies due to the absence or inconsistent reporting of different economic parameters, and multiple sources of heterogeneity in the data. In this paper, we aim to provide a step-by-step process to prepare the data and statistical methods for performing MAEE. Data harmonization methods were constructed to account for variability in data availability, economic parameters, and heterogeneity of economic evaluation studies (i.e., country income level, currency, time horizon, perspective, modeling approach, and willingness to pay). The basic methods of MAEEs, including identifying and selecting relevant studies, are similar to other systematic reviews. We developed five data extraction scenarios based on the availability of data reported in studies, including the incremental cost (ΔC), incremental effectiveness (ΔE), and incremental cost-effectiveness ratio (ICER), and their associated dispersion. Study reports the mean and variance (Scenario 1) or 95% confidence interval (Scenario 2) of ΔC, ΔE, and ICER for incremental net benefit (INB) and variance calculations. Scenario 3: ΔC, ΔE, and variances are available, but not for the ICER; a Monte Carlo was used to simulate ΔC and ΔE data, variance and covariance can be then estimated leading INB calculation. Scenario 4: Only the cost-effectiveness plane was available, ΔC and ΔE data can be extracted; means of ΔC, ΔE, and variance/covariance can be estimated accordingly, leading to INB and variance estimates. Scenario 5: Only mean cost/outcomes and ICER are available but not for variance and the cost-effectiveness plane. A variance INB can be borrowed from other studies which are similar characteristics, including country income, ICERs, intervention-comparator, time period, country region, and model type and inputs (i.e., discounting, time horizon). The INB and variance were estimated and pooled across studies using a random-effects model as suggested by the comparative efficiency research (COMER). Our data harmonization and meta-analytic methods should be useful for researchers for the synthesis of economic evidence to aid policymakers in decision making.

Systematic review and meta-Analysis of economic evaluation studies: A case study of seasonal influenza vaccination in elderly and health workers

PRESENTER: **Karene Hoi Ting Yeung**, World Health Organization
AUTHOR: Sajesh Kalkandi Veettil

A number of cost-effectiveness analysis of influenza vaccination have been conducted to estimate value of influenza vaccines in elderly and health workers (HWs). This study aims to summarize cost-effectiveness evidence by pooling the incremental net monetary benefit (INB) of influenza vaccination. A systematic review was performed in electronic databases from their inceptions to February 2022. Cost-effectiveness studies reporting disability-adjusted life-years (DALY), quality-adjusted life year (QALY), or life year (LY) of influenza vaccination were included. Stratified meta-analyses by population, perspective, country income-level, and herd-effect were performed to pool INB across studies. 21 and 15 studies were included in the systematic review and meta-analysis respectively. All included studies in the meta-analysis were conducted in elderly. According to pre-specified analyses, studies for elderly in high-income economies (HIEs) and upper-middle income economies (UMIEs) without herd effect could be pooled. For HIEs under a societal perspective, the perspective which identify all relevant costs occurred in the society including direct medical cost, direct non-medical cost and indirect cost, pooled INB was $217.38 (206.23, 228.53, I^2 =28.2%), while that for healthcare provider/payer perspective was $0.20 (-11,908.67, 11,909.07, I^2 = 0.0%). For societal perspective in UMIEs, pooled INB was $28.39 (-190.65, 133.87, I^2 = 92.8%). The findings were robust across a series of sensitivity analyses for HIEs. Studies in HWs indicated that influenza vaccination was cost-effective compared to no vaccination or current practice. Influenza vaccination might be cost-effective for HWs and elderly in HIEs under a societal perspective with relatively small variations among included studies, while there remains limited evidence for healthcare provider/ payer perspective or other level of incomes. Further evidence is warranted.

Advancing Methodology By Addressing Potential Challenges

PRESENTER: **Simon Procter**, London School of Hygiene and Tropical Medicine
AUTHOR: Mark Jit

The concept of meta-analysis of economic evaluation (MAEE) studies was presented in a meeting of the Immunization and Vaccine-related Implementation Research Advisory Committee (IVIR-AC) held on March 2021. The IVIR-AC considered several examples of MAEEs and commented on several methodological issues. Heterogeneity observed in MAEEs is a major methodological challenge. Two-thirds of recently published MAEEs showed evidence of a substantial level of heterogeneity. However, most analyses provide no explanations of the potential sources of heterogeneity. In a recent meta-analysis, we demonstrated that variation in the willingness-to-pay (WTP) threshold across individual studies might be a major source of heterogeneity. We proposed a strategy to apply a uniform WTP threshold across studies, which has been found to be successful in mitigating heterogeneity. There are other sources of heterogeneity while performing MAEE, including study characteristics (such as setting, perspective, and funding source) and methodological characteristics (such as time horizon, data source, model type, input parameters, and model assumptions), which may require different strategies. There is a critical need to explore sources of heterogeneity and develop a standardized approach to handle it to improve the efficiency and acceptability of future MAEEs. In our present approach, we perform MAEE by pooling the incremental net benefit (INB) of each study in a random-effects model using the DerSimonian and Laird method in which studies are weighted according to the variance of the INB since the variance is frequently used in traditional meta-analyses of empirical studies with meaningful sample sizes. Therefore, studies with higher levels of reported uncertainty were given less weight in a meta-analysis. Experts suggested that since these uncertainty intervals depend on how thoroughly the modelers have investigated uncertainty (e.g., what parameters they included in a probabilistic sensitivity analysis, and what sources of uncertainty they incorporated into the uncertainty distributions of each parameter); therefore, larger intervals may reflect relatively better-quality studies that, in some cases, should be given more weight rather than less. The IVIR-AC suggested developing a grid of criteria for assessing study quality, especially focusing on the quality of uncertainty assessment in an economic evaluation as well as the quality of the modelling approach, to enable quantitative synthesis weighted by study quality rather than the traditional approach for empirical studies. An attempt should be made to

adopt the methodology recommended by experts to enable MAEE weighted by study quality rather than the traditional approach to recognize how findings differ in both ways.

3:00 PM –3:30 PM   MONDAY   [Health System Performance]

Cape Town International Convention Centre | CTICC 1 – Clivia conservatory
POSTERS: Field 8. Health System Performance

8.1 The Healthcare System Sustainability and Resilience Index: Estimating the Sustainability and Resilience of Healthcare Systems

PRESENTER: **Sian Besley**, Office of Health Economics
AUTHORS: Dimitrios Kourouklis, Mireia Jofre-Bonet, Alistair McGuire, George Wharton

Background: The COVID-19 pandemic has highlighted the need for sustainable and resilient healthcare systems to protect population health. To achieve this, countries must be able to quantitatively assess potential areas of strength and weakness not only within their healthcare system but also in terms of other external factors that can impact the sustainability and resilience of the healthcare system. This will enable countries to assess past and current healthcare system sustainability and resilience and to measure the progress of health systems towards becoming more sustainable and resilient.

Objective: The aim of this research is to design, construct and pilot a country-level *healthcare system sustainability and resilience index* (HSSRI) that reflects and combines the two dimensions.

Methods: The HSSRI aims to capture the performance of a healthcare system across the different domains contributing to its sustainability and resilience. These domains are: i) health system governance, ii) health system financing, iii) health system workforce, iv) medicines and technologies, v) health service delivery, vi) population health and social determinants, and vii) environmental sustainability. Domains i) to vi) are included in both dimensions. Domain vii) is only included in the sustainability dimension.

As part of our analyses, we conduct a rapid evidence assessment to identify indicators reflecting the domains included in the sustainability and resilience dimensions. We assess the indicators' suitability by the quantity and quality of the literature supporting their inclusion. We extract the variables in the indicators from publicly available data sources, such as the OECD, World Bank, and others. The period covered is from 2000 to 2020.

We use a weighted average of all indicators - and then domains - to calculate domain and dimension-level indices, respectively. This approach allows users of the index to vary the weights of the indicators and domains. However, for this pilot, we apply equal weights to all indicators and dimensions. We do so by obtaining the sub-indices as geometric means of their components. Finally, we use a geometric mean to combine the sustainability and resilience dimensions indices into one final index – the HSSRI.

Results: We pilot-test the HSSRI with data from five high-income countries: France, Germany, Japan, Poland and the United Kingdom. The indices reveal that all countries have room for improvement concerning their healthcare system sustainability and resilience. There is also heterogeneity in performance within and across countries during the period examined. This is likely to be driven by country-specific and policy-related differences. The dimension and domain-level indices enable policy-makers and stakeholders to observe how different factors have contributed to their overall sustainability and resilience.

Conclusion: The HSSRI will facilitate a better understanding and monitoring of healthcare systems' absolute and relative weaknesses and strengths, allowing policy-makers to design interventions that can improve their resilience and sustainability.

8.2 A Priority-Setting Framework for Value-Based Healthcare: Evidence from Australia

PRESENTER: **Yuanyuan Gu**, Macquarie University
AUTHORS: Olukorede Abiona, Mona Aghdaee, Henry Cutler

Background: Australian healthcare system is moving towards value based health care (VBHC), and a few Australian States have adopted VBHC in delivering care. In line with this shift to VBHC. The New South Wales (NSW) government, the largest State of Australia, has rolled out VBHC programs within the state-wide health system in the past few years. One of the programs, Living Better Value Care (LBVC), commenced in 2017 to realign health systems with the elements of VBHC. Through the VBHC framework, the Ministry of Health is shifting focus from measuring and monitoring the volume of healthcare services delivered to value. This means healthcare executives must understand outcomes and experiences that matter to patients and the community, critically review how and where care is delivered, and reduce unwarranted variation in healthcare.

Aim: In this paper, we first seek to understand the public preferences for priority setting within the VBHC framework. This research helps us to understand how healthcare budgetary allocations could be spent toward patient priorities within NSW. This will help the general public and the decision makers in local health districts and hospitals better reflect on how to increase value when they allocate resources across different public healthcare programs and interventions.

Methods: This research engages in mixed research methods, including literature review, semi-structured interviews, and surveys that adopt the Discrete Choice Experiments (DCE) approach. Foremost, we interviewed a sample of local health district administrators and executives within NSW. With a combined sample of 20, we were able to understand the decision-making processes of the LHDs towards efficient budgetary allocation of VBHC healthcare resources since 2017. The interviews provided additional insight into the provider experience and important factors for successful VBHC. The final stage of the data collection process is the survey implementation among 1,000 representative public participants after the revisions made to the pilot survey. This will be followed by the DCE analysis to understand the public preferences for features of a hypothetical NSW program that implicitly embed the VBHC framework. The data collection process during the survey includes a careful selection of important variables for interaction and heterogeneous effects during analysis.

Results: Preliminary results show that there are values for additional consideration for VBHC-based program delivery across LHDs within NSW. Based on the literature review and qualitative interviews, our DCE integrated seven attributes: 1. Patient experience; 2. Patient safety; 3. Patient access; 4. Provider experience; 5. Health outcomes; 6. Care effectiveness; and 7. Care efficiency. The public survey is underway to provide complete data for the DCE analysis.

Conclusions: The research first provides primary results for public preference regarding prioritisation among the VBHC-based attributes. Priority-setting within VBHC constitutes an important component for the successful execution of programs. Our preliminary results indicate that this includes a complex set of subjective processes at the LHD level. However, results from the survey analysis designed for DCE will enable the researchers to understand public preferences, thereby providing the NSW Ministry of Health with an evidence-based VBHC framework for efficient allocation of resources.

8.3 Evaluation of the Effects of Official Development Assistance to Sexual and Reproductive Health Services in Low- and Middle-Income Countries: A Cross-Country Panel Data Analysis

PRESENTER: **Jesper Sundewall**, Lund University and University of KwaZulu-Natal
AUTHORS: Björn Ekman, Jessy Schmit

Over the past decades, sexual and reproductive health (SRH) outcomes have improved in most low- and lower-middle-income countries (LMICs). However, improvements have been uneven and for a group of poor countries reaching SDG 3.8 of universal health coverage will be unattainable without further improvements. Achieving this will require substantial investments, including in strengthening health systems to ensure access to relevant services. While countries will need to adjust priorities, much of the funding will need to come from external development assistance (ODA). However, the extent to which ODA contributes to strengthening health systems for improved SRH is largely unknown at the country level.

The purpose of our study is to contribute to an improved understanding of the relationship between SRH-ODA disbursed during the period 2002-2019 and key Sexual and Reproductive Health and Rights (SRHR) indicators. More specifically, we aim to address this issue by conducting an analysis of the effects of SRH-ODA on changes in SRHR indicators. To achieve this, we use a purposive panel data set of 103 LMICs across the years 2002 to 2020 to estimate the effects of development assistance on three key SRHR service indicators for which there are sufficient data: prevalence of modern contraceptives; skilled birth attendance; and coverage of anti-retroviral therapies for HIV/AIDS. The effects of development assistance is measured by modeling the relationship between three different measures of health-related ODA and the service outcomes while controlling for a set of other factors that also may affect these outcomes.

Data was analysed using econometric methods. To control for the potential problem of endogeneity we use multivariate, fixed-effect panel data regression modeling. By using fixed-effect panel data analysis, we are able to effectively control for all time-invariant factors at the country level that may also affect the outcome measures but for which data are not available.

The main finding of our analysis is that SRH ODA has had, on average, a positive effect on service coverage over this period in the current sample of countries. More specifically we see that SRH ODA have a statistically significant positive impact on all three outcomes measured. In addition, we do not find that ODA has had a statistically significant *negative* effect on these SRH service indicators. Furthermore, economic income has generally been an important factor in these outcomes. In particular, GDP per capita has had a strong impact on skilled birth attendance in the sample of countries over this period. Finally, the observed effects generally appear to be stronger in low-income countries than in lower-middle-income countries. With a couple of exceptions, our results appear to be robust to all sensitivity tests performed.

While limited to an aggregated level, our study makes an important contribution to the existing evidence on the effectiveness of ODA generally and SRH-ODA in particular. Additional analyses are needed to identify country specific effects of SRH ODA.

8.4 Public Satisfaction with Health System after Healthcare Reform in China

PRESENTER: **Changle Li**, Inner Mongolia Medical University
AUTHORS: Lili Kang, Tianyi Zhang, Bensong Xian, Mahmud M Khan

Introduction: Since the launch of China's comprehensive health system reform in 2009, the Chinese government has made considerable investments in primary care facilities and issued a series of new policies to expand insurance coverage, reforming the pharmaceutical market, and pilot-testing public hospital reforms. After nearly a decade since the reforms, the reforms have made many noteworthy gains. These policies should have improved public satisfaction with the health system as well but no significant increase in satisfaction was observed. In addition, given the importance of quality of care in improving health outcomes and well-being, it is assumed that improving the quality of

health services ought to be a priority for any health system. However, evidence on associations between public satisfaction and perceived quality of care is limited. Therefore, this study analyzed the factors that influence public satisfaction and to examine the relationship between perceived quality of care and public satisfaction.

Methods: The data used in this study were obtained from the 2012-2020 China Family Panel Studies (CFPS). The final sample consisted of 145,843 observations from 47,397 adults across all five waves of the surveys. Public satisfaction with health system was defined as an ordinal dependent variable with values ranging from 0 to 10, 0 indicating completely dissatisfied and 10 indicating completely satisfied. Since the health care delivery system differs between urban and rural areas, the two-way fixed-effects ordered logistic model was used to analyze factors affecting public satisfaction stratified by urban-rural residence, which should help avoid potential bias created by differences between urban and rural health systems.

Results: The ordered logistic regression showed that perceived good quality of care was positively associated with pubic satisfaction in health system regardless of rural-urban residence. Older adults and individuals with more than three years of college education were less likely to be satisfied with the system in rural areas. Personal income and the density of medical professionals in the geographic area had positive effect on public satisfaction in rural areas. Having medical insurance coverage and fair or good self-rated health improved the probability of reporting public satisfaction in urban areas. Married people and individuals who lived in the West region were less likely to be satisfied with the health system in urban areas.

Conclusion: Knowledge and skills of healthcare providers or physical quality of facilities may not necessarily improve public satisfaction in health system. Policy-makers need to understand important factors affecting public perception of the system, This analysis identified several policy-amenable factors to improve public perception of the health system in rural and urban China. First, the health delivery system of China needs to be rebranded as the provider of high-quality healthcare services. Second, the health system may consider improving access to healthcare services for patients from vulnerable population groups, such as the poor and the elderly in rural areas. Third, high out-of-pocket expenses and public satisfaction are related, and expanding medical insurance to achieve universal coverage with in-built protection from catastrophic health expenditure should improve public satisfaction significantly.

8.5 Not All Local Governments Are Created Equal: State of Local Health Financing in the Philippines

PRESENTER: **Loraine F Gallevo**, The Palladium Group
AUTHORS: Abba Marie S Moreno, Carlo Irwin A Panelo, Alejandro N Herrin

The delivery of basic health services was assigned to more than 1,500 local government units (LGUs) when the Philippines devolved its health system in 1991. However, many LGUs struggle to finance the delivery of services leading to wide variation in health outcomes. Overall, LGU spending has been stagnant since 1991 and only saw an uptick in 2020 and 2021, largely due to pandemic spending. As the country move to the endemic phase, it is likely that LGU health spending will decline to pre-pandemic levels. While LGUs got a windfall with the adjustment of shares from national taxes, the national government also devolved additional functions including that for health. These scenarios do not bode well for the implementation of an ambitious legislation on universal health care (UHC) that affirmed the LGU mandate for providing basic health services, among others.

To understand the capacity of LGUs to finance health services, we analyzed the Statement of Receipts and Expenditures (SRE) for 2020. For each of the 81 provinces, we aggregated the income and expenditures at the province-level which includes the component cities and municipalities but analyzed the Highly-Urbanized Cities (HUC) separately. We also computed for the following: 1) Health, Nutrition and Population (HNP) per capita using the population census for 2020, 2) percentage of the expenses spent for Health, Nutrition and Population over the total expenses of the LGU, 3) percentage of total expenses over total operating income, 4) total national tax allocation received over total income.

We noted that there is wide variation in health spending across provinces and HUCs. The relatively low rate of HNP expenditures over total expenses averaging 15% (range of 2% to 27%) imply low priority given to health programs relative General Public Services and Social Services and Social Welfare. Interestingly, all LGUs have an operating surplus that suggests it can potentially spend on health given the ratio of total expenditures over total income averages at 65% (range of 48% to 55%) . But for 59% of LGUs, the high ratio of national allocations over total operating income averaging at 72% (range of 44% to 93%) suggest that the provinces are highly-dependent on the national government. In contrast, HUCs are more capable of generating revenues with national allocations averaging at 37% (range of 8% to 74%).

As the Philippines pursues universal health care, expectations from LGUs need to be tempered given the stagnant health spending levels across three decades. It also remains to be seen whether the windfall from adjusted shares from national taxes will translate to health spending.. While there is potential of tapping into the operating surplus, this will be highly dependent on the priorities and preferences of LGU chief executives. Inter-governmental transfers, mainly in the form of financial and non-financial grants from the national government, but also from better endowed LGUs, can be designed to incentivize LGUs to adopt options towards greater financial and service equity across LGUs. Equitable health financing remains a challenge for achieving UHC in the Philippines.

8.6 Inequality in Unmet Healthcare Needs Under Universal Health Insurance Coverage in China

PRESENTER: **Jingxian Wu**, Xi'an Jiaotong University
AUTHORS: Yongmei Yang, Ting Sun, Sucen He

Background: Expanding health insurance is a critical step towards universal health coverage due to its positive effect on reducing unmet health care needs and enhancing equitable access to health care. Despite previous studies on the socioeconomic factors associated with unmet health care needs, few studies have analysed the inequalities in such needs and the impact of universal health insurance coverage on addressing them. This study aimed to measure the contribution of social health insurance (SHI) coverage to inequalities in financially and non-financially constrained unmet health care needs among middle-aged and elderly Chinese adults.

Methods: The study data were obtained from the China Health and Retirement Longitudinal Study (2011–2015). A total of 11592 respondents reporting outpatient care needs and 6320 reporting inpatient care needs were included. The concentration index (CI) was employed to measure the extent of income-related inequalities in unmet health care needs. A decomposition method based on a probit model was used to investigate the contribution of SHI to the inequalities.

Results: The incidence rates of unmet outpatient needs due to financial and non-financial constraints were 4.68% and 24.78%, respectively; these rates were 18.69% and 15.73% for unmet inpatient needs. The CIs of unmet outpatient needs due to financial and non-financial constraints were -0.1872 and 0.0195, respectively; these values were -0.1558 and 0.0352 for unmet inpatient needs. The percentages of the contribution of SHI to the CIs of financially constrained unmet outpatient and inpatient needs were 0.2639% and 1.8898%, respectively. Moreover, the percentages of the contribution of SHI to the CIs of non-financially constrained unmet outpatient and inpatient needs were -0.4513% and -6.4192%, respectively.

Conclusion: The universal coverage of SHI in China increased pro-poor inequalities in financially constrained unmet health care needs but decreased pro-rich inequalities in non-financially constrained unmet needs. Additionally, the contribution of SHI to inequalities in financially constrained unmet needs for inpatient care was stronger than that for outpatient care. Policy-makers are advised to introduce favourable reimbursement policies for patients with poor socioeconomic conditions and address both financial and non-financial barriers to promote equitable access to health care for the entire population.

8.7 Universal Health Insurance Monitoring in Egypt: Pulse Survey.

PRESENTER: **Ahmed Yehia Khalifa**, World Health Organization
AUTHORS: Naeema Hassan Al Gasseer, Gasser Gad Elkareem, Amira Aly Hegazy, Ahmed Taha Aboushady, Riku Edward Elovainio

Background: Universal Health Insurance (UHI) in Egypt is established to ensure equity in population access to quality health services without financial hardship. WHO conducted a pulse phone survey on the population of the Pilot UHI governorate Portsaid to inform decision makers on the patterns and key underlying determinants that affect key aspects of UHI implementation process. In particular, the survey addressed the following key dimensions: a) Population **Awareness**, **Access and Unmet Needs**, and **Perception** towards UHI services, b) Household Health **Expenditure** and **Utilization** patterns across all providers, c) The level of **Financial Protection** in Portsaid compared to national average.

Method: The survey was carried out via phone interviews. Data was collected between 10 January 2022 and 1 February 2022 from a representative sample of 3095 of Portsaid residents aged 18 or above, who were called at different times of the day and the week to ensure inclusion of varied sociodemographic groups. Random digit dialing technique was used to generate random numbers of respondents with an overall response rate of 48.9%.

Results: There was an overall **favorable perception** of the quality of UHIS services (**78%**). Nevertheless, trends of utilization and expenditure among UHI enrollees show **high preference** towards **uncontracted private providers** in most service categories, even when incurring additional financial burden on already insured households. Average utilization rates across all provider types for outpatient visits, diagnostics laboratory, and diagnostic imaging was 1.1, 0.3, 0.1 visit per person per month, respectively. Average utilization of inpatient services was 0.1 admission per person per 6 months. A large share of household **out of pocket** expenditure is spent on **Medicines (62.7%), mainly** at the **private uncontracted pharmacies (67.2%)**.

Awareness of the UHI System was sub-optimal, including services to which residents are entitled within the UHI system. Moreover, **knowledge gaps** about UHI exist notably among UHI lower-wealth and lower-education enrollees. Governorate average awareness was 76% compared to 55.8% in lower education groups. Considerable variation in **unmet need** for health services with low- and middle-income groups most affected. 13% of low-income groups did not get needed services compared to 8.1% in high-income groups. While 79% of UHI users reported contracted health facilities to be close to their place of residence (11 minutes average transportation time), access barriers related to ease of reservation system are the most frequently reported (**20%**).

Conclusion and Recommendations: Results of the survey identified the following high level policy options to overcome implementation challenges:

- **Accelerate** setting a regulated strategy and mechanism for **private sector engagement** with well-designed financial and non-financial incentives.
- **Emphasize** on an adaptable and inclusive **communication and behavioral change strategy.**
- **Investigate access barriers** with more qualitative and quantitative research.
- **Institutionalize and integrate** such survey to establish robust and unified UHI monitoring framework and to establish baseline data for future UHI governorates.

8.8 Measuring Progress Towards Universal Health Coverage in Rural China: Evidence from Panel Household Data in Ningxia

PRESENTER: **Min Hu**, Fudan University

AUTHORS: Xuanqi Qiao, Yusheng Jia, Zemin Xia

Objectives: Universal Health Coverage (UHC), as one of the Sustainable Development Goals, has become a global health priority. Despite the fact that great progress has been made in China through healthcare reform since 2009 aiming to provide citizens with equal access to quality basic care without financial risk, insufficient resources in rural areas still exist as a major obstacle towards UHC in China. Hence, monitoring the UHC progress in rural China is informative to promote the overall UHC progress. This study aims to measure the progress towards UHC of five counties in Ningxia Autonomous Region which is a representative of rural China in terms of the level of socioeconomic development.

Methods: Data were obtained from three waves of household surveys from five rural counties in Ningxia in 2009, 2012, and 2015. Following the framework proposed by World Health Organization and World Bank, we selected 12 service coverage indicators and 2 financial protection indicators to evaluate the progress towards UHC in Ningxia. The service coverage indicators consisted of 6 prevention indicators (e.g. improved water source, DTP3 immunization, antenatal care visits, etc.) and 6 treatment indicators (e.g., tuberculosis effective treatment coverage, hospitalization rate, etc.). The incidence of catastrophic healthcare expenditure (CHE) and medical impoverishment were used to illustrate financial protection. The service coverage index was computed as a geometrical mean of prevention indicators and treatment indicators and was compared with the target of 80% which was commonly perceived as a goal of normative UHC. The incidence of CHE was defined as the proportion of households whose annual healthcare expenditure exceeded 40% of non-food expenditure. We estimated medical impoverishment based on the National Poverty Line of 2,300 RMB per person-year in 2012 and adjusted this threshold by the Consumer Price Index (CPI) for 2009 and 2015.

Results: Our findings showed that 9 out of 12 service coverage indicators were improved from 2009 to 2015, which were all the prevention indicators and most of the treatment indicators. The three treatment indicators, that is the prevalence of care-seeking behavior for children with cough, the prevalence of care-seeking behavior for children with physical discomfort, and tuberculosis (TB) effective treatment coverage, slightly decreased. The service coverage index increased from 24.3% in 2009 to 39.6% in 2015, while it was still far below the target of 80%. Our findings of financial risk protection showed that the incidence of CHE decreased from 17.0% in 2009 to 15.0% in 2015, but the incidence of medical impoverishment increased slightly.

Conclusion: Progress towards UHC has been made in rural China since the healthcare reform in 2009. However, great challenges remained both in health service coverage and financial risk protection as of 2015. To facilitate healthcare utilization as well as effective treatments of TB and other communicable diseases in rural areas is of great significance given the decreasing treatment coverage in Ningxia.

8.9 Contextualized Management Systems & Capacity Toolkit for Practical Use When Designing Government Strategy and Action Plans

PRESENTER: **Sebastian Uchenna Ilomuanya**, Clinton Health Access Initiative

AUTHORS: Lindsey Hehman, Akachi Mbogu, Jessica Gu, Marta Prescott, Praveena Guranatnam, Yesunesh Teshome, Leslie Berman

Background

Since 2013, the Clinton Health Access Initiative (CHAI) has worked with Ministries of Health to improve the management systems and capacity (MSC) of eight countries in Africa and Asia at various levels of intensity and with mixed results. Management Systems are structures, processes, procedures, or a collection of rules in the Ministries of Health (MoH) that organize duties necessary to accomplish health outcomes/goals. Strengthening management systems is part of CHAI's overall strategy to sustainably reduce mortality and morbidity from vaccine-preventable diseases by identifying and addressing critical bottlenecks limiting the effectiveness, efficiency, and sustainability of government health programs/systems.

Research Aim

The research aims to distill CHAI's MSC key learnings from the past eight years to identify inefficiencies and provide tools, processes, and key performance indicators (KPIs) that governments, policymakers, partners, and implementers can use to systematically monitor and improve immunization program performance. Specific research questions are:

- What are the critical success factors to drive management systems and capacity KPIs across different health systems depending on their levels of maturity?
- What are the different interventions required to improve immunization KPIs?
- How do you determine when and where to implement MSC interventions?

Methodology

This is a qualitative review of CHAI's MSC interventions in eight countries (Cameroon, Ethiopia, India, Kenya, Lesotho, Nigeria, Tanzania, and Uganda) from the past eight years. We interviewed key informants from CHAI and the MoH identified through purposive sampling, and

reviewed meeting and donor reports, presentations, and annual operational plans to compare the findings against settings without MSC interventions in place. Analysis of results identified common cross-cutting themes determined to be the key drivers for the improvement of MSC.

Key Results

We identified four impactful program management pillars: 1) Human and Institutional Capacity, 2) Strategic Planning, 3) Enhanced Financing, and 4) Program Performance Management and Accountability. From these pillars, we synthesized 12 **Critical Success Factors (CSF)** for strengthening system-wide management systems and capacities. These CSF were further distilled into an **MSC Organizational Scale,** which helps in grouping country or county management systems based on their level of maturity and identified **a menu of interventions** to move the systems from one level of maturity to another**.** Additionally, we developed a **diagnostic tool** that can be used to determine the relevant scaling of the country management systems, which will help ease identification and application of interventions for improvement. We also developed a table of indicators as an **MSC Monitoring and Evaluation Framework** to monitor systems improvement and course-correct where necessary. Collectively, this **MSC Toolkit** propels a transformation cycle that will build stronger management systems and capacity that enables high quality service delivery, efficient cold and supply chain logistics, and sustainable health systems.

Conclusions

The MSC toolkit is a structured and measurable approach to support Ministries of Health, policymakers, funders, researchers, and implementers to determine health system cross-cutting barriers and propose targeted, measurable interventions for practical use when designing government strategy and action plans. It serves as a practical, user-friendly guide to introduce and rapidly monitor prioritized, targeted health system interventions.

8.10 Technical Efficiency Analysis of Basic Health Care Provision Fund (BHCPF)-Funded Primary Health Care Facilities in Southwestern Nigeria

PRESENTER: **Sunday Adeniyi Atobatele**, Sydani Group

AUTHORS: Oluomachukwu Prosper Omeje, Sidney Sampson, Folake Oni, Toluwani Oluwatola, Oluwafisayo Ayodeji

Background: The poorly funded primary healthcare (PHC) system has been a perennial challenge of the Nigerian health sector. As part of the measures to address this challenge, the National Health Act of 2014 institutionalized the establishment of the Basic healthcare provision fund (BHCPF) as a catalytic fund to improve the financing of PHCs through direct facility financing and funding of a basic minimum package of health services. This fund became operational in 2018. However, beyond improving funding, more beam light needs to be shone on the efficiency of PHC centers to maximize returns on investment. As part of a national PHC assessment exercise, we conducted a technical efficiency analysis of BHCPF-funded primary healthcare centers in Southwestern Nigeria.

Objective: This study aimed to determine the technical efficiency of BHCPF-funded PHC centers in southwest Nigeria and identify the drivers of technical efficiency among these facilities.

Methods: We conducted a two-stage data envelopment analysis (DEA) among 850 BHCPF-funded PHC facilities in Southwest Nigeria using a constant return to scale (CCR model). In the first stage, we derived technical efficiency scores using an input orientation. We used two inputs (number of clinical staff and number of facility inpatient beds) and four outputs (number of fully immunized children, outpatient attendance, antenatal care attendance, and facility deliveries). An input-oriented approach was considered appropriate for this analysis because the objective of BHCPF is to promote facility autonomy and enable facility managers to determine how to use funds to achieve the best results. In the second stage, we used a Tobit regression model to assess the effect of the catchment area's population, patient-reported quality of care, and patient-reported immediate newborn and post-partum care.

Results: The mean technical efficiency score of the 850 facilities was 21.1%, which shows with the current inputs, primary health centers can improve their efficiencies by 78.9%. The technical efficiency scores of the health facilities ranged from 1-0.02. The Tobit regression model showed that the catchment area of health facilities was a determinant of their technical efficiency. However, the quality of delivery and newborn care were not significant determinants of the technical efficiency of health facilities.

Implications: To improve the impact of the Basic health care provision fund on Nigeria's primary health care system, there needs to be increased emphasis on productivity. Healthcare managers should be trained on effective and efficient resource use to maximize health system outcomes. Improving access to healthcare facilities, thereby expanding their catchment area, will improve the efficiency of healthcare facilities. Efforts to improve efficiency should be consolidated by institutionalizing measurement of health facilities' efficiency and tracking progress towards attaining health systems goals and universal health coverage.

8.11 Estimating US State-Level Healthcare Value and Its Association with Key Health System Characteristics and Policies: 1991-2019

PRESENTER: **Haley Kathryn Lescinsky**, University of Washington

AUTHORS: Maitreyi Sahu, Sawyer Crosby, Kevin Shulman, Arnold Milstein, Joseph Dieleman

While the US as a whole spends more on healthcare per person than most peer countries, there is dramatic variation within the US. Moreover, health outcomes also vary dramatically, although they are only weakly correlated with healthcare spending. In this study, we leverage variation in healthcare spending and health outcomes to estimate state-level healthcare delivery system value after accounting for underlying differences in population risk (ie age, obesity, smoking, etc). Then we examine trends in value over the last 30 years and identify key policies and characteristics associated with value following the enactment of the Affordable Care Act.

We extracted annual health condition-specific death and prevalence estimates for each US state from the Global Burden Disease 2019 Study for 1991 to 2019. We used state-level annual healthcare spending per person from the State Health Expenditure Accounts (SHEA) for 1991 to 2019. Using non-linear meta-stochastic frontier analysis, condition-specific mortality-prevalence ratios for 66 major treatable illnesses were regressed on per capita healthcare spending and key covariates including age, obesity rate, smoking rate, physical activity rate, and educational attainment. State- and year-specific inefficiency estimates were extracted for each health condition and combined to create a single estimate of healthcare delivery system value for each US state for 1991 through 2019.. The association between changes in healthcare value and 30 key healthcare system characteristics and state health polices was measured using bivariate linear regression, with specific focus on market concentration for large, small, and individual group insurance plans and health insurance coverage.

After two decades of increases in healthcare delivery system value, we found that there has been a decline in healthcare delivery system value for all US states in the last decade. This decline was smallest in Washington, Colorado, and Rhode Island and most pronounced in Mississippi, West Virginia, and Alaska. When looking at absolute healthcare value, Washington, California, and Minnesota attained the highest scores in 2019. Greater market concentration of insurers were associated with worse healthcare value, as were increases in insurance premiums and hospital expenses. Value scores were not correlated with state coding biases in physician coding of diagnoses.

Efforts to improve health system value could focus on increasing market competition for insurers and hospitals. Moreover quantifying and reporting estimates of value can be valuable for drawing attention to disparate spending levels and outcomes, and encourage action by state policymakers to rein in spending.

8.12 Evaluating Performance of the Healthcare Access and Quality Index Based on Mortality from Causes Amenable to Personal Health Care in West African Countries

PRESENTER: **Shafiu Mohammed**, Ahmadu Bello University
AUTHORS: Wilm Quentin, Reinhard Busse

Introduction: Providing access to quality health care is among the foremost objectives of health systems. Furthermore, the receipt of effective personal health care can substantially improve many health outcomes and avert premature mortality. However, few studies in Africa have sought to assess personal health-care access and quality across a wide range of key health service dimensions and the development spectrum. This study examines the performance of health-care access and quality (HAQ) using an index for comparability among West African countries.

Methods: Drawing from the Global Burden of Diseases (GBD 2019) data, we measured the HAQ index overall and for select age groups in 18 locations from 1990 to 2019. we used 32 causes from which death should not occur in the presence of effective care to approximate personal health-care access and quality by location and over time. We applied a principal components analysis to construct the HAQ Index using all scaled cause values, providing an overall score of 0–100 of personal health-care access and quality by location over time, in tandem with global level outcome measures (23·8–94·6). We distinguished the overall HAQ Index (ages 0–74 years) from scores for select age groups: the young (ages 0–14 years), working (ages 15–64 years), and post-working (ages 65–74 years) groups.

Results: Between 1990 and 2019, nearly all West African countries saw their HAQ Index values improve; nonetheless, the difference between the highest and lowest observed HAQ Index was larger in 2019 than in 1990, ranging from 23·8 (20·3 to 27·2) to 50·2 (47·7 to 52·9) in Chad and Cabo Verde, respectively. The HAQ Index for Nigeria being the most populous country was 31·6 (26·0 to 38·0). In 2019, the young age group had an overal HAQ Index score of 30·5 (95% UI 26·3 to 34·9). This is an increase of 11·2 points (5·4 to 16·9) relative to 1990. The HAQ Index was 37·0 (95% UI 32·6 to 41·7) for the working age group in 2019. The average improved by 10·5 points (5·3 to 15·8) over 1990–2019. The post-working group had a HAQ Index of 32·2 (95% UI 28·4 to 36·4). The post-working group improved by 7·2 points (3·1 to 11·5) from its 1990 score. Our findings showed improvements in the overall and select age group HAQ Indices in almost every country between 1990 and 2019. However, disparities in HAQ Index scores across locations persisted into 2019.

Conclusion: Mortality from causes considered amenable to personal health care serve as an important proxy of health-care access and quality, and thus can be used to benchmark dimensions of health-system performance and to identify untapped potential for advancing personal health-care access and quality. Our findings suggest that gaps exist among the countries, and geographic inequalities in personal health-care access and quality might be on the rise. To strengthen and deliver health systems for the next generation, governments and health agencies must focus on improving health-care access and quality across health service areas and reaffirm their commitment to accelerating progress for their populations.

8.13 A Policy Impact Analysis of the HIV/AIDS Test and Treat Policy on ART Treatment Outcomes in Eight Countries in Sub-Saharan Africa

PRESENTER: **Stephen Lagony**, Medical Research Council

Introduction: Many countries in Sub-Saharan Africa have adopted the HIV/AIDS treatment policy guidelines that were issued in 2015 by the World Health Organization (WHO) on the treatment of HIV/AIDS patients. The policy known as test and treat advocates for treatment of all people that are tested and found to be HIV positive regardless of their CD4 count. The policy was mainly introduced to increase patient enrollment on Antiretroviral Treatment (ART) in order to reduce the spread of new HIV infections and to achieve the UNAIDS 90-90-90. Despite the adoption of the policy by several countries in Sub-Saharan Africa, the number of new HIV infections continues to rise.

Aims: This paper examined; i) the impact of the test and treat policy in providing universal access to care and treatment for all people living with HIV/AIDS in eight countries in Sub-Saharan Africa. ii) It analyzes the strength and weaknesses of the test and treat policy as far as HIV treatment is concerned. iii) it provides recommendations for policy for decision makers and professionals working in HIV/AIDS care and treatment in Sub-Saharan African countries.

Methods: We conducted a literature review of relevant online documents from April 2020 to July 2020. We searched and collected information from google scholar, pub med and country government sources such as the Ministry of Health websites of different Sub-Saharan countries. Additionally information was also collected from international organizations' websites such as the WHO, the Joint United Nations Programme on HIV/AIDS and the United Nations The following words and phrases were used in different combinations to identify reports and publications that contained the necessary information: HIV/AIDS, test and treat, Sub-Saharan Africa, treat all policies, WHO guidelines on HIV/AIDS treatment, ART, viral load suppression. The stages heurestic model was used to analyze the information that was collected.

Results: This study found that the policy registered a number of successes such as; an increase in the number of patients initiated on ART for example between the first quarter of 2016 and the last quarter of 2017, the number of people accessing ART increased by 65% in Zambia. Other successes as a result of the policy included; reduction in the mortality rate from AIDS related illnesses, increased testing for HIV/AIDS and achieving a high viral load suppression amongst patients on treatment. In South Africa, Kenya and Uganda, mortality rates from HIV reduced significantly as result of the test and treat policy. In Nigeria, 79% of the patients whose viral load was measured within six months of receiving treatment achieved viral suppression. On the other hand, the policy has had a few shortcomings with the most notable one being the failure to slow down the rate of new HIV infections.

Conclusion: The policy has made gains in achieving its objectives, however, the overall success of the policy will be dependent on its ability to stop the transmission of the AIDS virus from one person to another. This is strongly hinged on strengthening target-based testing of key population groups and improved linkages to treatment.

3:00 PM –3:30 PM   MONDAY   [Social Events]

Cape Town International Convention Centre | CTICC 1 – Clivia, Jasminum & Strelitzia conservatories
Refreshment Break and Poster Viewing

3:00 PM –3:30 PM   MONDAY   [Demand & Utilization Of Health Care Services]

Cape Town International Convention Centre | CTICC 1 – Clivia conservatory
POSTERS: Field 4. Demand and Utilization of Health Care Services

4.1 "What I Need Is Guidance. What My Son Needs Is... Me." Family Perceptions of Early Autism Supports and Their Application to Economic Evaluation
PRESENTER: **Lisa Gold**, Deakin University
AUTHORS: Katherine Pye, Teresa Iacono, Ha N.D Le
Background

Attitudes towards autistic people and supports have changed considerably since the emergence of developmental and behavioural interventions. While these approaches have demonstrated positive child outcomes, less is known about other effects including those relevant to the family unit, or which outcomes families see as priorities. Family wellbeing is known to play a critical role in child development, but is excluded from most economic evaluations.

In Australia, the National Disability Insurance Scheme (NDIS) provides individualised funding to enable people with disabilities to exercise "choice and control" over their supports. Participants can theoretically choose their supports based on individual need. This Australian context provides an important opportunity to understand the family experience of service choice for autistic children, and to consider meaningful outcomes in economic evaluations in the field.

Objectives

To measure: 1) supports families access for their autistic preschoolers, 2) potential outcomes they value most, and 3) caregivers' health-related quality-of-life and family experience of autism.

Methods

This mixed methods study comprised a survey followed by semi-structured interviews, both conducted online. The study targeted families in Australia with at least one autistic child who had not yet started school, with promotion via advocacy groups and social media. Survey participants completed the EuroQol-5D-5L and the Autism Family Experience Questionnaire (AFEQ). Interview participants provided more detailed information about supports accessed, factors influencing their choices, and potential outcomes they considered most valuable.

Results

Survey respondents (n=73) had varied socioeconomic and family backgrounds, with children ranging from 25 to 71 months of age, with most (94.4%) accessing the NDIS.

Caregivers' self-reported global health (EuroQol-5D-5L visual analogue scale) averaged 56.59 (95%CI 51.33, 61.86), much lower than previously published general population means in Australia and other developed countries (e.g., 78.55; McCaffrey et al., 2016). The mean total AFEQ score was 144.43 (95%CI 138.84, 150.03; possible range 48-240; high scores indicate poorer outcomes), broadly in line with previously published results (e.g., 141.0; Leadbitter et al., 2018).

Preliminary analysis of interviews (n=19) revealed emerging themes of caregivers' evolving competence in parenting and advocating for an autistic pre-schooler, and difficulty navigating an unfamiliar and under-resourced system. Therapists offering flexibility and neurodiversity-affirming practices were clearly preferred by some caregivers. Participants were often unaware of specific intervention techniques, but valued a flexible approach to their changing needs and limited capacity to attend sessions. Prior knowledge of autism and the support system appeared to improve access to services and clarity about preferred outcomes.

Possible association between family experiences and caregivers' HRQOL will be explored via regression analysis. Thematic analysis will be completed to explore the diverse views of participants, to support an economic evaluation of early supports that incorporates family outcomes.

Conclusions

Australian families access early autism supports using public funding. While financial burden may be reduced and/or the level of support increased with access to this funding, likely inequities persist, reflected here in a heavy reliance on prior knowledge of autism and caregiver capacity to navigate the healthcare/social system. Preferences for family-centered, neurodiversity-affirming practices are not reflected in traditional outcome measures.

4.2 Diversity in the Costs of Disease Complications: A Longitudinal Study across 27 European and Central Asian Countries

PRESENTER: **Marjan Walli-Attaei**, University of Oxford

AUTHORS: Ramon Luengo-Fernandez, Alastair Gray, Aldo P Maggioni, Aleksandra Torbica, Adam D Timmis, Radu Huculeci, Panos Vardas, Jose Leal

Introduction: For many conditions, disease complications are the main driver of care costs. Atrial fibrillation (AF) – the commonest manifestation of cardiac arrhythmia – increases the risk of stroke and coronary heart disease, both of which are costly. The prevalence of AF is expected to rise due to the ageing population, resulting in further increases in healthcare costs. Although the clinical burden of AF is well understood, it is unknown to what extent AF-related complications contribute to health care costs and whether these costs vary across countries.

Objective: To assess the individual patient health care costs associated with AF-related complications and their variation across 27 European and Central Asian countries.

Data and Methods: We used data from the European Society of Cardiology's Atrial Fibrillation General Registry, a prospective, multinational registry of 10,249 atrial fibrillation patients from 27 countries with two-years of annual follow-up. Information on patients' clinical characteristics, health care visits, as well as diagnostic and interventional procedures were collected at each visit. Atrial fibrillation related complications were angina, non-ST-elevation myocardial infarction (NSTEMI), ST-elevation myocardial infarction (STEMI), thromboembolic events, haemorrhagic events, and new onset or worsening heart failure. All health care resource use (inpatient stays, outpatient visits, and medications) were costed using 2019 UK unit costs to better assess variations in overall resource use across countries. The association of AF-related complications and health care costs and resource use were compared across three models: pooled OLS, fixed effects, and random effects models. The Hausman test was used to assess the appropriateness of the fixed effects model. The models were adjusted for patients' clinical and sociodemographic characteristics, prior medication use and geographical location.

Results: Over the follow-up period, 745 (8%) of patients had an AF-related complication at 12-months and 477 (6%) at 24-months. Of the total 1,222 complications, the most common AF-related complication was new onset or worsening heart failure which occurred in 567 (3%) patients with complications. Results of the Hausman specification test showed that the null hypothesis could not be rejected (p-value of

0.806), therefore we report results based on the random effects model. However, regardless of model, the observed associations were similar. Overall, angina (£2,629, 95% CI: 1869 to 3361) and haemorrhagic events (£2,549, £2,199 to £2,900) incurred the highest cost, whereas non-stable myocardial infarction (£1,367, £687 to £2,048) incurred the least additional cost. We found significant regional variation. Costs of angina in Eastern EU and in non-EU former Soviet republics were, respectively, £1,362 (-£2,262 to -£461) and £1,416 (-£2,571 to -£261) lower than in Western Europe. Whereas costs in Southern EU and Northern EU countries were £721 (-£2,629 to £1,186) and £344 (-£1,460 to £ 674) lower than in Western Europe.

Conclusions: Although disease complications are costly across all countries, important differences were observed across countries. These differences were mainly driven by fewer investigation, clinic visits, and ER admissions. Our results highlight, therefore, the important differences in resource use patterns across countries, limiting the generalisability of country-specific economic evaluations to other jurisdictions.

4.3 Socio-Economic and Rural-Urban Differences in Health Seeking Behaviour Among Enrollees of a Sub-National Health Insurance Scheme in Nigeria: Evidence from a Pre and Post Study

PRESENTER: **Simeon Onyemaechi**, University of Nigeria
AUTHOR: Uchenna Ezenwaka

Background: Understanding factors that explain the health-seeking behaviour (HSB) among enrollees of the Anambra State Health Insurance Scheme (ASHIS) is a critical entry point for improving health outcomes and achieving universal health coverage (UHC). This study assesses socio-economic and rural-urban differences in health-seeking behaviour among the enrollees of ASHIS in Anambra State, Nigeria.

Methods: A cross-sectional health facility-based survey involving enrollees of the ASHIS was undertaken. A total of 447 enrollees were randomly selected from 12 (6 rural and 6 urban) facilities using a multi-stage sampling method. Data was collected using a pre-tested, interviewer-administered questionnaire. Analysis was done using Fisher's exact test and multivariable regression models to determine the association between dependent and independent variables. A wealth index was computed by means of principal component analysis (PCA) using household food and non-food expenditures.

Results: Overall, the findings revealed a positive change (71%) in enrollee's HSB post-health insurance enrollment. Majority (83%) of the respondents take prompt action (defined as seeking care within less than 24 hours of episode) when ill post-health insurance enrollment as against 34% (pre-health insurance) resulting in a 49% increase, with a statistically significant difference (p <0.02). There was a percentage increase in the use of health facilities as the choice of provider during an illness episode post-health insurance enrollment. This increased from 37% to 90% (post-health insurance enrollment), representing a 52.8% increase, which is statistically significant (p<0.03), in seeking care in hospitals. Urban facilities were significantly associated with appropriate HSB (p<0.04), source of care (p<0.00), and when care was sought (p<0.00) than the rural facilities. Enrollees with lower socio-economic status (SES) had higher appropriate HSB (p<0.04), source of care (p<0.00), and when health care was sought (p<0.00) than those with higher SES. There was a positive association of urban-rural locations (Adjusted Odds Ratio (AOR) = 1.49, CI 0.15-0.59) with the source of care when ill. SES predicts positive HSB (AOR = 1.29, CI 0.25-0.60) and where health care was sought (AOR = 0.81, CI 0.07-9.13).

Conclusion: Health insurance has been established as an effective strategy for improving appropriate HSB. Yet disparity among urban-rural locations still exists. The distribution of the SES within the health insurance pool indicates that it may have achieved the desired aim of enhanced access particularly to the low-income population. Hence, to attain UHC in developing countries, could be through making quality health facilities available in rural areas given that there isimproved HSB among beneficiaries of health insurance services in rural areas with mainly people of low SES.

Keyword: Anambra State Health Insurance Scheme, ASHIS, Determinants, Enrollees, Health Insurance, Health Seeking Behaviour, Nigeria

4.4 Evaluation of the Spatial Accessibility of Inpatient Services in Beijing, China

PRESENTER: **Jiawei Zhang**, Peking University
AUTHORS: Peien Han, Li Yang

Background: Beijing is not only the capital of China, but also the center of top medical institutions. However, 80% of the tertiary hospitals are concentrated in the central urban districts, and the distribution of medical resources is uneven. Therefore, the government has rearranged medical institutions to improve the accessibility of medical services.

Objectives: The study aimed to quantify spatial accessibility to inpatient services in Beijing and to assess accessibility improvements following the completion of the medical institution reconstruction and expansion in 2025.

Methods: The 2019 health statistics report, medical institution reconstruction and expansion lists from Beijing Municipal Health Commission and the 2019 community based population data were collected. To begin, we obtained the names, addresses, and beds of medical institutions. Second, we computed the proportion of local patients in secondary and tertiary hospitals using data from each hospital's patient source. Thirdly, we analyzed the spatial accessibility of local residents to inpatient services using the enhanced two-step floating catchment area (E2SFCA) method in an ArcGIS 10.5 environment.

Results: The proportion of patients from other provinces hospitalized in secondary and tertiary hospitals in Beijing reached 40%. For inpatient services, the average accessibility to beds was 3.03 beds per 1,000 person, while the median was 2.90 beds per 1,000 person. In all 351 communities, 285 (81.20%) communities fell short of Beijing's threshold for medical resource allocation planning. 78 communities (22.22%) had poor accessibility, which meant the number of beds per thousand person was below 1.0. Accessibility was recalculated using population estimates in 2025 and included reconstruction and expansion of medical facilities. After the rearrangement of medical institutions, the average number of beds available per 1,000 person increased to 4.27, with a median of 4.30. Inpatient services accessibility grew in 289 communities (82.34%), with 98 communities experiencing an increase of more than 50%. 32 communities maintained roughly similar accessibility (change of less than 0.005), whereas 29 communities' accessibility decreased. Inpatient services was more commonly accessible in the central city than in the suburbs and exurbs. The reconstruction and expansion of medical institutions has significantly improved the accessibility of medical services.

Conclusions: In comparison to Beijing's guideline for medical resource distribution planning, the total medical sources are insufficient when considering external patients from other provinces. Additionally, the proposed model's results indicate a large gap in community-level spatial accessibility to inpatient care. Accessibility to inpatient services has improved in Beijing with the reconstruction and extension of medical institutions, with the majority of improvements occurring in the southern and eastern suburbs. The government should pay attention to the reasonable distribution of medical resources in areas with sufficient resources, and avoid the phenomenon of excessive concentration of resources such as "super hospitals", in order to achieve the equity of allocation.

4.5 The Socio-Economic Capabilities of the Rwanda Community Based Health Insurance (CBHI) Beneficiaries

PRESENTER: **Mark Akanko Achaw**, USAID Rwanda Integrated Health Systems Activity (RIHSA)
AUTHORS: Regis Hitimana, Charles Mulindabigwi Ruhara, Edouard Musabanganji

Since the establishment of the Rwanda CBHI scheme in 2000, premiums have only been revised once in 2011, during a reform that came with the introduction of socio-economic classification. To ensure the CBHI's continuous financial sustainability, there have been calls for various reforms including the revision of the premiums to reflect current socio-economic conditions.

In this context, the RSSB in collaboration with the USAID RIHSA project facilitated this large-scale study to assess the willingness and ability of people of different socio-economic conditions to pay an increased premium for an improved CBHI service which includes access to private health facilities. The socio-economic classification of the study respondents was aligned to the country's socio-economic categorisation called "Ubudehe", where category-1 are the very poor citizens and category-4 members are the upper income earners. The CBHI has different premiums for each category i.e., Category-I household members are charge RWF3,000 (this category get fully subsidised from Government and donors), RWF 3,000 per person for Category II & III and RWF7,000 per person for Category-4.

The study employed the Double-Bounded Dichotomous Choice (DBDC) Contingent Valuation (CV) technique to elicit responses from 6,044 randomly sampled respondents across the 30 districts of the country. A three-stage sample design was used (i.e., district, sector, cell, and household). The sample size was calculated with Deff=1.5; P=0.50; Z=1.96 at 95% Confidence Interval; e=0.05, and α=0.1. Some of the broad questions asked included: What factors enable or limit CBHI enrolment; What is the maximum amount that people are willing to pay for an improved CBHI; and what is the ability to pay for different packages based on socio-economic characteristics?

Logistic and linear regression models were applied to examine determinants of willingness to join the CBHI and willingness to pay respectively. Eighty percent (n=4888) of respondents indicated that they would be willing to enrol in an improved CBHI if all essential medical services and medicines are accessible and available. The overall average amount the households were willing to pay for an improved CBHI was RWF3,572 (US$3.5) per person. However, current CBHI members were willing to pay a maximum of RWF3,572 (US$3.5) per person compared to RWF3,229 (US$3.2) among previous members and RWF3,817 (US$3.8) among respondents who have never enrolled in the CBHI. Also, differences were found across people from different socioeconomic levels; for example, respondents from Ubudehe category II households were willing to pay a maximum of RWF 3,518 (US$3.5) per person, much less than respondents from category-III households who reported willingness to pay of RWF4,648 (US$4.6).

The statistically significance potential determinants of willingness to enrol and to pay for an improved CBHI include household's socio-economic classification, size, head's age and employment status, income, expenditure, participation in income generating activities, saving behaviour, utilisation of healthcare, knowledge and understanding of the CBHI terms and conditions, perception of quality of healthcare services, and price of the CBHI. Importantly, several respondents indicated that current challenges with the CBHI including improving the availability of medicines at health facilities must be addressed before any premium adjustments are made.

4.6 Decongesting Public Health Facilities in Urban Settings: The Role of Client Perceptions

PRESENTER: **Cathbert Tumusiime**, ThinkWell Institute
AUTHORS: Richard Ssemujju, Charlotte Muheki, Michael Chaitkin, Paul Kiggundu, Angellah Nakyanzi, Daniel Ayen Okello

Background

Since 2000, maternal mortality ratio in Uganda have declined from 550/100,000 to 336/100,000 between 2000 and 2016. Despite this progress, Uganda is not on track to meet the global target of less than 70 deaths per 100,000 livebirths by 2030 Uganda will need to intensify efforts to increase access for key maternal interventions if it is to achieve this target.

Research shows that demand for maternal health services in Kampala continues to exceed what public health facilities can supply. Out of 1,448 health facilities in Kampala, only 2% are public facilities. With a high population in the city, limited number of public health facilities result in congestion in health facilities, which leads to delays in access to care. Uganda's annual Maternal and Perinatal Death Surveillance and Response Report (2020/21) noted that delays in accessing healthcare contributed to half of the maternal deaths. Decongesting public health facilities in Kampala would greatly improve timely access to maternal health services. We conducted a study to document client perceptions of services in public facilities with the view to inform solutions for decongesting health facilities in an urban setting in Kampala.

Methods

To understand the choices, and healthcare seeking behaviour of women and girls aged between 15 and 49 years, a cross-sectional study was conducted at two public health centres in Kampala. Data were collected through document reviews, client questionnaires, and focus group discussions (FGDs). Using STATA v14, analysis included quantitative and qualitative summaries of client characteristics and their perceptions and willingness to access care from private providers.

Findings

Results showed that women preferred to access care in public facilities because they perceived higher quality of care at those facilities particularly in terms of availability of medicines and qualified health workers, attitude of health workers and clean environment. Clients would prefer to access antenatal care and family planning (FP) services from private facilities and delivery, permanent FP methods, and emergency care services from public facilities because they are free.

We also found that women were willing to access health services at private health facilities if they were made available free of charge with a preference for private-not-for-profit facilities because of their perceived low-cost services compared to private-for-profit facilities. Women acknowledged that they were aware of the services provided by the private sector but were concerned about affordability and their current economic situation.

Additionally, we found that proximity to health facility in relation to women's workplace was a key factor in determining where women sought care.

Conclusion

Public health facilities in Kampala are severely congested and this has led to delayed access to maternal health services. Lessons from this study show that, to decongest public health facilities in an urban setting, maternal health services can be strategically purchased from private health providers if we ensure that they access free services of high quality and there is good proximity to women's workplaces.

4.7 Mental Health Care Use Among High-Cost Children and Youth

PRESENTER: **Claire de Oliveira**, Centre for Addiction and Mental Health

Background: Most research on high-cost patients has mainly focused on adults; however, children and youth can also incur high costs, particularly those with mental disorders. The objectives of this analysis were to examine high-cost children and youth who use mostly mental health care and understand whether and why they persist in the high-cost state.

Methods: Using health care records on children and youth covered under a universal health care system, we selected all individuals in the ninetieth percentile of the cost distribution in 2012. Among all high-cost patients, we defined mental health high-cost patients as those for whom costs related to mental health care accounted for 50% or more of their health care costs and compared them to non-mental health high-cost patients. We followed mental health high-cost patients until 2019 to determine the predictors of being a moderate or persistent mental health high-cost patient compared to being a sporadic one using regression analysis. Moderate and persistent mental health high-cost patients were defined as those in the high-cost state for 3-5 years and 6-8 years, respectively.

Results: In 2012, there were 273,490 high-cost patients (mean cost = $7,936.37). Roughly 8% (n = 20,463) were classified as mental health high-cost patients (mean cost = $10,040.16; mean age = 13; 51% males), where asthma (30%), ADHD (36%) and mood and/or anxiety disorders (95%) were the most common conditions. Persistent and moderate mental health high-cost patients comprised 2% and 17% of all mental health high-cost patients, respectively. These groups were slightly younger (mean age = 9; 12) and had more males (65%; 47%), and more likely to have mental and behavioural disorders compared to sporadic high-cost patients. Having mood and/or anxiety and schizophrenia spectrum disorders were identified as the main predictors of persistence in the high-cost state in the regression analysis.

Conclusion: Some high-cost children and youth have high levels of mental health care use, namely those with mood and/or anxiety disorders. These findings will help inform the development of appropriate case management and care coordination interventions and improve the design of care pathways for this patient population.

4.8 Use of and Healthcare Access through Community-Based Health Insurance Among Migrants from Senegal

PRESENTER: **Modou Diop Jr.**, University of Granada

OBJECTIVE

Senegalese organisations and communities abroad have been widely described as providers of funds for the repatriation of deceased migrants to their home country. This research captures the further development of community-based protection mechanisms. In the context of Spain, Senegalese organisations have started to gather and channel funds to ensure access to healthcare. The aim this study was provide an in-depth analysis of the origin and the functioning of Community-based Health Insurance (CBHI)

METHODS

We have conducted 28 in-depth interviews in various localities in Spain. Participants were asked about barriers to healthcare access and finance as well as the role and contribution of CBHI to healthcare access. Grounded theory procedures were used as a general framework for the analysis of the collected data.

RESULTS

The findings show that CBHI emerged as a collective response to unmet medical needs. Community funds are mobilised in these cases in which access to healthcare cannot be provided by public and private healthcare systems. We have also captured the emergence of transnational tendencies in healthcare as community insurance is also used to fund return, care, and treatment in Senegal.

CONCLUSION

Migrant organisations prove to be grassroots microfinance initiatives that can contribute to the improvement of access to healthcare both in the country of destination and the origin.

4.9 Willingness to Pay for Primary Health Care at Public Facilities in the Western Cape Province, Cape Town, South Africa

PRESENTER: **Plaxcedes Chiwire**, Western Cape Government: Health

Background and Objectives: As facilities are being prepared for the implementation of National Health Insurance (NHI) in South Africa, there is a pressing need to understand how the public equates the provision of health services at Primary Health Care (PHC) centres with monetary value. Accordingly, this exploratory study was designed to ascertain the willingness to pay (WTP) for public primary healthcare services in South Africa and to identify factors that influence the WTP.

Methods: The study was conducted in Cape Town, South Africa, among 453 persons presenting at two public primary health care centres, namely Bothasig Community Day Centre (CDC) and Goodwood CDC. The study used the contingent valuation range methodology. Descriptive statistics, multiple logistic and tobit regression analyses were conducted to assess demographics, socio-economic, and health access factors that influence WTP.

Results: Overall, 60% of participants were willing to pay for services offered at the PHC facilities. The average willingness to pay for all participants was 49.44 ZAR, with a median of 25 ZAR. The multiple logistic regression for grouped facilities showed unemployment, public transport, and the facility attended to be significant while public transport, facility visits, and facility attended were the only significant variables in the tobit model. There was less willingness to pay for those unemployed in comparison with students, those using public transport rather than walking, those frequenting the facilities more than first-time visitors and those attending Goodwood facility in comparison with Bothasig.

Conclusion:
This study revealed factors related to the participants' WTP and to their willingness to contribute towards the health service, though at very low amounts. Understanding the economic value placed upon a service provided in a facility is essential in decision-making for quality care

4.10 Applying Machine Learning and Natural Language Processing to Electronic Medical Records to Develop a Predictive Model of 30-Day Hospital Readmission Among Older Adults with Alzheimer's Disease and Related Dementia

PRESENTER: **Elham Mahmoudi**

Background: Hospitals are insufficiently equipped for patients with complex care needs. For example, hospital readmission is higher and costlier among patients with Alzheimer's disease and related dementia (ADRD) than the general population. Hospital discharges often occur without adequate preparation for the specific needs of patients or their caregivers. This study aimed to develop a risk-assessment tool for hospitalized patients with ADRD. We hypothesized that by providing timely and interpretable risk assessments, hospital discharge planners could allocate scarce resources more efficiently to reduce readmissions.

Data/Methods: We used 2016-2019 electronic medical records data from the University of Michigan health system and applied regression and machine learning techniques (Random Forest, XGBoost, Generalized Additive Model, and Logistic LASSO) to develop a readmission risk-assessment tool. Furthermore, we applied natural language processing (NLP) to identify whether patients had an informal caregiver (e.g., family members or friends) to care for them at home. We identified 2,899 individuals with ADRD who had at least one index hospital

admission. We included more than 170 data features (variables) in our predictive model, including demographics, lab results, prior counts of healthcare use, characteristics of index hospitalization, and caregiver availability (predicted using NLP algorithm). Additionally, we geocoded the street address of place of residence using the National Neighborhood Data Archive using the U.S. Census tract-level information to include two composite measures of socioeconomic status: disadvantage (high concentrations of poverty, unemployment, female-headed families, households receiving public assistance income, and a high proportion of African Americans) and affluence (high concentrations of adults with a college education; with incomes > 75K and people employed in managerial and professional occupations). Finally, to ensure that we included all hospital readmissions, using probabilistic matching, we merged our data with all claims within the state of Michigan to include readmissions to other hospitals.

Results: The readmission rate for ADRD patients was 22% versus 17% for the general geriatric population. The best predictive model based on the validation set was the Random Forest (area under the receiver operating characteristic curve=0.66; sensitivity=0.64; specificity=0.61). The accuracy of our model (0.61) was 42% higher than the LACE score (0.43), which the hospital currently uses for all patients. The top 5 predictors of 30-day readmission among people with ADRD included length of hospital stay, frailty index, living in a disadvantaged neighborhood, and total prior-year healthcare charges. The generalized additive model provides the highest level of interpretation, enabling us to predict who is at risk of readmission and why. For example, people whose length of stay in the hospital was more than 6 days had a higher risk of readmission.

Conclusion: ADRD patients are highly vulnerable and require many resources, with substantially greater readmission risk and elevated rates of other adverse health events. Leveraging structured and unstructured electronic medical records data in a readmission risk-assessment tool can help inform appropriate and efficient coordination and transitions of care for high-need patients. Our risk-assessment tool can identify patients at high risk for readmission and why they are at higher risk. This can enable better decision-making before discharge.

4.11 Impact of Health Shock on Healthcare Utilisation Among Australian Adults: Do Gender Disparities Exist?

PRESENTER: **Rezwanul Rana**, Macquarie University
AUTHOR: Syed Afroz Keramat

Introduction: Past studies have shown that women report greater morbidity and use healthcare services more than men. However, individuals navigate the health system differently after experiencing a health shock. Hence, we examined whether there is gender-specific heterogeneity in healthcare utilisation due to a health shock among Australia's middle-aged and older adults.

Methods: We used three waves (waves 9, 13 and 17) of the Household, Income and Labour Dynamics in Australia (HILDA) survey (estimation sample spans nine years). The retrospective longitudinal research design included individuals aged 15 years and over. We constructed an unbalanced panel data, consisting of 29,002 person-year observations from 16,476 unique individuals. We have taken two variables (work-limiting disability, and serious injury or illness to self) as the proxy of health shock. We have also considered seven healthcare utilisation variables as the outcome variables (GP/hospital doctor, specialist, allied health professional, mental health professional visits, number of doctor visits, number of hospital admission, and number of nights stay in the hospital). We used the longitudinal fixed-effects logistic regression and fixed-effects negative binomial regression techniques to find out the within person differences in the association between health shock and healthcare services utilisation.

Results: We have found evidence that both proxies of health shock increased the utilisation of healthcare services. Our results indicated that work-limiting disability increased the utilisation of all the studied healthcare services utilisation. We also found that serious injury or illness to self lifted all the studied healthcare services utilisation except allied and mental health professional visits. We also revealed that gender differences exist in healthcare services utilisation caused by health shocks.

Implications: Understanding the gender difference in healthcare utilisation will provide additional information for developing appropriate health policies and care programs, communication strategies, and care practices that can improve the overall health outcomes of patients experiencing health shocks.

4.12 Antenatal Care and Birth Weight: Causal Evidence from India

PRESENTER: **Santosh Kumar**, Notre Dame University
AUTHORS: Kaushalendra Kumar, Kompal Sinha, Bernard Nahlen

Objective

About 18% of Indian infants are born as low birth weight infants (LBW, weighing less than 2,500 grams). Poor birth outcomes have negative consequences on adult health, education, cognition, and labor market outcomes. Inadequate antenatal care is widely considered an important risk factor for LBW. The main goal of this study is to estimate the causal effects of antenatal care on the incidence of LBW in India.

Data and method

The study uses data from the fourth round of the National Family Health Survey (NFHS-4) surveyed in 2015-16. The analytical sample is restricted to the last-born children since ANC information is available for only the last birth before the survey. We use the instrumental variable method to estimate the causal effects of ANC on LBW since the ANC variable is endogenous. For example, women with complicated pregnancies are likely to have more ANC visits and give birth to infants with lower birth weights. Unobserved characteristics of

the mother, such as health behavior, may affect the infant's decision to seek antenatal care and birthweight simultaneously. We use the average distance to the health facility at the district-rural level as an instrument for the ANC visits. We control for birth order, gender, and age of the infants; mother's education, age, height, religion, caste, household wealth, year of birth fixed effects, and district fixed effects. Standard errors are clustered at the district level. The sample size is 142,000 observations.

Results

The average birthweight is 2,825 grams and about 17% of the infants are LBW. The average number of ANC visits is 4 and about 18% of women had zero ANC visits. Only 47% of the women had an adequate number of ANC (ANC > 4 visits). The 2SLS results show that an extra ANC visit reduces LBW probability by 5.6 percentage points, while women with adequate ANC visits had 28 percentage points lower probability of giving births to LBW infants. Furthermore, ANC quality reduces the probability of LBW by 11.5 percentage points. These effects are statistically significant at a 5% level of significance.

Conclusions

High levels of malnourishment among young children in India such as stunting, and wasting are close to 50%. LBW is a significant risk factor for malnourishment among children. Promoting antenatal care can be an effective policy to improve birth outcomes and infant health and reduce malnourishment in developing countries. A conditional cash transfer similar to Janani Suraksha Yojana could increase the demand for antenatal care in LMICs.

4.13 Maternal Health Service Utilization and Its Determinants Among Women in Poverty-Stricken Rural Areas of China

PRESENTER: **Yuxuan Yang**, Academy of Military Medical Sciences
AUTHOR: Min Yu

Background: Reducing the maternal mortality rate (MMR) has been a worldwide public health challenge for a long time. Utilization of maternal health services including antenatal care (ANC), institutional delivery (ID), and postnatal care (PNC) is vital to prevent maternal mortality. China has made significant improvements in maternal health during the past 30 years, however, disparities in maternal health service utilization still exist among regions and the western rural areas had the lowest utilization rate. This study aims to assess the inequality and influencing factors of maternal health service utilization in western poverty-stricken rural areas based on Anderson's Behavioral Model of Health Service Use and provide evidence-based suggestions to improve equity and coverage of maternal service utilization.

Methods: A cross-sectional study was conducted in Gansu and Yunnan Province, Western China using survey data (n=996) collected by our research team. A multistage, judgment, quota sampling procedure was employed to select the participants of the survey. Trained local health staff formed an interview team to help respondents answer a structured, pre-tested questionnaire designed based on Anderson's Model. Data collected through interviews were used for descriptive analysis, and univariate and multivariate binary logistic analysis to identify influencing factors of 5+ANC (at least five ANC visits during pregnancy), 8+ANC (at least eight ANC visits during pregnancy), ID, and PNC utilization.

Results: Place of resident, education level, per capita household income and health education during ANC were influencing factors of 5+ANC; place of resident, education level, per capita household income and availability of financial incentive programs were influencing factors of 8+ANC; place of resident, education level, and availability of financial incentive programs were influencing factors of ID; education level, number of children, health education during ANC, and availability of financial incentive programs were influencing factors of PNC.

Discussions: Inequities in maternal service utilization existed between Yunnan and Gansu province. As of predisposing factors, education level was positively correlated with service utilization and number of children was negatively correlated with the utilization. As of enabling factors, respondents living above poverty line, receiving health education during ANC and participating in financial incentive programs tend to have higher utilization rate. Need factors didn't show significant influence on maternal health service utilization.Our key finding is that financial factors and health literacy are important determinants of maternal service utilization. Therefore, promoting financial incentive projects and increasing health education adherence are suggested in order to increase utilization rate and improve maternal health.

Keywords: maternal health service utilization, Andersen's Behavioral Model of Health Services Use, antenatal care, institutional delivery, postnatal care

4.14 Take-up and Impact on Healthcare Utilization of a Public Health Insurance Program for Undocumented Migrants in France

PRESENTER: **Paul Dourgnon**, IRDES
AUTHORS: Florence Jusot, Antoine Marsaudon, Jérôme Wittwer

Title: Take-up and impact on healthcare utilization of a public health insurance program for undocumented migrants in France

Context and Objective

The French so called State Medical Aid is a public health insurance program implemented in 2000 which provides undocumented migrants with access to a comprehensive basket of health care services, free of charge. The coverage is means tested and provided for a year, after which one has to reapply. To this day, the undocumented migrants residing in France had remained largely understudied, and neither take up nor the effects on the program on healthcare utilization had been assessed.

Data and Methods

To study the State Medical Aid take up and ensuing healthcare utilization, we designed the Premier Pas survey, a representative survey of undocumented migrants attending facilities providing assistance to deprived populations in France, either public services or NGOs. The data was collected in 2019 on a sample of 1 223 undocumented migrants. The questionnaires focused on migration history, health status, State Medical Aid coverage, access to healthcare services.

The statistical analysis of coverage determinants was performed using Probit and Cox modeling. The analysis of patterns of healthcare consumption was based on Probit and multinomial Probit modelling.

Results

The results show that only 51% of those who are eligible for the State Medical Aid program are covered. Women appear more often covered than men. Non take is correlated to lower proficiency in French language, poor housing, food insecurity, and above all length of stay. The length of stay in France is the strongest and most consistent determinant of take-up. It is worth noting that State Medical Aid take-up is not associated with chronic diseases and is negatively associated with poor mental health. Access to the State Medical Aid overall appears as a slow and incomplete process occurring over the years, with 35% still being uncovered after 5 or more years in France.

Undocumented migrants covered by Medical State Assistance are more likely use healthcare services, and to choose medical practices as their usual sources of care. Length of stay and length of coverage are strong predictors for usual source of care.

Conclusions and Policy implications

- While 51% are covered, a large part of migrants with significant health needs remains uncovered, meaning that the policy does only very incompletely reaches those who need it the most.

- Lack of inclusiveness of social and health services, including translation services and administrative simplification, which are largely documented in France, are essential to ensure better access to coverage, especially for those who need it the most.

- Poor living conditions in the host country are detrimental to both health and access to coverage.

4.15 Service Utilization Differences at the Strategic Purchasing Clinics : Findings from First Pilots in Myanmar

PRESENTER: **May Me Thet**, Population Services International Myanmar
AUTHORS: Naw Eh Thi Paw, Ye Kyaw Aung, Phyo Win Naing, Phyo Myat Aung

To accomplish the Universal Health Coverage (UHC) goal in Myanmar and to support the country's pro-poor strategy, Population Services International Myanmar introduced a pilot in Yangon urban township and another one in Chin rural township in 2017 with an innovative financing mechanism where private General Practitioners (GP) were contracted to provide basic primary care services. Four GPs (2 in Yangon and 2 in Chin) were provided with a capitation payment system. Poor households were registered in the pilots and they were issued health cards to seek services such as those for under 5 years old (U5), family planning (FP), maternal health (MH), non-communicable diseases; hypertension and diabetes (NCD), counselling and referral (CS) and fever and minor illness (Gen) with a standard subsidized rate. The project aims to lessen financial burden of households with a hypothesis that poor families could reduce their financial burden if they seek care at the pilot GPs. The objective of this study is to investigate the clinic utilization patterns and assess equity in utilization by applying absolute and relative equity indices.

The study uses client registration data and routine clinic data from March 2017 to December 2021. The utilization data were retrieved from clinics data bases. The socioeconomic status of the households was assessed by household assets and measured by constructing a wealth index using principal component analysis. Each type of service utilization was stratified by wealth quintiles. Equity was assessed by measuring differences in service utilization between poorest wealth quintile (Q1) and richest wealth quintile (Q5) and then by calculating slope index of inequality (SII) and concentration index. Statistical significance was set as $p=0.05$.

Among 10,685 beneficiaries, 70.7% received at least one service from the GPs. Mean age of users was 25.9(SD 20.9) years and 56% of users were women. Chin users (53.7%) were more than those of Yangon for any service but for specific services, FP, MH and CS users were significantly more in Yangon than Chin. Fever and minor illness (Gen) was the most popular service with 98.4%, followed by U5(79.3%), CS (42.1%), NCD (16.5%), FP(15.4%), and MH(11.6%). Service utilizations disparities were seen among age groups, gender, geographic regions and wealth quintiles ($p<0.05$). While younger beneficiaries used more FP and MH services, older ones sought more NCD services.

The utilization differences between Q1 and Q5 were U5 (27.6% vs.11.4%), FP (30.8% vs.10.1%), MH (34.6% vs.7.7%), NCD (22.0% vs.12.1%),CS (33.5% vs. 5.4%) and Gen (26.5% vs.12.3%) and . The SII were significantly negative for all services in both pilots, indicating that the users were higher among individuals in the poor wealth quintiles. The concentration indices for services were -0.09 (U5), -0.17 (FP),

-0.24(MH), -0.5(NCD), -0.1(Gen) and -0.25(CS). These index values were statistically significant (p<0.001) and it showed that all services utilization were favored by poor beneficiaries.

The study findings indicated that the pilots seemed to work for the poor in both urban and rural settings as targeted. Thus, there is a potential for large scale implementation among poor communities in other regions of Myanmar.

4.16 Tracking Healthcare Spending on Injuries Using Public Health-Relevant Categories

PRESENTER: **Haley Kathryn Lescinsky**, University of Washington
AUTHOR: Joseph Dieleman

Injuries account for a large portion of healthcare utilization and spending in the USA. However, most data tracking healthcare utilization and spending on injuries use *nature of the injury* coding typology, such as broken wrist or brain injury instead of the public health-relevant categories associated with the cause of the injury, such as car accident or self-harm. Though not required for billing, *cause of injury* information provides important policy-relevant information on the activity, mechanism, and intent behind an injury, as well as identifying opportunities to prevent injuries, improve health, and ultimately to reduce avoidable healthcare utilization and spending.

To make claims data with nature of injury ICD codes useable for tracking healthcare utilization and spending using actionable categories, we developed maps that probabilistically link nature of injury codes to causes of injury. We then aggregated healthcare utilization for distinct types of care for each cause of injury.

We use USA hospital claims data from the Healthcare Cost and Utilization Project (HCUP), MarketScan, Medicare, Medicaid, and Kythera Labs. Since this data contains cause of injury codes along with nature of injury codes, we analyze the co-occurance rates of injury codes in the diagnosis chains of the encounter-level data. To reduce complexity, we link simplified nature of injury ICD codes to one of 6 causes of injury: falls, self-harm, transport injuries, exposure to mechanical forces, interpersonal violence, and unintentional injuries (cuts, poisonings, drowning). This is done separately for 38 age and sex groups and 5 types of care. We use generalized additive linear models with an age spline and linear year to ensure plausible age and time trends for nature to cause of injury ratios when there are limited observations or missing years.

We made maps for 291 ICD9 and ICD10 nature of injury codes with distinct age, sex, and time trends that differ between ambulatory, emergency department (ED), inpatient (IP), home health, and nursing facility settings. Each mapping provides insight into the causes that are associated with specific nature of injury codes. One of the most frequently occurring nature of injury codes is open head wound, which exists in both ICD9 and ICD10. From the constructed and then modeled ratios, we see that the probability of an open head wound due to a fall increases as adult's age increases for both ED and IP. However, transportation injuries are more likely to have caused an open head wound than mechanical injuries in an inpatient setting, while the reverse is true in an ED setting. Another finding from this example is that the 2014 ICD9 and 2016 ICD10 maps are remarkably similar, indicating that our method can be robust to the coding impacts of the ICD9 to ICD10 transition. Across all HCUP data, we see that falls is the injury that the highest healthcare utilization and spending.

Our method and estimated mappings can be used to further assess patterns in injuries and assess more granular causes of injury. Identifying public health policies to reduce rates of injury requires knowing the cause of injury.

4.17 Socioeconomic Inequalities Related to the Management of T2D Outpatients By Residential Areas in Tunisia: Application of Regression-Based Decomposition Using an Analytic Approach.

PRESENTER: **Khouloud Khemiri**, UAntwerpen
AUTHORS: Philippe Beutels, Guido Erreygers

Background: Persuasive statistics, at least, of STEDIAM conference in Tunisia (STEDIAM, 2017) show that about one million of Tunisians live with diabetes but only half of them know about their health condition, and half of those aware that they are diabetic could achieve their healthcare treatment. By 2028, this figure would rise to double. The THES report (THES, 2020) shows that 15.5% of the 15 years old and over of the surveyed population had diabetes. The prevalence is higher among people who are: male (16.1%), 60 to 65 years old (37%), earning higher income (16.7%) and with low education (26.9%). In addition, only 12.92% of diagnosed patients have regular consultations with doctors and only 38% regularly checked their blood sugar individually (INSP, 2020).

While diabetes is not considered curable or reversible, crucial self-management of diabetes by patients includes early detection, regular consultations with physicians and self-checking of the blood sugar and medication. Preventing the development of diabetes and regular self-management are key factors in early screening high-risk individuals and then prevent their disease complications.

The purposes of this paper are: 1) to understand the determinants of inequalities in relation to socioeconomic, socio-demographic, and clinical morbidity; 2) to quantify inequality in diabetes healthcare checkup utilization; and 3) to compare the empirical outcome of using income level, health insurance status and educational level as proxies for Socio-Economic Status (SES) between the urban and rural areas in Tunisia.

Methods: We used data of the National Health examination survey in 2016 (N = 1681). A concentration index with the decomposition of related-socioeconomic inequalities into contributing factors according to the analytic approach was computed.

Results: Differences in T2D patients' healthcare utilization patterns suggest that checkups differ among outpatients belonging to all SES and between rural and urban areas. Comparison of the empirical outcomes from using educational level, health insurance coverage and income level (used as a proxy for patients' SES) indicate significant differences in inequality estimates. While income and education are factors of inequalities, health insurance and age are more decisive factors for patients' ability to maintain adequate diabetes management.

Conclusion: First, results show impact of SES and health insurance effects on the inequalities of access to regular consultations. Then, the regular self-check of blood sugar depends significantly on SES among patients. Finally, some barriers remain to achieve better diabetic healthcare, and therefore require original policy interventions.

*Keywords***:** Diabetes management, Inequalities, Concentration index, urban and rural areas.

4.18 Implementation of the Basic Health Care Provision Fund in Nigeria: A Retrospective Analysis of Released Funds, Enrollment, and Utilization of Healthcare Services

PRESENTER: **Bolanle Bukola Olusola-Faleye**, Abt Associates
AUTHORS: Charles Aninweze, Deji Bodunde, Abdu A Adamu, Umar Ahmed, Gaza Gwamna, Jemchang Fabong, Abdulkadir A Shinkafi, Andrew Murphy, Ekpenyong Ekanem, Elaine Baruwa

Background:

According to Nigeria's National Bureau of Statistics, about 133 million Nigerians live in poverty, and over 95% have no health insurance. The National Health Act 2014 established the Basic Health Care Provision Fund (BHCPF) to provide a minimum package of services through 1) the National Health Insurance Authority (NHIA) via subsidized insurance for vulnerable groups and 2) the National Primary Healthcare Development Agency (NPHCDA) via direct facility financing, to fund primary healthcare revitalization. The USAID-funded Local Health System Sustainability project supports BHCPF implementing agencies in Nasarawa, Plateau, and Zamfara states to assess, strengthen and expand the program. However, since the BHCPF program's start in 2021, impact analyses have not been conducted to determine if the implementation is efficient and effective in terms of results.

Objectives:

An analysis of BHCPF program data in three states is reviewing disbursements (insurance capitation and direct facility financing), expenditures, enrollment figures, and enrollee healthcare service utilization across three states to understand the impact of BHCPF implementation through increased funding at the facility level.

Methods:

A retrospective analysis of BHCPF disbursement (via capitation payments per enrollee and direct facility financing) and expenditure data, along with corresponding enrollment targets and actuals, were obtained from state records. Clinical encounter numbers from the primary healthcare facilities receiving DFF and capitation payments between August 2021 to October 2022 were recorded.

Results:

Analysis of the BHCPF disbursement showed that all three states had received funds in two tranches for Nasarawa, Plateau and Zamfara respectively (NGN531,026,764.68- USD 1,193,318.57; NGN754,743,809.07- USD1,696,053.50; and NGN550,920,000.00-USD1,238,022.47) from the NHIA gateway for two consecutive years – USD1 to NGN445. Regarding enrollees: 22,920, 33,823, and 23,862, which represent 80.6%, 97.2%, and 51.9% of the enrollment targets, have been enrolled in Nasarawa, Plateau, and Zamfara States, respectively. Aggregate healthcare service utilization data for Nasarawa State suggest approximately 1.25 visits per enrollee per year. Further expenditure, demographic disaggregation, and utilization analysis for the three states are in progress. While financial disbursement and enrolment data are mainly complete, expenditure and clinical encounter data are not.

Conclusions:

The study findings showed that the release of the BHCPF funding has been consistent. Enrolment compared to the targets varied across the states but has been high in Nasarawa and Plateau. As such, capitation payments have been made along with direct facility financing payments. Analysis findings will likely confirm that women and children account for a substantial proportion of enrollees, given the enrollment criteria prioritize children and pregnant women. However, utilization is suboptimal where data are complete and significant data gaps exist. Since DFF should benefit both enrollees and non-enrollees, it is critical to understand facility-level expenditures to understand why increased funding is not leading to increased utilization. Furthermore, data gaps appear at the facility level, suggesting a need for increased state agency support to strengthen facility-level program management.

Keywords: BHCPF, targets, enrollment, healthcare utilization

4.19 Assessing Trends in Telehealth Visits in the US: Evidence from a Large Commercial Health Insurer

PRESENTER: **Bijan Borah**, Mayo Clinic
AUTHOR: Hannah Ahn

Introduction

COVID-19 pandemic accelerated the use of telehealth visits in the US. Adoption of telehealth or virtual care, which includes both phone and video visits, was aided by the regulatory flexibilities including licensing requirements enabling clinicians to provide care to out-of-state patients, and reimbursements for telehealth visits both by government and commercial payers. While many of the COVID-19-related public health emergency deregulations have expired or about to expire, telehealth has matured in the last couple of years and will likely stay as an optional mode of delivering and receiving care. However, there is dearth of evidence on the longitudinal trends in telehealth utilizations including the types of diagnoses, and whether the nature of telehealth utilizations have changed in the post-COVID world. The objective of this project is to estimate the trends in telehealth usage and how those trends stabilized in the post-COVID era.

Methods

Adult patients (age³18 years) with evidence of telehealth use between April 2020 and March 2022 were identified from OptumLabs Data Warehouse®. The date of the first telehealth visit was defined as the index date. Patients were required to have continuous medical insurance 1 year prior to the index date (baseline) and at least 90 days following the index date (follow-up). The types of visits as characterized by the primary and secondary diagnosis codes will be captured during the follow-up period. Patient characteristics, including age, gender, race, geographic region etc. will be reported. The top 10 primary diagnoses and top 10 secondary diagnoses will be reported.

Results

A total of 11,043,320 unique patients had a qualifying telehealth visit during the 2-year identification period. The average age of patients was 51.9 years with 46.2% males and 53.8% females. The race composition of the cohort was 66.0% whites, 11.3% Blacks, and 22.7% others. About 23.0% of the patients had more than bachelor's degree and 84.7% of the patients were from a metropolitan area. In addition, 71.4% had commercial insurance while 28.6% had Medicare insurance (elderly patients aged³65 years).

The top 10 primary diagnoses captured during telehealth visits included hypertension, encounter for general adult medical examination without abnormal findings, generalized anxiety disorder, COVID-19, contact with and (suspected) exposure to COVID-19, contact with and (suspected) exposure to other viral communicable diseases, type 2 diabetes mellitus without complications, low back pain, major depressive disorder, and adjustment disorder with mixed anxiety and depressed mood. The top 10 secondary diagnoses included: hypertension, generalized anxiety disorder, hyperlipidemia, muscle weakness, type 2 diabetes mellitus without complications, anxiety disorder, mixed hyperlipidemia, low back pain, contact with and (suspected) exposure to COVID-19 and hypothyroidism.

Conclusion

Our findings suggest that patients that used telehealth were heterogenous in terms of their baseline characteristics. Key diagnoses during telehealth visits appeared to be for chronic conditions (e.g., hypertension, type 2 diabetes) and mental health conditions (e.g., generalized anxiety disorder). This underscores the emerging trend that telehealth can potentially play a complementary role in managing patients with chronic and mental health conditions.

4.20 Evaluation of Implementation and Utilisation of Telehealth Services during the COVID-19 Pandemic in Rural Australia

PRESENTER: **Feby Savira**, Deakin University
AUTHORS: Liliana Orellana, Martin Hensher, Lan Gao, Andrew Sanigorski, Kevin Mc Namara, Vincent Versace, John Szakiel, Elizabeth Manias, Anna Peeters

Introduction: In March 2020, the Australian Government expanded the availability of telehealth services in response to the COVID-19 pandemic. This study sought to evaluate the implementation and utilisation of telehealth services in rural Victoria, Australia, before and during the pandemic.

Methods: To evaluate the implementation of telehealth, we conducted semi-structured interviews with practice managers working in general practices across rural Victoria, Australia. Interview data was coded to the Consolidated Framework for Implementation Research and emerging themes were synthesised. To evaluate the utilisation of telehealth, we examined longitudinal Medicare claims data from July 2019 to June 2021 from approximately 140 general practices in rural Victoria. The patterns of monthly proportion of general practitioner and nurse consultations, overall and by type of consultation (videoconference vs. telephone), were analysed descriptively. Further, the pattern of consultations stratified by consumer characteristics and length of consultation was estimated using generalised linear mixed models.

Results: Preliminary analysis of interview data suggests that the implementation of telehealth was challenging due to 1) multiple rapid changes in rulings for telehealth use, 2) staff difficulty in adapting to sudden workflow changes, and 3) a lack of support from the government. Infrastructure and clinician motivation determined the availability of video services within the general practice. In terms of utilisation, telehealth represented one in four general practice consultations over the two-year period (July 2019 until June 2021). The introduction of the telehealth expansion policy in March 2020 led to an unprecedented and rapid uptake in telehealth services. This was followed by a steady decline until January 2021, and by June 2021, telehealth utilisation had stabilised. Telephone services and shorter consultations were the most dominant form. The proportion of video consultations was higher during periods with government-imposed lockdown, and higher in the most socioeconomically advantaged areas compared to less socioeconomically advantaged areas.

Conclusions: Our findings support the continuation of telehealth use in rural and regional Australia post-pandemic. Future policy must identify mechanisms to reduce existing equity gaps in video consultations and consider of patient- and system-level implications of the dominant use of shorter telephone consultations. Governments must ensure sufficient financial and infrastructure support to improve efficiency of telehealth implementation and use in rural areas of Australia.

4.21 What Are the Non-Financial Barriers to the Enrollment of People Living with HIV/AIDS in Financial Protection Schemes in South-West Nigeria?

PRESENTER: **Chidumga Ohazurike**, Abt Associates
AUTHORS: Bolanle Bukola Olusola-Faleye, Abdu A Adamu, Charles Aninweze, Deji Bodunde, Oluwafemi K Serrano, Emmanuella O Zamba, Monsurat Adeleke, Oladipupo Fisher, Andrew Murphy

Background

Financial protection schemes are designed to prevent catastrophic health expenditure and reduce vulnerability and poverty. Nigeria has about 1.9 million people living with HIV (PLHIV), with 130,000 new infections recorded every year. Nigeria has decentralized its national health insurance scheme to the sub-national level as a policy response to scaling-up participation in financial protection schemes. These schemes allow for pre-payment of the direct costs of health care such as hospital registration fees, clinical consultations, and basic laboratory tests for PLHIV beneficiaries, such that out-of-pocket payment is averted at the point of care. In addition, the cost of premium is subsidized through sub-national equity funds of the State Health Insurance Schemes (SHIS) and the Basic Health Care Provision Fund (BHCPF) from the Federal government for vulnerable groups including PLHIV. However, the uptake of financial protection schemes among PLHIV has been sub-optimal. We sought to understand the non-financial barriers to participation of vulnerable PLHIV in financial protection schemes.

Methodology

Our approach included desk reviews, discussions with key PLHIV stakeholders and use of a vulnerability assessment tool to identify the vulnerable PLHIV. Stakeholder discussions were held with Network executives of PLHIV, HIV focused Civil Society Organizations and support group leads to map the support groups (87 Adult and 20 Adolescent and young People support groups), to jointly identify the non-financial barriers to enrolment and the system levers and opportunities within the health facilities and communities to support the enrolment of PLHIV in financial protection schemes.

Results

The most common non-financial barriers mentioned on the demand side included the lack of awareness of the existence of the schemes, poor knowledge of the eligibility requirements and the registration process, and poor knowledge of the services covered in the benefit package. On the supply side, the major barriers included perceived low quality of care and the perception that the scheme was only for government workers. Furthermore, nine adult support groups with 263 members received Information about the SHIS and BHCPF, their premiums, the benefit packages, the registration procedure, and the applicable subsidies. Information on the documents required for registration for the state equity fund and the BHCPF were provided to the PLHIVs through the support group leads prior to support group meetings resulting in minimal incidence of incomplete registration. About 213 (80%) were identified using the vulnerability assessment tool as vulnerable PLHIV. Registration and enrolment were done during support group meetings which reduced stigma and provided immediate registration assistance, especially for those with limited education

Conclusion

Addressing non-financial barriers by providing information on financial risk protection schemes and registration assistance can improve the enrolment of vulnerable PLHIV in financial protection schemes in low and middle-income settings like Nigeria.

Key words: Financial protection, PLHIV, Enrolment, Barriers

4.22 Health Needs across Generations in Australia and Its Implication for Health Service Planning

PRESENTER: **Sabrina Lenzen**, The University of Queensland
AUTHORS: Luke Brian Connelly, Stephen Birch, William Whittaker

Background: Health service planning is pivotal in making the most effective use of available and future health care resources. In this context, population ageing is an important consideration for most governments around the world, often regarded as a major cause of upward pressure on health care costs. However, age-specific incidence and prevalence rates for chronic conditions and illness in populations are changing. Despite this evidence, most economies use historical age- and gender-specific measures of service use to plan future health resource requirements and therefore neglect any generational differences in in disability and disease by age, producing misleading estimates of the need for future health care resources in the population.

Objective/Aim: This paper aims to evaluate differences in health needs by age across different birth-cohorts among the Australian population and consider the implications for planning health services for the future. The paper is the first to explore this in the Australian population and the first to stratify needs by gender.

Method: We use representative Australian survey data (The Household, Income and Labour Dynamics in Australia Survey) from 2001 to 2021, to identify trends in age-specific health. We use a measure of self-reported limitations with physical functioning impacting activities of daily living as proxy for needs in order to analyse differences in age specific health status across different birth cohorts. We estimate age-period-cohort models that separate birth cohort effects from age and year effects by transforming the year variable to follow a trend around zero, while at the same time allowing for fluctuations. Applying estimated need by age and trends in birth cohorts to future population projections, we compare our estimates of age specific levels of need for care with the estimates used in official government planning for future health care based on current age- specific use of care.

Results: We find that more recently born birth-cohorts report less limitations with physical function at the same age as earlier born cohorts. Whilst the differences between birth cohorts are not significant for cohorts born in decades adjacent to the reference cohort (those born before 1921), we find substantial and significant differences between birth cohorts born several decades apart. Comparing health service planning projections for 2030 that integrate these trends in health status over time to those that rely on age- specific use estimates, we find that including generational effects lead to lower predictions of future needs.

Conclusion: In this paper, we adopted a needs-based health service planning model that incorporates changes in population health over time. Comparing our estimates to those that follow a fixed age- specific approach, we conclude that significant health differences between birth cohorts exist and neglecting such a trend will lead to inaccurate provision of health care in the future. We suggest that our method is one approach that governments and health service planers could adopt to improve health care planning that currently often rely on the assumption that age-specific use (and implicitly, need) will remain constant over time.

3:30 PM –5:00 PM   MONDAY   [Health, Its Distribution And Its Valuation]

Cape Town International Convention Centre | CTICC 1 – Room 1.43

Generating Capability Measures across Populations, Settings and Health Conditions

MODERATOR: **Paul Mitchell**, University of Bristol

ORGANIZER: **Marion Coste**, Aix Marseille Univ.

DISCUSSANT: **Giulia Greco**, London School of Hygiene and Tropical Medicine

Identifying Key Capabilities in Children and Young People Aged 6 to 15 Years Old: A Qualitative Study to Inform the Development of Economic Capability Wellbeing Measures for Children and Young People

PRESENTER: **Joanna Coast**, University of Bristol
AUTHORS: Paul Mitchell, Philip Kinghorn, Sarah Byford, Katie Breheny, Cara Bailey, Paul Anand, Tim Peters, Isabella Floredin, Samantha Husbands

Introduction

The capability approach provides a broad evaluative space for making funding decisions for health and care interventions, with capability wellbeing as the outcome of value. For children and young people (CYP), for whom health is only likely to be one important aspect of their development and wellbeing, this framework may be valuable for such decision making. This study aimed to identify important capabilities for CYP aged 6 to 15 years of age, and to develop these capabilities into the attributes for economic measures to inform health and care funding decisions for CYP. Whether CYP capability measures should focus only on current wellbeing or also take account of well-becoming, i.e., CYP's opportunities for future development, was also explored. The congress presentation focuses on those aged 11 to 15.

Methods

Qualitative in-depth interviews were undertaken with CYP aged 11 to 15 years and their parents. Purposeful maximum variation sampling ensured representation from participants from different backgrounds. Initial sampling was through schools and charitable organisations but due to COVID-19, later participants were recruited using Facebook. Interviews took place face-to-face or online; questions focused on what was important to CYP's quality of life. Prior to interview, CYP completed a mapping activity; they were asked to think of things that were important to them and place these on sticky notes around a drawing/photograph of themselves. The interview asked CYP about the things they had recorded as important. Parents were asked to identify factors which enhanced and negatively impacted their child's wellbeing. Interviews were analysed using constant comparison. Analytic accounts were created to facilitate exploration of similarities and differences in important capabilities between groups. Codes identifying factors important to wellbeing were combined to inform overall themes of capability wellbeing. A second phase of semi-structured interviews finalised attributes for measures, obtaining meaningful wording and identifying appropriate visual images.

Findings

Thirty-three in-depth interviews were undertaken with CYP aged 11-15 years (n=19) and parents (n=14). CYP were from different areas of England (urban, rural), of different ages, genders and from different ethnic, socioeconomic, and family backgrounds (one and two parent families) and included CYP with and without health conditions. Eight overarching themes important to capability wellbeing and well-

becoming were identified across all participants, with some variation across the CYP and parent groups: fun and enjoyment; learning and experiencing; attachment; emotional security and support; achievement; identity and choice; physical safety; aspiration. Wording interviews were conducted with CYP aged 11-15 years (n=15), with four rounds of interviews required to fully establish the final wording and visual images for the capability measure.

Discussion

A capability measure has been developed for CYP aged 11-15. Despite challenges associated with COVID-19, it was feasible to generate measures through interviews with CYP and their parents. These measures now need to be fully tested in different contexts, to establish their psychometric properties, and values need to be obtained to enable their use in economic evaluation.

What Capabilities Matter to Young People with Life-Limiting and Life-Threatening Conditions? a Qualitative Study from the UK

PRESENTER: **Isabella Floredin**, University of Bristol
AUTHORS: Samantha Husbands, Paul Mitchell, Susan Neilson, Joanna Coast

Background:

An outcome measure for young people who are near the end of their life has not yet been developed for use in economic evaluation. Existing children and young people (CYP) measures of health-related quality of life (HRQoL) can be used with young people at the end-of-life (EOL) but these measures were not developed for specific use in CYP EOL populations and may fail to capture what is important to this specific population in this context. The use of adult EOL measures with young people is also likely to be inappropriate.

Moreover, it has been suggested that the use of HRQoL measures for complex care interventions, such as end-of-life care (EOLC), and economic decision making based solely on health gain could result in the under-provision of interventions in which important outcomes are not limited to changes in health.

The Capability Approach of Amartya Sen has been argued to offer an alternative basis for measure development in economic evaluation at the EOL as it can provide a broader framework to explore what is important to people in this situation. This research extends this application of the Capability Approach to EOL in young people.

Aim:

To capture aspects of life that are important to young persons, with life-threatening and life-limiting conditions (LLCs/LTCs), and to use this information to develop attributes for a measure of capability for young people who are near the EOL.

Methods:

In-depth interviews were conducted online with young people, 14-25 years old, with LLCs/LTCs; parents or guardians of young people with LLCs/LTCs, but who were unable to participate directly because of their condition; and bereaved family and friends of young people who have died from a LLC/LTC.

Participants were recruited through hospices and charitable organisations across the UK, through social media adverts and snowball sampling.

Data collection and analysis were conducted iteratively, with analysis using constant comparison. Analytic accounts were developed for groups of participants to compare responses and develop the final themes related to what appeared important to young people at the EOL.

Findings:

Twenty-one interviews were conducted between May 2021 and September 2022. Participants included nine bereaved family members, six parents and six young people with LLCs/LTCs.

Preliminary analysis suggests that important capability themes include: Have experiences, normality and enjoyment in life; Be independent and have privacy; Be free from Physical and Emotional suffering; Be able to maintain Identity; Be cared and supported by people I trust; Be in control of my care. Important conversion factors through which important capabilities can be achieved include: Access, Continuity and Consistency in care; Communication and Coordination in care.

Discussion:

The attributes generated through qualitative work can inform the development of a measure for use in economic evaluation that captures important capabilities for young people who are near the EOL. Full findings from interviews will be presented in the conference, in relation to what is important in the young person's life as an end in itself (capabilities) and the means through which these valuable ends can be achieved (conversion factors).

Perceived Dimensions of a Good Life in Tanzania and Malawi: Constructing Domains of Capability Wellbeing for Adults

PRESENTER: **Nateiya Yongolo**, Liverpool School of Tropical Medicine

Introduction

Economic evaluation generally uses preference-based outcome measurement, often comparing utility values derived from different populations for given health states combined with duration to generate Quality-Adjusted Life-Years (QALYs) which emphasises health as the most important aspect of quality of life. More recently, a capability approach to conceptualise wellbeing is proposed which advocates assessing capability (what an individual can do) rather than functioning (what they actually do). This approach highlights the importance of freedom to choose and what is important to individuals. This study aimed to explore Tanzanian and Malawian adults' own perceptions of the dimensions of a good life and iteratively construct domains of capability from that exploration

Methods

The research was conducted in two stages. The first involved in-depth interviews to generate conceptual attributes for measures with 34 adults from urban and rural Tanzania and 34 adults from Malawi urban and rural locations. Sampling was purposeful to obtain quotas in relation to age, sex and health. Interviews were transcribed and analysed using constant comparison. Data collection and analysis were initially conducted independently by two teams; analysis was then brought together to generate a common set of attributes across the two countries. Stage 2 used further interviews to check wording for attributes in both countries.

Findings

We found very similar views of a good life across Tanzania and Malawi. People valued: having financial security; being able to achieve what they wanted for themselves and their families; faith and spirituality; autonomy – being able to make decisions alone or with others; being able to meet their basic needs for food, shelter, clothes; loving and being with their family and friends; and their health as a source of financial security but also in its own right. Appropriate wording for attributes was identified.

Discussion

People in Tanzania and Malawi value similar attributes, and illness has the potential to impact on many aspects of capabilities. Relative to existing capability measures developed using the same methods in the UK, there was a greater emphasis on financial security and a different interpretation of autonomy that included a role for others; there was no focus on enjoyment. Further research is needed to investigate which of the aspects of capability wellbeing found here are most important to people in Tanzania and Malawi. Such a capability wellbeing measure, when fully developed and valued, can provide information to decision-makers about which health and care interventions will most benefit people's lives.

Health Capability Profile of People Living with Chronic Hepatitis B in Rural Senegal: A Mixed Methods Study

PRESENTER: **Marion Coste**, Aix Marseille Univ.
AUTHORS: Cilor Ndong, Aldiouma Diallo, Sylvie Boyer, Jennifer J Prah

Context

Worldwide, over 800,000 annual deaths are attributable to chronic hepatitis B (CHB) virus infection. In Senegal, where 10% of the adult population lives with CHB, low knowledge and out-of-pockets costs have been identified as barriers to the life-long monitoring required to avoid CHB-related morbidity and mortality. However, in the recent PeCSen-AmBASS study, less than 25% of CHB patients were linked to care following at-home community CHB testing – despite sensitization and free-follow-up options. This study presents an empirical application of the Health Capability Profile (Prah, 2010) to investigate fifteen inter-related abilities and conditions (health capabilities) that constitute the ability to avoid CHB-related morbidity and mortality of adults living in rural Senegal.

Methods

A thorough review of the Health Capability Profile was conducted to adapt all fifteen dimensions to the empirical context of CHB in rural Senegal. A health capability module was designed as part of a cross-sectional survey administered to 725 individuals interviewed in 2018-2019 (quantitative data) – a sample representative of adults living in the Niakhar area in rural Senegal. 40 semi-directed interviews (qualitative data) were conducted with survey participants to document all fifteen dimensions of the Profile. Additional data were collected to document resources available in health facilities, and to account for the perspective of healthcare professionals (5 semi-directed interviews) and community healthcare workers (one focus group with 6 participants). Quantitative and qualitative data were integrated employing flow diagrams and 0-100 health capability scores to document and quantify strengths and vulnerabilities, within and across individuals.

Results

Quantitative scores highlighted significant shortfalls in CHB-related knowledge and social-economic and political security, followed by material circumstances and social norms on decisional latitude. Individual health capability profiles and flow diagrams revealed lower levels of internal capabilities development were identified in young and/or illiterate adults, and in women. Low CHB-related knowledge was

detrimental to linkage to care when tied into traditional or alternative medicine. In contrast, knowing someone who died from CHB or identifying CHB infection as particularly dire was a strong lever for individual and family mobilization towards linkage to and retention in CHB management. Interestingly, High material circumstances and knowledge were *not* automatic determinants of linkage to care (cf. several cases of denial). Finally, even the strongest profiles displayed residual vulnerabilities attached to shortfalls in economic and social security (i.e., absence of comprehensive health insurance and social protection schemes, and poor job quality).

Conclusion and discussion

The Health Capability Profile provides an accurate and comprehensive understanding of people's complex lived experiences. The rich empirical results can help inform and prioritize policy changes in targeting the most vulnerable populations (youth, women, illiterate adults) and addressing areas of shared vulnerabilities (non-evidence based knowledge, and absence of social protection). As an empirical investigation, this study can serve as a model for future adaptations to different health issues or settings.

3:30 PM –5:00 PM   MONDAY   [Cross-Cutting Themes And Other Issues]

Cape Town International Convention Centre | CTICC 1 – Room 1.41

Innovations in Health Economics Teaching: Case Studies from Around the World [TEACHING HEALTH ECONOMICS SIG]

MODERATOR: **Heather Brown**, Lancaster University

DISCUSSANT: **Neha Batura**, University College London; **Femi M Ayadi**, University of Houston Clear Lake; **Lisa Gold**, Deakin University, Institute for Health Transformation, Deakin Health Economics

Free to Learn: Using Reflective Writing to Teach Health Economics
PRESENTER: **Frederik Booysen**, University of Witwatersrand
AUTHORS: Laura Dison, Greig Krull, Pia Lamberti, Agata MacGregor

Background: Reflective writing is used to build communicative competencies and to inculcate active, deep and life-long learning. Although not new to Economics, there is a need to further expand knowledge on using reflective writing as a tool for 'assessment for learning' in the discipline of Health Economics.

Aims: This study had four purposes. Firstly, the research aimed to document students' perceptions of and experiences with reflective writing in essays and portfolios. Secondly, the research sought to analyze the nature of reflection and reflexivity in the writing of post-graduate students. Thirdly, the research set out to develop and pilot a new rubric for the assessment of reflective writing. Lastly, the research also includes a personal reflection on the lecturer's experiences with the use of this form of assessment in the teaching of Health Economics.

Methods: Reflective essays and portfolios were employed as a continuous assessment method in two post-graduate Health Economics courses. The human-subjects ethics committee approved the study. Informed consent was obtained from all study participants, including permission to analyze their reflective essays and portfolios. For data collection purposes, in-depth interviews were conducted with a total of nine post-graduate students following the completion of these courses. The interview schedule included both open- and closed-ended questions. The transcripts of these in-depth interviews and the essays and portfolios were analyzed using thematic content analysis. We employ selected excerpts from students' essays and portfolios to illustrate the principles of reflection and reflexivity. Personal reflections were documented using an auto-ethnographic approach.

Results: Students reported having no prior knowledge of or experience with reflective writing, although some students were familiar with free writing. Excerpts from the more reflective and reflexive essays and portfolios illustrated evidence of both deep learning and an ability to integrate personal experiences with course content. Some contents reflect students' ability to reflect on their own learning and the learning process, evidence that is supported by responses in the in-depth interviews. Most students found the rubric useful in guiding their writing, but many were also of the opinion that the lecturer could have provided more detailed comments during the formative assessment process. All students reported their proficiency in reflective writing to have improved over the course of the semesters' formative assessment process. Students also considered reflective writing as a fair form of assessment. Personal reflection and discussions with colleagues suggest it would be productive to incorporate self- and peer-assessment in future reflective writing tasks and that it is necessary to consider the restrictive effect of word counts and the provision of exemplars of reflective writing to assist students in navigating this unknown assessment style. Students expressed positive views on the scope for introducing reflective writing in the assessment strategies employed in other post-graduate Economics courses, even in more technical content such as Econometrics.

Conclusion: Reflective writing has the pedagogical potential to enhance teaching and facilitate lifelong learning in Health Economics, but more research is required to further develop the modalities of its implementation in our discipline.

Using Collaborative Online International Learning for Learning about Health Systems' Financing Structures

PRESENTER: **Paul Andres Rodriguez Lesmes**, Universidad del Rosario

AUTHOR: Daniela Andren

Background: Collaborative online international learning (COIL) connects students in different countries for joint activities as part of their coursework. Fostering cross-country student interaction enhances the learning process. In the context of health economics, the organization and financing of health care systems is a prime example where cross-country learning about personal experiences of different health care systems can enhance student learning and understanding.

Aims: To determine if a COIL experience, where students must suggest how to reform the health care of a hypothetical low-income country that aims to obtain universal health coverage (UHC) with growing revenues from an unexpected income source, involving students from a high and upper-middle income country can improve the understanding of alternative structures for the organization and the financing of health systems.

Methods: The assignment was distributed to undergraduate students (bachelor's in economics) taking health economics' classes in Colombia (N=13) and Sweden (N=22; including two exchange students from Hungary and one from Japan). Students were instructed to read the instructions, to watch three short videos presenting the organization and financing of health care in Colombia and Sweden and to prepare for three-hours long international workshop via the video conferencing programme Zoom in the English language. With the consent of all participants, the workshop was recorded. The Swedish students were required to submit a written report one day before the workshop but their participation at the workshop is voluntary. To assess how collaborative working may have influenced students' understanding of different types of healthcare financing we compared individual solutions submitted before the workshop to group responses after the workshop. Recordings of the sessions were viewed to assess interactions between students.

Results: None of the 22 reports submitted before workshop contained private health insurance in their proposal of financing health system; 19 of 22 proposals rely on taxation; 2 on social health insurance and 1 on a combination between taxation and social health insurance. During the interaction in small groups with Colombian students, all 11 Swedish students who participated in the workshop were considering the importance of developing both the market for private health insurance and the market for private healthcare. Two students considered that the assignment was too complex, mostly because of the economic conditions of the hypothetical country, while another student found this being challenging and stimulating for reading and thinking outside the textbook. Seven students found it interesting and relevant to learn about the healthcare system of another country. The qualitative analysis of the workshop's videorecording and the submitted individual reports with focus on the solution for financing healthcare suggests that due to the interaction with the Colombian students, Swedish students were considering and discussing the importance of the market for private health insurance and the market for private health care.

Conclusion: Based on a small sample, our results suggest that COIL experiences may be a promising educational activity to help students better understand problems, needs, and potential solutions for financing healthcare when interacting with peers from other cultural and socio-economic backgrounds.

Online Distance Learning: Perspectives on the Promotion of Belonging

PRESENTER: **Jenny Crow**, Glasgow University

Background: A multi-disciplinary academic research group at a university in Scotland have run a online distance learning (ODL) MSc Health Technology Assessment (HTA) for six years to a diverse global audience. Drawing on insights into policy and principles of HTA, health economics, statistics, modelling, qualitative research and data science, our teaching aims to give hands-on experience of the interconnected disciplines that are core to Health Technology Assessment. As an online course, it is important that students feel like they belong to an educational community. This sense of belonging is important for both student satisfaction and to improve learning.

Aims: From the student perspective, we aim to explore the nature of 'belonging' and what this means for students who study online. We also aim to make this interactive for the audience to showcase some of our learning tools.

Methods: Research into the nature of 'belonging' was undertaken as part of a PhD thesis by the Digital Education Team Manager. During the summer of 2022, twenty-eight online interviews were conducted with online students, to gain a greater understanding of what it is like to be an online student, their perspective on belonging to the university and their course (staff and peers), what works and does not work for belonging and ideas for future improvements.

Results: Key results and actions from our research and hands-on experience in online and digital education include: i) The teaching team has moved from using PowerPoint with audio to using Articulate 360 (Rise and Storyline) so that the learners have a more engaging, modern looking learning experience that is accessible on different devices; ii) Discussion forums are great, however, engaging with some students is challenging, especially those who lurk or seem to be invisible; iii) Live sessions build community on a course, however, it is a balance as they have selected an online course for the flexibility. Replacing live lectures with an interactive Question & Answer session after a pre-recording allows for better engagement and less stress if students cannot make the lecture; iv) Students shared in the interviews that when staff replied to them promptly it increased their connection, on the other hand when staff did not respond then it left them feeling disconnected. Additionally, some students fed back that they appreciated comments from staff that pushed them forward in their learning; v) In linking our efforts to reflect these findings on 'belonging', we include students in wider team activities, team presentations and external seminars; and final year students are invited to present to our team early on in their project for advice and support from the wider team.

Conclusions

Developing a sense of belonging is key to student ODL experience. Teaching and support staff are vital in creating belonging on a course, and the use of technology can help to promote this through a variety of means in order to enhance engagement, motivation and participation.

3:30 PM –5:00 PM   MONDAY   [Health System Performance]

Cape Town International Convention Centre | CTICC 1 – Room 2.44-2.45

Health System Efficiency – Measurement, Drivers, Policy [HEALTH SYSTEMS' EFFICIENCY SIG]

MODERATOR: **Kara Hanson**, London School of Hygiene & Tropical Medicine (LSHTM)

DISCUSSANT: **Joseph Kutzin**, World Health Organization (WHO); **Ama Pokuaa Fenny**, Institute of Statistical, Social and Economic Research

Examining the Drivers of Primary Healthcare Efficiency in Low- and Middle-Income Countries

PRESENTER: **Anna Vassall**, London School of Hygiene & Tropical Medicine (LSHTM)

Primary healthcare is a critical platform for delivering basic health interventions and is a foundation for universal health coverage (UHC). Low- and middle-income countries face fiscal constraints that limit investments in the health sector generally, including PHC. The efficiency of county delivery of PHC is therefore critical to leveraging the benefits of PHC to enhance its desired outcomes. The *Exemplars in PHC* project examined the drivers of PHC efficiency in five countries in Africa, Asia, and South America. The project is founded on the assumption that one of the strategies to promote health system reform is to identify health systems that have demonstrated success (Exemplars), examine the drivers of success, and translate and adapt these lessons to contexts that are keen on making similar health systems improvements. This paper will present a cross country synthesis of the drivers of PHC efficiency (and their causal pathways) in the five PHC exemplar countries. Grounded in complex adaptive system (CAS) theory, we used mixed methods to identify PHC exemplar countries and examine the drivers of PHC efficiency in these countries. First, we carried out stochastic frontier analysis (SFA) to identify PHC efficient countries using the UHC effective coverage index as an outcome and per capita total health expenditure as an input. Five countries (Zambia, Ghana, Rwanda, Bangladesh, Peru) were identified in this step. In each of these countries, we reviewed literature, analyzed secondary data on PHC indicators, and conducted key informant interviews with 15-20 participants at the national level to identify key reforms, strategies, and sub-system operational drivers that the countries had implemented over the past 20 years (2000 – 2020) that contributed to improvements in PHC efficiency. We conducted SFA of district PHC performance in each country to identify efficient and inefficient districts and measure determinants of efficiency. The findings from this prior research activities formed the basis for a system dynamic modelling (SDM) exercise using the group model building (GMB) approach to identify the causal pathways for the drivers of PHC efficiency. We drew participants of the GMB exercise from national and district level health sector stakeholders. District level participants of the SDM workshop were drawn from those districts identified as efficient by the SFA analysis. Lastly, we collected and analyzed qualitative and quantitative data from 2 efficient and 2 inefficient districts to unpack the sub-system drivers of efficiency, linked to the broader reforms and strategies. Drawing from the findings from these analyses, we developed country case studies on the drivers PHC efficiency and conducted cross-country synthesis to distil evidence on the cross-cutting drivers of PHC efficiency.

Level and Determinants of County Health System Technical Efficiency in Kenya: The Kenya Efficiency Study (KES)

PRESENTER: **Edwine Barasa**, KEMRI-Wellcome Trust Research Programme

Kenya has made a commitment to achieve Universal Health Coverage (UHC) by the year 2030. The country however faces fiscal constraints that translate to underfunding of the health system. The country's public expenditure as a percentage of its gross domestic product (GDP) is 2.2%, less than half the recommend minimum (5%) for low- and middle-income countries to make significant progress towards UHC. Efficiency gains is a potential pathway to unlock additional resources for the health sector in Kenya.

The country has a devolved governance arrangement with a national government and semi- autonomous county governments. The health sector is the most devolved sector, with county governments bearing the responsibility for health service delivery. County governments own and manage primary healthcare (health centers and dispensaries) and first and second referral secondary care health facilities (hospitals), are responsible for managing community health services, as well as public health services delivered outside of health facilities. Counties are also responsible for recruiting and management of human resources and the procurement of health commodities.

The Kenya Efficiency Study (KES) aimed to examine the levels and determinants of county health system efficiency in Kenya. Grounded on complex adaptive system (CAS) theory, the study employed mixed methods organized in 4 phases. In the first phase, we carried out a systematic review of global literature and facilitated a health sector (national and county) deliberation workshop to conceptualize health system efficiency at the sub-national level and co-create the study focus. In the second phase, we applied data envelopment analysis (DEA) to measure the levels and determinants of county health system efficiency. In the third phase, drawing from the findings of the first and second phase, we carried out 4 in-depth qualitative case studies to further un-pack the identified determinants of county health system efficiency. These case studies, conducted in 8 of the 47 Kenyan counties, collected data using in-depth interviews and document reviews, and focused on the following determinants of health system efficiency in Kenya - human resource management, public finance management, health sector

coordination, and corruption. In the fourth and final phase, we carried out synthesis and systems dynamics modelling (SDM) to develop a model that unpacks the complex interactions and causal pathways across all the identified determinants of county health system efficiency in Kenya. This paper will present a synthesis of the findings from Kenya Efficiency study and its recommendations for how health system efficiency in Kenya and similar settings can be improved.

A System-Wide Approach to Identifying and Addressing Cross-Programmatic Inefficiencies in Pakistan

PRESENTER: **Susan Powers Sparkes**, World Health Organization

Background

Health programmes focusing on increasing access to specific interventions and services have resulted in fragmentation across health systems that constrain the ability to improve or at the very least sustain coverage of priority health services. This fragmentation, which is compounded and sometimes motivated by donor funding, has led to parallel service delivery, information system, supply chains, health workforce, financial incentives, and planning processes. Based on this recognition, WHO developed its cross-programmatic efficiency approach (CPEA) that uses applied health systems analysis to identify specific functional areas of duplication and misalignment across health programmes that are sources of inefficiency. In its application in 14+ countries to date, policies have been developed and incorporated to address these sources of inefficiency.

Beginning in 2020, CPEA has been applied in Pakistan to identify areas of duplication and misalignment across the TB, malaria, HIV/AIDS, and EPI programmes in relation to the overall system that compromise governments' ability to improve delivery of priority health services. It was motivated by persistent caps in service coverage across all four programmes despite substantial investment. This analysis lays the baseline to explore options for change that would be beneficial and feasible.

Methods

Data and methods include literature review of grey and published literature, primary data collection (November 2022) through interviews at national, provincial, district and facility level, and budget data analysis to triangulate and substantiate identified areas of inefficiency. The CPEA exercise explores possible inefficiencies in how health programmes are organised within the wider health system. It does this in stages:

- First, examines how each programme carries out four functions: service delivery, financing, generation of human and other resources, and stewardship/governance.
- It then explores any areas of duplication, fragmentation, overlap and misalignment in functions across the four programmes.

Findings

Six key areas of inefficiency were identified for priority action:

1. Prevention and treatment services are co-located in facilities to varying extents but are not co-managed.
2. A holistic approach to the primary care workforce appears to be missing.
3. Information system fragmentation is costly and appears to be rising despite a policy commitment to integration.
4. Across programmes there is laboratory duplication and fragmentation, along with separated screening and testing.
5. There are fragmented and highly specified programme funding flows, which limits flexibility in reallocating funds when there is a need and inhibits more joined-up care.
6. Governance issues are affecting programmes' role in wider system

Conclusions

Overall, the main emerging conclusion from the CPEA in Pakistan is well-captured in a comment that programmes are 'islands without bridges'. There is scope and motivation for greater cross-programmatic efficiencies as part of overall system-strengthening efforts. Some of the actions needed to improve cross-programmatic efficiency are straightforward, while others are more complex, and some actions directly involve programmes, while others are beyond their remit. More could be done now, building on current initiatives, as well as defining which actions are needed in the longer-term. Realization of Pakistan's commitment to UHC relies on these shifts to empower and build capacity throughout the system.

Cape Town International Convention Centre | CTICC 1 – Room 1.63

The Dark Side of the Moon: Financial Protection and Forgone Care in Developing Countries

MODERATOR: **Jacopo Gabani**, University of York

ORGANIZER: **Julia Dayton Eberwein**, The World Bank

DISCUSSANT: **Owen O'Donnell**, Erasmus University Rotterdam

Forgone Health Care during the COVID-19 Pandemic: Changes from 2020 to 2021 in 25 Developing Countries
PRESENTER: **Julia Dayton Eberwein**, The World Bank
AUTHOR: Amanda Kerr

Recent estimates of excess mortality from the COVID-19 pandemic suggest that as many as 18.2 million excess deaths in 2020-2021 were attributable to the pandemic. Forgone and delayed care due to health system disruptions (facility closure, insufficient staff, cancellation of elective procedures), fear of becoming infected with COVID-19, mobility restrictions and lockdowns, reduced household incomes, and other reasons are likely a substantial contributor to this burden of excess deaths. Although some estimates of forgone care have been published for high income countries, quantitative estimates of the prevalence of forgone care, in developing countries, and especially changes in forgone care during the pandemic, are largely absent from the published literature. Using repeated measures collected with a standardized instrument from two time periods from over 63,000 households in 25 low- and middle-income countries, this analysis offers unique insights into how prevalence of forgone care and its drivers have changed between the early period of the pandemic in 2020 and the first half of 2021. The prevalence of forgone care in the sample declined between mid-2020 and early 2021. In 2020, about 17.9% of the households in the countries included in the study reported not being able to access the care they needed. In the first half of 2021, this proportion declined to 10.3%. Despite this decline in prevalence, financial constraints remained the most reported reason for forgoing care. The percentage of households forgoing care who reported that this was due to financial reasons remained virtually unchanged in the overall sample (42.0% in 2020 and 45.1% in 2021). Given the uneven recovery from the pandemic and the deepening economic crisis due to the Russian invasion of Ukraine, it is likely that the financial barriers to accessing care will persist and perhaps increase, possibly slowing progress towards achieving universal health coverage.

Income Shocks and Healthcare Access: Evidence from High Frequency Phone Surveys in Burkina Faso, Ethiopia, Malawi, Nigeria, and Uganda
PRESENTER: **Nicholas Stacey**, SAMRC Centre for Health Economics and Decision Science - PRICELESS SA
AUTHOR: Julia Dayton Eberwein

The COVID-19 pandemic has severely disrupted the utilization of routine health services. While a significant body of evidence has documented this, there is much less evidence on the correlates of households foregoing needed healthcare, particularly from developing countries. In particular, the COVID-19 crisis caused economic disruptions which saw household incomes falling. Income shocks leave households without the means to pay the expenses required to access healthcare services. In this paper, we draw on longitudinal phone surveys recruited early-on in the pandemic and following households on a bi-monthly basis between 2020 and 2022 for a nationally representative sample of households in five African countries: Burkina Faso, Ethiopia, Malawi, Nigeria, and Uganda. In country-specific and pooled regressions, we document the association between income shocks and households' not accessing needed healthcare. We find households who report a reduction in household income in the previous month are more than 48% more likely to report foregoing needed care than those who do not report an income drop. Moreover, we document socio-economic gradients with households in the top pre-COVID consumption expenditure quintile being more likely to not report foregoing care. These findings suggest that while ensuring continued access to healthcare services must be prioritized, this is not solely a question of health systems but also one of protecting livelihoods.

Disrupted Healthcare Services and Associated Factors during the COVID-19 Pandemic 2020-21: Evidence of the Magnitude, Reasons and Inequalities from Household Phone Surveys in 14 Latin America and Caribbean Countries
PRESENTER: **Cristian A Herrera**, The World Bank

Background : The COVID-19 pandemic and associated responses have disrupted healthcare in a significant way. The aim of this study is to explore households reported healthcare disruption in 14 Latin America and Caribbean (LAC) countries in 2020 and 2021 in the following two dimensions: 1. the magnitude of disruption and the reasons for households reporting healthcare disruption, and its relationship with country contextual factors; and 2. the inequalities at the household's vulnerability level in terms of reported healthcare services disruption, along with exploring the household level characteristics associated with such inequalities.

Methods: The study uses the COVID-19 High-Frequency Phone Surveys (HFPS) conducted in 14 LAC countries in three rounds in 2020 and two in 2021. For the first dimension, we classified the reasons reported for healthcare disruption into four groups: concerns about contracting COVID-19; healthcare supply constraints; financial reasons; and public health measures (PHM). Bivariate and multivariate regressions were used to examine correlates of reported healthcare disruption with the above groups and country context control variables.

For the second dimension, since no direct household income level was compiled, a proxy for the household's vulnerability level will be estimated using the education level of the respondent, the geographic location (rural or urban); and its dependency level (members that are dependent). Then, logistic regression models will be used to analyze trends and inequalities after controlling for several household level variables.

Findings: For the first dimension, on average, 20% of households reported a disruption in May-June 2020 (45% to 10% at country level), dropping to 9% in June-July 2020 (31% to 3%) and July-August 2020 (26% to 3%), and declining to 3% by May-July 2021 (11% to 1%). The most common reason reported for disruption was healthcare supply constraints, followed by concerns about contracting COVID-19, PHM, and financial reasons. In multivariable regression analyses, we found that a higher incidence of new COVID-19 cases (regression coefficient, 0.018 [SE, 0.003]; P<0.01), stricter PHM (regression coefficient, 0.002 [SE, 0.0002]; P<0.01), fewer hospital beds per population (regression coefficient, -0.011 [SE, 0.003]; P<0.01), and lower out-of-pocket health spending (regression coefficient, -0.0008 [SE, 0.0003]; P<0.01) were associated with higher levels of disrupted care. A lower GDP per capita (regression coefficient, -0.00001 [SE, 0.0000]; P<0.01) and lower population density (regression coefficient, -0.056 [SE, 0.00004]; P<0.01) were contextual factors associated with higher care disruption.

For the second dimension, we will have our results in relation to household inequalities during the first semester of 2023.

Conclusions: Healthcare services for households in LAC were significantly disrupted during the COVID-19 pandemic. Findings about supply and financial constraints can inform the recovery of postponed healthcare services, while public health and contextual factors findings can inform future health system resilience efforts in LAC and elsewhere.

The forthcoming findings on inequalities will complement with information about the magnitude of such inequalities per country and the factors that were associated with them to inform policies aimed at protecting the most vulnerable households during crisis like the COVID19 pandemic.

How Do Questionnaire Design and Respondent Selection Impact Survey Data Collection on Health? Experimental Evidence from National Phone Surveys in Africa

PRESENTER: **Alemayehu Ambel**, The World Bank
AUTHOR: Talip Kilic

Initially motivated by the COVID-19 pandemic and starting in April 2020, high-frequency phone surveys have been rolled out rapidly across low- and middle-income countries with otherwise limited experience with phone-based data collection. In view of the slow-down in face-to-face survey data collection, phone surveys, particularly those that have leveraged pre-COVID-19 household surveys as sampling frames, have fulfilled important gaps in evidence and knowledge regarding the impacts of and responses to the pandemic, also as they relate to the health sector. Now in the third year of the pandemic, phone surveys continue to respond to evolving data needs not only regarding the COVID-19 pandemic but also emerging, large-scale, covariant health and economic shocks. Starting in 2022, thanks to the partnership between the Living Standards Measurement Study and the Global Financing Facility, national phone survey systems across several Sub-Saharan African countries have started eliciting high-frequency information regarding health service needs, foregone care, and out of pocket health expenditures, among other socio-economic data. This paper reports on a series of randomized survey experiments that were piggybacked onto the longitudinal phone survey platforms in Burkina Faso, Ethiopia, Malawi and Uganda and that attempted to gauge the impact of (household- versus individual-level) questionnaire design and (purposive versus random) respondent selection on nationally-representative survey data collection on health, for the purpose of informing the design and implementation of downstream phone surveys that are implemented by national statistical offices in low- and middle-income countries.

3:30 PM –5:00 PM   MONDAY   [Supply And Regulation Of Health Care Services And Products]

Cape Town International Convention Centre | CTICC 1 – Room 2.43
Physician Location & Mobility [HEALTH WORKFORCE SIG]

MODERATOR: **Slavek Roller**, University of Groningen

The Policy Determinants of Physician Return Migration

PRESENTER: **Joseph Nwadiuko**, Leonard Davis Institute of Health Economics, University of Pennsylvania
AUTHOR: Arturo Vargas Bustamante

Introduction

Physician migration is a matter of great concern to international policymakers. Outside of medicine, return migration is a well-recognized phenomenon across countries and labor sectors. Within the health workforce there are important examples of return migration by physicians, such as to Peru and South Africa. However, systematic estimates of return migration rates are not known. Furthermore, host country policies raising barriers to migration might instead decrease return migration, as it increases the costs of repeat outward migration to destination countries. This phenomenon, called reverse flow substitution, has been proven in multiple contexts for nonphysicians but has not been proven for health professionals. In 2005, the United Kingdom enforced changes to its physician workforce regulatory policy placing it in line with

the European Economic Area (EEA)-wide labor regulations. These changes gave EEA medical graduates higher priority for medical placements over medical graduates from other nations and might represent an example of such a barrier.

Methods

The UK General Medical Council (GMC) reached out to practitioners in 2020 who had a history of registration in the UK but were no longer licensed to determine their actual geographic location. We combined the results of that survey with data from the UK Licensed Registry of Medical Professionals (LRMP) to determine overall return migration rates between 2005-2019.

We also use a difference-in-differences analysis to compare low- and middle-income country (LMIC) medical graduates in the UK with UK medical graduates (who faced no policy changes), using data from the UK LRMP, since individual level survey data could not be released due to privacy restrictions. In the LRMP, "Return migration" was estimated by a modified attrition method: physicians with foreign education are considered to have returned to their home country if they have relinquished their registration before the age of 65 without having it revoked or dying. We compared the license cancellation rates of individuals who *became fully registered* to practice in the United Kingdom before vs after 2005. The logistic regression model included controls for specialty choice and gender as well as year and origin country fixed effects.

Results

The analysis identified 337,210 registrants, of which 168,174 met analytic criteria (53% UK trained, 30.5% LMIC trained, 16.4% EEA trained). GMC survey data from 13,158 responses showed variable return migration rates across countries with country specific rates highest for Norway at 83.4%. Return migration rates were correlated with origin country GDP per capita, with a 0.63% increase in return migration for every 1% increase in origin country GDP. The difference-in-differences term was not significant, indicating UK policy might not have had any effect on return migration rates (OR 0.98 95% CI 0.66, 1.46).

Conclusion

This is the first known systemic estimate of physician return migration rates from a high-income nation. Return migration rates are variable and likely driven by home income conditions correlated with origin country income. Policies that restrict LMIC physician migrant integration might not influence their propensity to return to their home countries.

The Migration Transition Among Physicians

PRESENTER: **Joseph Nwadiuko**, Leonard Davis Institute of Health Economics, University of Pennsylvania
AUTHOR: Arturo Vargas Vargas Bustamante

Introduction:

Physician migration remains an issue of great global concern, with 17% of all physicians believed to be practicing outside their nation of origin. However, like the nutritional and epidemiologic transitions, there is an understood "migration transition" as well, with migration levels for highly educated individuals decreasing with increasing national income. This phenomenon has not been studied for physicians, however, and would provide insights on the macroeconomic determinants and prediction of migration.

Methods:

We drew 2000-2021 physician migration data from the OECD, converted it into logged, year lagged-annual physician emigration flows, and charted it against logged origin country real GDP per capita (2017 international dollars). We fit an ordinary least squares model testing the relationship between the year-lagged natural log of real GDP per capita and the natural log of total annual emigration flows separately a) as a quadratic model and b) with knots at GDP per capita of $4000 and $8000 (determined by trend inspection). Both models included an interaction with European Economic Area status and country level fixed effects and clustered standard errors. In sensitivity analyses we censored country-years with known coups or conflicts, data from small island developing states, and data from the years 2020 and 2021 due to the COVID pandemic.

Results:

We gathered 2,507 country years of data from 166 countries. We found a statistically significant quadratic relationship (quadratic coefficient 0.14, 95% CI 0.02, 0.26) between GDP per capita and annual physician emigration flows, such that for every 1% increase in GDP per capita there was a 1.04% decrease in annual physician migrant flows with GDP per capita less than $4000 (95% CI -1.61, -.459), a 0.84% increase between $4000 and $8000 (95% CI .013, 1.66), and a nonsignificant 0.14% increase (95% CI -0.25%, 0.54%) for GDP per capita greater than $8000, although the interaction for EEA status was significant (0.28%, 95% CI 0.01%, 0.56%). Results remained similar when removing small island developing states, country years with coups and conflicts, and the years 2020 and 2021.

Conclusion:

There is a U-shaped relationship between GDP and physician migration, with high but decreasing migration in low and low middle income countries and increasing migration in upper middle income and EU nations. This is consistent with news reports of physician migration from both low income and upper middle income and high-income nations. In line with global health workforce labor market analyses made by Scheffler et al (2018), we hypothesize that this paradoxical relationship might be explained by a) elevated but declining physician surplus in

low-income countries leading to improving domestic job placement with increasing GDP, b) increasing physician shortage in upper middle-income countries leading to greater strain, burnout and migration, c) EU labor mobility.

Citation:

Scheffler, R.M., Campbell, J., Cometto, G. *et al.* Forecasting imbalances in the global health labor market and devising policy responses. *Hum Resour Health* 16, 5 (2018)

The Apple Doesn't Fall Far from the Tree. Public Policies on Regional Residency Positions and GPs' Practice Location Decisions.

PRESENTER: **Bruno Ventelou**, CNRS - Aix Marseille Univ
AUTHORS: Alain Paraponaris, Julien Silhol

Objectives

French self-employed general practitioners (GPs) are free to set up practice wherever they wish. Their unequal distribution over the territory may jeopardise the equal access to primary care. Since 2004, general medical interns have been allocated to medical universities after an annual competition in which, on the basis of their ranking and their own wishes (the university reputation, the region they are from), interns choose the university where they will be trained for three years. In some cases, public policy makers have sought to prevent the risk of increasing inequalities in territorial distribution by increasing the number of medical internships positions in under-dense areas. This article seeks to evaluate the effectiveness of these policies.

Methods

We consider a representative panel database made of 5,048 private GPs who passed the internship competition between 2004 and 2007. Places of birth, clerkship, internship in medicine and location of GPs' surgery twelve years after the internship are collected, as well as the ranking in the internship competition, the GPs' gender and age and the physician density in the GPs' practice area. The probability of working in the internship area is first estimated with a logit model with cohort and university fixed effects. The proportion of GPs settled in their internship zone twelve years later is also estimated using a regional and temporal fixed-effects model considering the proportion of interns assigned to this zone twelve years earlier.

Results

An increase of 1 percentage point in the share of interns assigned to a university led, on average, to an increase of about 0.4 percentage point in the share of general practitioners deciding to practice in the area of that university. However, high physician density leads medical students in that area to significantly increase the probability of moving there to. In addition, a GP born in the area is associated with a propensity of practicing in the same area twelve years later 3.5 times higher than for a GP who was not born there, female GPs having yet a lower propensity than men to practice in the same area. The propensity to settle in the area of internship is all the lower when the student was poorly ranked at the internship competition.

Discussion

The latest generations of doctors are found to seek proximity to colleagues in order to avoid a disproportionate workload, with the risk of unbalance in the supply and demand for care. Interns who are more constrained (by their ranking) to carry out their internship are less likely to stay there than others. The effectiveness of a policy of recruiting medical students from the native population in areas where more doctors are desired seems to be far greater than that of sending non-native interns to these areas.

Spatial Autocorrelation in Physicians' Prices and Access to Healthcare

PRESENTER: **Benjamin Montmartin**, Skema Business School

The growing medical desertification in most OECD countries driven by an increasing spatial concentration of physicians (Pál et al., 2021) is a huge concern for policymakers, as it reduces healthcare access and increases inequalities. OECD (2016) mentioned that "the uneven geographic distribution of doctors is one of the most common health workforce policy challenges OECD countries currently face". If medical desertification is an important driver of unequal access to healthcare services, another reality that has received less attention from economists is the pricing of physician services (see Gaynor and Town, 2012). This could be a major concern for policymakers, especially in OECD countries which allow some or all of their physicians to set their prices freely. Indeed, in these countries, the pricing of physician services is another driver of healthcare inequalities. France is an interesting context in which to explore physicians' pricing decisions and their consequences. Approximately 40% of physicians (CNAMTS, 2017), mainly specialists, are able to balance bill their patients based on no other limit than their evaluation of "tact and moderation".

The objective of this paper is to provide new robust evidence on free-billing physicians' pricing behavior by developing a structural approach. This is an important and necessary step to better understand which kind of policy tools could limit additional fees. To achieve this objective, we make several contributions to the existing literature.

First, we develop a closed-form solution of a circular city model with heterogeneous physicians where consultation quality influences both patients' utility and physicians' costs. This allows us to highlight and discuss how individual and competitors' quality influence equilibrium prices but also to provide new insights concerning the effects of competition intensity. Second, we are able to structurally identify core parameters of the model by building a unique geolocalized database of more than 4,000 free-billing physicians from three specializations (ophthalmology, gynecology and pediatrics). We develop a two-step spatial GMM procedure allowing us to control for sample selection bias, endogeneity, and unknown distribution of errors. Finally, our empirical results provide important insights. We find for all specialties a significant positive spatial autocorrelation (dependence) in prices. This means that a physician's price is positively associated with the prices of its local competitors. According to our model, this spatial dependence reflects a market where incentives to compete for quality are low. We also find evidence of noncompetitive behavior for ophthalmologists and gynecologists. Indeed, for these two specialties, prices increase with both the competition intensity and the share of free-billing physicians among competitors. Finally, we validate our model prediction that spatial dependence in price increases with physician density. All this evidence points toward a market providing weak incentives to react to classical competitive mechanisms (both vertical and horizontal differentiation) and high incentives for noncompetitive behavior.

Together with the fact that spatial autocorrelation in prices seems to increase with physician density, it clearly indicates a risky dynamic of growing unequal access to care in France.

3:30 PM –5:00 PM   MONDAY   [Economic Evaluation Of Health And Care Interventions]

Cape Town International Convention Centre | CTICC 2 – Protea

The Effectiveness and Cost-Effectiveness of Childhood Cancer Care in Low and Middle Income Countries [ECONOMICS OF CHILDREN'S HEALTH AND WELLBEING SIG]

MODERATOR: **Allison Portnoy**, Harvard T.H. Chan School of Public Health

ORGANIZER: **Sarah Njenga**, University of Oxford

DISCUSSANT: **Nickhill Bhakta**, St. Jude Children's Research Hospital

A Rapid Assessment Tool to Estimate Childhood Cancer Specific Budget Needs and Cost-Effectiveness Projected over Five Years for National Cancer Control Plans (NCCPs) in Low-and Middle-Income Countries (LMICs)

PRESENTER: **Nancy Bolous**, St. Jude's Children's Research Hospital
AUTHORS: Nester Chokwenda-Makore, Miguel Bonilla, Grace Chingo, Joyce Kambugu, Justin Mulindwa, Mugisha Noleb, Inam Chitsike, Nickhill Bhakta

Background: The World Health Organization (WHO) launched the Global Initiative for Childhood Cancer (GICC) in 2018 with the goal of increasing five-year survival of childhood cancer patients in low- and middle-income countries (LMICs) from 20%-30% in 2015 to 60% by 2030. To meet this target, policymakers are often given constrained time frames and limited data to develop childhood-specific national cancer control plans (NCCPs) and integrated budget forecasts. To support planning efforts, we developed a rapid, modifiable costing tool that: (1) estimates context-specific, national budget needed to fund children cancer specific programs nested within NCCPs; (2) provides five-year scale-up scenarios to support implementation; (3) calculates the cost-effectiveness across the 5-years.

Methods: We piloted our tool with multi-stakeholder teams consisting of policymakers, clinicians and public health advocates in three Sub-Saharan African countries, Zimbabwe, Zambia and Uganda. Previous research identified 11 costing categories. Real-world data was collected for four major categories (medical personnel, non-medical personnel, hoteling and outpatient), and modeled data was used to estimate the fifth (pharmacy). The remaining six categories (pathology, radiation, imaging, surgery, blood services, and administration) were calculated as proportions of the overall budget, guided by ratios identified from previous publications. A base-case (one-year) and five-year scale-up scenarios were created using country-specific parameter inputs developed in collaboration with multi-stakeholder teams. Modifiable model inputs included: expected growth in diagnosed patients, proportion of patients diagnosed at an earlier stage, intensity of treatment protocols, and expansion of the workforce. We calculated the cost-effectiveness of the disability adjusted life years (DALYs) averted, after accounting for late effect morbidity and early mortality (15% reduction of normal life expectancy). Three five-year survival scenarios were assumed: 20% throughout, 20% increasing to 40%, and 20% increasing to 60%. Results were compared to the projected, country-specific Gross Domestic Product (GDP) per Capita for years 2022-2026.

Results: The number of patients anticipated in the first year of the NCCP were 250, 280 and 1,000 with a total budget of $1,109,366, $1,212,455 and $2,389,297 for Zimbabwe, Zambia and Uganda, respectively. By the fifth year, the number of new cases were assumed to increase to 398, 446 and 1,594 with a total budget of $5,545,445, $5,047,900 and $9,079,706, respectively. Cost per DALY averted|ratio to GDP per Capita for the first year assuming 20% survival for Zimbabwe, Zambia and Uganda was: $889|0.5, $868|0.8 and $489|0.5, respectively. By the fifth year, three survival scenario targets of 20%, 40% and 60% were tested. Results were $2,789|1.4, $1,395|0.7 and $930|0.5 for Zimbabwe, $2,267|1.7, $1,133|0.8 and $756|0.6 for Zambia and $1,166|1, $583|0.5, and $389|0.3 for Uganda.

Conclusions: Our tool provided a feasible, simplified framework to calculate a budget forecast for childhood-specific cancer services. By leveraging primary data collection with existing secondary data, local multi-stakeholder teams obtained rapid results without overburdening staff with excess, time-consuming data collection. Notably, our findings demonstrated that, as per the WHO-CHOICE cost-effectiveness thresholds, sustained investments in childhood cancer control programs were very cost-effective (<GDP per capita) or cost-effective (1-3 times GDP per capita) even in the most pessimistic survival scenario.

The Effectiveness and Cost-Effectiveness of Interventions to Promote Treatment Adherence Amongst Paediatric Cancer Patients: A Systematic Review

PRESENTER: **Sarah Njenga**, University of Oxford
AUTHORS: Ranin Soliman, Jane Wolstenholme, David Jones, Jason Madan, Ryan Danvers, Franceska Tchapedu
Title: The effectiveness and cost-effectiveness of interventions to promote treatment adherence amongst paediatric cancer patients: A systematic review

Background: The World Health Organisation estimates that survival rates for children diagnosed with cancer in high income countries (HIC) stand at more than 80%, in comparison to low-to-middle income countries (LMIC) which average less than 30%. Treatment abandonment is frequently identified as one of the key predictors of treatment failure in low-resource settings, and results in avoidable deaths. A range of various interventions which directly target treatment adherence as an outcome measure for children with cancer have been implemented in various settings, but currently, there is a lack of consensus on the scope and effectiveness of those existing interventions to promote treatment adherence and survival rates for childhood cancer patients, as well as their associated costs and cost-effectiveness.

Objectives: The aim of this study therefore is to conduct a systematic review to synthesise and analyse the existing evidence on the effectiveness and cost-effectiveness of interventions to promote treatment adherence amongst paediatric cancer patients as a primary outcome measure, and provide recommendations to assist health economists and policy makers in the design of future evaluations.

Methods: A review protocol was finalised and registered under PROSPERO (number: CRD42022374561). Relevant databases (EMBASE, MEDLINE, Global Health, PsycINFO, NHS EED, and Cochrane Central) were systematically searched for relevant literature, as well as hand searching. Inclusion criteria were that paediatric cancer patients < 21 years with a formal cancer diagnosis and have received an adherence promoting intervention were included. We identified studies evaluating the impact of interventions in promoting treatment adherence for childhood cancer, as well as its associated costs and cost-effectiveness as primary outcomes. All studies which met the inclusion criteria in the English language and without time or geographical limitations were included. Synthesis of evidence focused primarily on the data and methods applied as well as the results and its associated impact.

Results: 5,279 records were found, resulting in a final list of 63 papers. We find a range of multi-modal interventions that aim to address treatment adherence as an outcome measure. Results indicate there is a huge gap in the literature to analyse the cost effectiveness of adherence promoting interventions, particularly in low resource settings, highlighting the need for more robust primary data collection and analysis.

Conclusion: The SLR provides comprehensive evidence on the effectiveness and cost-effectiveness of interventions which aim to promote treatment adherence among childhood cancer patients. It demonstrates the wide range of interventions avaliable, as well as highlighting gaps in the literature surrounding cost-effectiveness.

Barriers and Facilitators to Implementing Cost-Effective Evidence-Based Childhood Cancer Treatment in Egypt: A Qualitative Interview Study with Clinicians

PRESENTER: **Ranin Soliman**, University of Oxford; Children's Cancer Hospital Egypt

Barriers and facilitators to implementing cost-effective evidence-based childhood cancer treatment in Egypt: A qualitative interview study with clinicians

Introduction:

Childhood cancer treatment is complex, resource-intensive, and expensive, and resource-limited settings would benefit from providing cost-effective treatment approaches on the basis of evidence. Effective implementation of cost-effective evidence-based treatment requires knowledge about factors influencing its use. In this study, we determined the clinicians' perceptions of the barriers and facilitators to implementing cost-effective evidence-based treatment for children with cancer in a resource-limited pediatric oncology setting in Egypt.
Methods:

We conducted a qualitative study on the basis of semistructured interviews with senior clinicians who make high-level decisions on treatment protocols and tailored decisions for the atypically complicated group of patients. Purposive sampling was used to recruit the participants. Thematic analysis was conducted semantically to develop themes of barriers and facilitators.

Results:

Fourteen participants agreed to participate in the study: nine pediatric oncologists; three surgeons; and two radiation oncologists. We identified four main themes of barriers and facilitators: awareness and orientation; knowledge, skills, and attitudes; system, resources, and context; and clinical practice. The main barriers included the absence of easily available costs/cost-effectiveness data, limited resources and inability to pay for expensive novel (cost-effective) drugs, and a gap between evidence and practice. The main facilitators included adopting standard treatment protocols on the basis of clinical effectiveness, leadership support, availability of patients' clinical and cost data from the local context, and existing knowledge and skills in clinical research and health economic evaluation. The interview participants also provided suggestions to promote the implementation of cost-effective evidence-based treatment in priority areas.

Conclusion:

Our study findings provide an understanding of the barriers and facilitators affecting the implementation of cost-effective evidence-based treatment for childhood cancers in Egypt. We provide practical recommendations to address the implementation gaps with implications on practice, policy, and research.

Cost-Effectiveness and Budget Impact of Covering Burkitt's Lymphoma in Children Under Ghana's National Health Insurance Scheme

PRESENTER: **Richmond Owusu**, University of Ghana

Abstract

Background

Many children in sub-Saharan Africa die from preventable deaths due to Burkitt's lymphoma (BL), an aggressive but highly curable form of non-Hodgkin's lymphoma. Delayed care seeking and treatment abandonment are common reasons for a relatively low overall survival (OS) when compared to OS in high income settings. The financial burden of care seeking to families is often the main reason for the high treatment abandonment. Yet childhood cancer is not a high priority in health care financing for many countries, including in Ghana, where at the time of this study, treatment was not covered by the National Health Insurance Scheme (NHIS). In this study, we analyze the cost-effectiveness of extending health insurance coverage to children with BL in Ghana.

Methods

We developed a Markov model in Microsoft Excel to estimate the costs and effects of BL treatment when NHIS was provided compared to the status quo where NHIS does not cover care for childhood cancer. The analysis was undertaken from the societal perspective. Both costs (US$) and effects, measured using disability adjusted life years (DALYs), were discounted at a rate of 3%. The time horizon was a lifetime. Probabilistic sensitivity analysis was done to assess uncertainty in the measurement of the incremental cost-effectiveness ratio (ICER). A budget impact analysis was undertaken from the perspective of the NHIS.

Results

In the base-case analysis, the intervention (NHIS reimbursed treatment) was less costly than current practice (US$8,302 vs US$9,558). The intervention was also more effective with less DALYs per patient than the standard of care (17.6 vs 23.33). The ICER was US$219 and indicates that intervention is still cost-effective when taking a narrower, health system only perspective. The probabilistic sensitivity analysis showed that the intervention is likely to be both less costly and more effective than current practice in 100% of the 1,000 simulations undertaken.

Conclusion

Providing health insurance coverage to children with BL is potentially highly cost-effective. The effectiveness and cost-saving of this strategy is driven by its positive impact on treatment initiation and retention. Based on this evidence, there has been a policy change where Ghana's NHIS has prioritized financing for cancer treatment in children.

3:30 PM –5:00 PM   MONDAY   [Health Care Financing & Expenditures]

Cape Town International Convention Centre | CTICC 1 – Room 2.41-2.42
Innovations in Paying for Medicines and New Technologies

MODERATOR: **Aleksandra Torbica**, Università Bocconi

An Opportunity for Countries to Leverage Regional Collaboration to Advance HTA in Their Own Settings: Exploring the Need for a Health Technology Assessment HUB in ASIA

PRESENTER: **Julie Hoang**, Management Sciences for Health
AUTHORS: Christian Suharlim, Jeffrey Sine

Health technology assessment (HTA) hubs, like EUnetHTA in Europe and RedETSA in Latin America, have supported the development and advancement of HTA in their respective regions. In the Asia region, there is currently no existing HTA hub, but there may be an opportunity for an HTA hub in Asia to further the evolution of HTA practice and use. By establishing an HTA hub, Asia could hasten the pace of institutionalizing HTA and integrating it within decision-making processes in the Asia region, building on the presence of formal HTA institutions and networks. The USAID Medicines, Technologies, and Pharmaceutical Services (MTaPS) Program led by Management Sciences for Health aimed to explore the demand, feasibility, and sustainability of an HTA capacity-building hub in Asia.

To meet the study objective, the MTaPS Program conducted a literature review, reviewing over 40 published articles, supplemented by a broad search on publicly available materials. Then, MTaPS organized an online survey to 25 HTA doers, implementers, development partners, and funders in Asia representing 10 countries (China, India, Indonesia, Malaysia, Philippines, Singapore, South Korea, Taiwan, Thailand, and Vietnam). In addition to the surveys, MTaPS conducted key informant interviews with HTA experts in donor agencies, HTA practitioners in the Asia region, implementing agencies providing HTA technical assistance, and secretariat members of HTA hubs in other regions. The transcriptions of the 28 key informant interviews were analyzed into key themes.

The findings confirmed that the demand for HTA is rapidly growing in Asia and identified different needs and offerings for the Asia region due to different progress levels. These needs are political commitment, financial sustainability, additional trained experts, and increased awareness about the value of HTA. A regional HTA hub can support and catalyze the progression of HTA adoption and institutionalization by promoting cross-country knowledge exchanges and collaboration. The study also suggests that HTA public goods, like references cases database, for the Asia region could make data and findings more accessible for countries and lower the barrier to HTA. An HTA hub in Asia could institutionalize transparent and evidence-based decision-making, which will strengthen the medicine regulatory capacity and pharmaceutical governance in the region.

Overview of Spending on Medicines in Brazil (2015-2019)

PRESENTER: **Luciana Costa Xavier**, Ministério da Saúde
AUTHORS: Rebeca Carmo de Souza Cruz, Ivanessa Thaiane do Nascimento Cavalcanti, Mariana Marzullo Pedreira, Ana Carolina Esteves da Silva Pereira, Vitor Hugo Tocci Lima, Everton Macedo Silva

Introduction

Medicines are defined as pharmaceutical products, obtained or prepared for prophylactic, curative, palliative, or diagnostic purposes. Because they play an important role in protecting, maintaining and restoring people's health, the World Health Organization (WHO) recognizes access to essential medicines as an indicator related to advances in the guarantee of the right to health.

Insufficient access to medicines is a global concern and is associated with worsening health status, increased use of additional therapies, increased number of returns to health services, and additional spending on treatments.

To monitor the expenditure on medicines, two methodologies stand out: the System of Health Accounts (SHA), which adopts an international standard allowing comparability of health expenditures between countries; and the Health Satellite Account (HSA), which adopts a macroeconomic approach to analyze the production, consumption of goods and services and the generation of income and employment. Although the methodologies have different objectives, both have elements that allow interactions of information about health systems, including spending on medicines in Brazil.

Objectives

To present the Brazilian scenario of expenditure on medicines between the years 2015 and 2019.

Methods

This is a descriptive study of an exploratory nature on the expenditure on medicines in Brazil in the public and private sectors, based on information available in the HSA and the SHA Accounts.

Results

In 2019, the final consumption of the Health Sector was R$711 billion, representing 9.6% of the Brazilian GDP. Of this amount, medicines contributed R$131 billion, which represented 1.7% of the Brazilian GDP. As pointed out by HSA, medicine consumption by families includes those distributed by the government and those purchased in the private sector. The medicines distributed by the government totaled R$9.3 billion in 2019 and represented 3.3% of health spending by the government; it should be noted that this figure does not include subsidies for the Popular Pharmacy Program, which cost about R$2.3 billion in 2019. Households, on the other hand, consumed R$122 billion, which corresponded to 29.3% of final household consumption.

The SHA Accounts show how spending on medicines was made by provider type and health funding scheme. Thus, spending on medicines in 2019 accounted for 20.5% of total spending across all health funding schemes, with 87.7% coming from direct household procurement. From government spending, it can be seen that 75% of the amounts spent on medicines were funded by the Federal Government.

Conclusion

Medications are essential for the health of the population and correspond to an important portion of the Health Sector's consumption. However, as demonstrated, most of the expenses are financed by the families themselves. Therefore, the public policies for pharmaceutical assistance are essential to subsidize the population, and the Federal Government is its biggest financier.

Medicare Advantage Plans As Likely to Offer High-Cost Drugs to Some Cancer Patients As Fee-for-Service Medicare

PRESENTER: **Cathy Bradley**, University of Colorado Denver
AUTHORS: Richard Lindrooth, Lindsay Sabik, Marcelo Perraillon

Background. Medicare Advantage (MA) plans may reduce spending on cancer treatment through lower cost drug treatment choices. Per capita reimbursement incentivizes these plans to contain treatment costs by using lower cost drugs and palliative care when other treatment options are considered "low value." Traditional fee-for-service Medicare (TM) reimbursement incentivizes clinicians to provide higher margin cost care, including prescribing and administering expensive drugs covered under Part B when similar less expensive drugs are available. We examine whether medication choices differ for patients diagnosed with cancer for those enrolled in MA compared to TM.

Methods. We used the linked Colorado All Payer Claims Database (APCD) and Colorado Central Cancer Registry (CCCR), a dataset comprising adults aged 21 years and older diagnosed with colorectal (CRC) or non-small cell lung cancer (NSCLC). We identified Part B and Part D claims for chemotherapy (CT) and oral targeted agents. We set multiple thresholds for high-cost drugs as those exceeding $5000, $6500, $9000, and $12,000 per month for CRC based on the distribution of drug costs. Similarly, we set the thresholds at $4000, $6000, $8000, and $14000 for NSCLC. Our follow-up period was 6 months after the month of diagnosis, an observation window for which we had complete data on all patients. Controlling for patient characteristics and rural residency, we estimated inverse probability weighted regression. In a sensitivity analysis, we estimated similar logistic regressions on the unmatched sample.

Results: Among individuals enrolled in fee-for-service Medicare (N=9,129) and Medicare Advantage (n=7,188), differences were observed in the age distribution, race/ethnicity composition, and rural/urban residency prior to matching. Medicare Advantage enrollees tended to be younger, urban dwelling, and slightly less likely to be Black or Hispanic. Preliminary evidence suggests that patients diagnosed with earlier stage cancers and enrolled in Medicare Advantage were more likely to receive lower cost anticancer drugs compared to patients enrolled in Medicare fee-for-service plans. Patients diagnosed with metastatic disease were equally likely to receive high-cost medications, regardless of whether they were enrolled in managed care or fee-for-service Medicare.

Discussion: This longitudinal study found evidence that lower cost drugs were used in managed care plans for early-stage cancers, suggesting that incentives to encourage preventive care and reduce cost of cancer treatment appear to be effective in Medicare Advantage plans. However, when few treatment options are available, both plan types prescribe high cost drugs. We did not find evidence of a higher prevalence of palliative care in managed care. These findings have implications for how we incentivize cost-saving practices that also result in improved patient quality of life and long-term cancer survivorship, in health care delivery plans. Without measures to curb rising costs of new cancer drugs, such publicly funded health plans will not be sustainable.

3:30 PM –5:00 PM   MONDAY   [Cross-Cutting Themes And Other Issues]

Cape Town International Convention Centre | CTICC 1 – Auditorium 2
Obesity Impact and Its Burden [ECONOMICS OF OBESITY SIG]

MODERATOR: **John Cawley**, Cornell University

What Is the Economic Case for Reducing Overweight and Obesity Among Children and Teens?

PRESENTER: **Garrison Spencer**, RTI International

Background
The prevalence of overweight and obesity has increased rapidly over the past several decades and has reached epidemic proportions in many countries. While there is a common misperception that overweight and obesity is a public health challenge for only high-income countries, some of the countries with the highest rates of overweight and obesity are middle-income countries. This is concerning not only because of the many chronic conditions associated with overweight and obesity but also due to the far-reaching economic impacts from healthcare expenditures, reduced productivity, and premature mortality. This research examines the economic returns for investing in childhood and adolescent overweight and obesity prevention and treatment in Mexico.

Methods

The investment case model assesses the health and economic impact of childhood and adolescent overweight in a cohort aged 0-19 in 2025 and extends to 2090. A baseline scenario estimates the health outcomes for children and adolescents, absent any changes in policy, throughout their lifetime. We assume that current trends in mortality, morbidity, and risk factors in Mexico remain unchanged and project future mean BMI and overweight and obesity prevalence, disaggregated by age and sex. To identify and select priority overweight and obesity interventions for children and adolescents in Mexico, we conducted literature reviews of the costs and cost-effectiveness of

interventions aimed at preventing and reducing childhood overweight and obesity in Mexico and globally. We selected five proven interventions to include in the model: fiscal interventions (taxes on sugar sweetened beverages and subsidies for health foods), strengthening the restrictions on marketing of unhealthy foods to children, social marketing in schools, breastfeeding promotion, and strengthening school-based interventions. We gathered evidence from the literature on the effect size in terms of BMI reduction or reduction in overweight or obesity prevalence and the costs of each included intervention. We then estimated the impact of the interventions on YLLs, YLDs, and DALYs saved, healthcare cost averted, productivity gained, and lifetime wages gained due to increased educational attainment.

Results

Total lifetime health and economic impacts of overweight and obesity among Mexican children and adolescents amounts to USD 1.8 trillion, or about USD 30 billion on average per year. These five interventions can reduce lifetime costs by USD 124 billion, or an average annual saving of USD 2.1 billion. The largest gains by intervention come from fiscal measures, which result in USD 55.2 billion in savings result, or about USD 346,000 per person receiving the intervention, over the model period. Each intervention is highly cost-effective over the 30 year, 50-year, and lifetime horizon.

Conclusions

The results of the investment case provide policymakers with evidence for a robust policy response to the epidemic of childhood and adolescent overweight and obesity. If adequately implemented, the package of five interventions included in the investment case are cost-effective in delivering better health for children and adolescents and demonstrate the economic benefits of implementing new interventions and strengthening existing efforts.

The Effects of Year-Round and Shortened School Calendars on Obesity in California

PRESENTER: **Jennifer Graves**, Universidad Autónoma de Madrid
AUTHOR: Paul von Hippel

Various studies have established that children's overweight and obesity prevalence rise during summer vacation and fall during the academic year. What explains the deterioration of children's obesity and fitness during summer vacation? The "structured day hypothesis" posits that schools structure children's time in ways that encourage behaviors associated with fitness and healthy body mass index (BMI). Schools limit screen time, limit opportunities to eat, and cause families to enforce regular sleep schedules. Schools schedule regular if not always vigorous physical activity, and schools provide meals that, while not ideal, are on average more nutritious than meals that children bring from home. When school lets out, according to the structured day hypothesis, constraints loosen and children are freer to behave in ways that increase obesity and reduce fitness.

Can schools reduce obesity and improve fitness by adopting "year-round" school calendars that shorten summer vacation? To help answer this question, we estimate the impact that modified school calendars used in California had on obesity. To do so, we take advantage of policy changes that altered the school calendar to a "year-round" calendar. Although their name might suggest otherwise, year-round school calendars do not increase the days that children spend in school, but instead redistribute the same total number of school days more evenly around the calendar year. Whether such calendars can impact student obesity therefore depends on whether simply the total number of unstructured days matters or whether the distribution of unstructured days is also important for obesity and fitness.

We make use of special restricted student-level data for California public schools and school calendar changes that took place over the 1990s, 2000s and 2010s. These policy changes permit us to observe obesity and fitness levels in the same schools under different calendars, and estimate the effects of changing calendars while holding the school constant. Our estimation is done with a fixed effects linear regressions, where identification of the year-round school effects come from within-school comparisons over time.

Understanding the impacts of year-round calendars on student obesity will add to literature on the role that school environments play in either increasing or reducing children's risk of obesity. Additionally, the findings of this study could be particularly important for traditionally disadvantaged student groups. Obesity is more prevalent among black, Hispanic, and economically disadvantaged children, and year-round calendars were more common in Hispanic and economically disadvantaged communities. Therefore the use year-round calendars may have implications for the health equity across racial, ethnic, and socioeconomic groups.

Early results show mixed and nuanced evidence on the impacts of year-round school calendars on BMI, some of which indicate that it is not simply the total time spent in school that matters, but the length of continuous unstructured time under the long summer break that may matter. These findings are preliminary. Future robustness checks and heterogeneity analysis (currently underway) is necessary before drawing conclusions from this research.

The Potential Impact of Achieving Kenya's Obesity Reduction Target on Health Outcomes, Healthcare Costs, and Productivity: A Modelling Study

PRESENTER: **Mary Njeri Wanjau**, Griffith University
Background

Globally, the rising trend in mean body mass index (BMI) has resulted in a substantial increase of the burden of non-communicable disease attributable to high BMI. Kenya has adopted the WHO target of halting the rise of overweight, including obesity, by 2025. This paper assesses the potential impact of achieving the set target on health, healthcare cost, and productivity.

Methods

We used a proportional multistate life table model to quantify health outcomes, healthcare costs and productivity. We modelled the 2019 population of Kenya over their lifetime, comparing a scenario in which BMI distributions stabilize in 2025, against one in which BMI distributions stabilize in 2044. We conducted a literature search to identify the best estimates of the total health expenditure and disease specific healthcare costs in Kenya. We used the Human Capital Approach to estimate productivity gains.

Results

Halting the rise of overweight in the year 2025 is estimated to save 6.8 million HALYs (95% uncertainty interval [UI] 5.8- 7.9 million) over the lifetime of the 2019 Kenyan population (135 HALYs per 1,000 persons). Up to the year 2044, the leading contributors of the health gains were musculoskeletal diseases (537,052 new cases avoided [95% UI 444,361- 639,460]), followed by T2DM (466,030 [95% UI 360,103- 597,378] and cardiovascular diseases (301,729 [95% UI 248,559- 367,949]). A total of US$ 755 million in body mass-related healthcare costs could be saved by 2044 (US$ 15 per capita). For context, this translates to 16% of Kenya's annual healthcare expenditure. Over the lifetime, over US$ 3 billion healthcare costs could be saved (US$ 62 per capita). By 2044, the total productivity gains resulting from a reduction in obesity-related mortality and morbidity (combined) could be as high as ~US$ 5.8 billion, about 8 times higher than the direct healthcare cost savings realized in the same period.

Conclusion

Halting the rise of overweight and obesity not only improves health outcomes but also yields healthcare cost savings and productivity gains. Assessment of the cost-effectiveness of interventions that reduce the prevalence of overweight and obesity could inform priority setting for non-communicable disease control.

Costs of Obesity in Austria

PRESENTER: **Stephanie Reitzinger**, Institute for Advanced Studies
AUTHOR: Thomas Czypionka

Background

Excess body weight has been increasing over the last decades worldwide. Obesity constitutes not only a risk to health of the individuals concerned but yield a major cost burden for the society.

Previous studies estimated the direct and indirect costs of obesity considering the costs of some associated diseases, for instance, cardiovascular diseases, different types of cancer, diabetes, and arthrosis. For various diseases, though, evidence on a higher risk associated with obesity has not been included in cost analyses yet. Most existing cost analyses differentiate between overweight and obesity defined by body mass index (BMI) categories, however, do not specifically differentiate between obesity classes.

Aim

The aim of our research is to approximate the costs associated with overweightness for Austria, where 3.8 million adults were overweight or obese in 2019 (50 % of adult population). Our study also brings along two methodological novelties. First, we cover a wider range of co-morbidities in our analysis aiming to include the most current epidemiological evidence of obesity associated diseases. Second, we consider a non-linear dose-response relationship per BMI unit up to a BMI of 45.

Method

We use population-weighted survey data (ATHIS 2019) on the distribution of BMI for Austria and data on relative risks regarding 83 obesity related diseases. Using fractional polynomial regressions, we estimated relative risks per BMI unit for 23 cost-intensive diseases regarding morbidity risk and for 11 main diseases regarding mortality risk. Data for various cost categories came mainly from administrative data of the year 2019. The approach for the cost analysis was based on the use of population-attributable fractions applied to direct medical, direct non-medical and indirect costs.

Results

We estimated that 11.7% of all deaths under the age of 85 are related to overweight (25%) or obesity (75%) in 2019. In our analysis, almost half of obesity associated deaths are related to cardiovascular diseases. The direct medical costs amount to EUR 2,063 million; a third of these costs are related to cardiovascular diseases, 15% to diabetes and another 15% to diseases of the musculoskeletal system and connective tissue. The indirect costs amount to €602 million. We estimated that nearly 1,300 new entries into disability pension (7.5% of all entries) are associated with co-morbidities of excess body weight in 2019, amounting to costs of about €18 million. About 3,900 full time equivalents were on sick leave yielding costs of about €23 million. In total, the costs amount to €2,708 million associated with overweight (29%) and obesity (71%).

Conclusion

The costs arising from overweight and obesity for the society are substantial for the year 2019. The maximum of obesity prevalence is projected to be reached around 2035, therefore, the financial impact on the Austrian health system and the economy will further rise. Our methodological advancement considering the risks per BMI unit allows us to estimate public health intervention programs in forthcoming research investigating ways to control the obesity epidemic.

3:30 PM –5:00 PM   MONDAY   [Health Care Financing & Expenditures]

Cape Town International Convention Centre | CTICC 1 – Room 2.64-2.65

It's Not (all) about Money: Understanding the Role of Local Health Systems Organisation, Policies and Practices in Shaping How Public Expenditure Affects Health and Inequality

MODERATOR: **Laura Anselmi**, The University of Manchester

DISCUSSANT: **Timothy Powell-Jackson**, London School of Hygiene & Tropical Medicine (LSHTM); **Peter Binyaruka**, Ifakara Health Institute

The Effect of Public Health Expenditure on Health and Health Care: A Systematic Review and Meta-Regression Analysis

PRESENTER: **Eliana Chavarría Pino**, University of Manchester

Background: Although it is considered one of the main inputs influencing health, there is no conclusive evidence on returns on public health expenditure. Two previous studies attempted to review the literature available, but they have restricted the year of publication and sourced literary databases, or covered only certain countries. The objective of this research paper is to synthesise the international evidence to date, and for the first time assess how health system characteristics as well as study design decisions affect point estimates. This study will try to reconcile existing evidence by updating previous findings and systematically investigating the role of differences in health systems for the subset of studies that provide this information. The findings will help guide public policies at the current juncture of rising health costs and multiple pressures on health systems.

Methods: We searched subject-specific databases and journals, grey literature sources, and websites of international organisations to identify relevant studies. We performed searches without restriction on language and published by October 2021. The searches were conducted and completed between October 2021 and February 2022. We provide an overview of the main analytical strategies and conceptual frameworks used, together with their limitations. We excluded studies estimating the effect of private and out-of-pocket health expenditure, and remittances; as well as studies evaluating the effect of specific health programs without reporting the level of expenditure.

Results: We included 324 quantitative peer-reviewed studies for full-text review and quality assessment. We retained and extracted data from a final pool of 104 studies. The studies differ in the source and type of spending that is evaluated; the type of outcome variables used; unit of analysis; econometric strategy; and the population groups studied. Study settings shape the type of analysis that is done. For example, low- and middle-income countries usually evaluated the effect of spending on maternal and child health using national aggregate data or by evaluating a specific health project. High-income countries, on the other hand, tend to use indicators of life expectancy and preventable mortality and be able to draw conclusions at the subnational level.

Preliminary results suggest strong heterogeneity across settings and high sensitivity to estimation methods. We found that spending has larger effects on mortality than life expectancy, and when allowing for lagged effects. In contrast, effect sizes are smaller or no longer significant when controlling for endogeneity in the health production function. Income and local governance are also found to be essential moderators of the relationship.

Conclusions: The review contributes to a deeper understanding of the pathways through which public health expenditure affects population health status while highlighting persistent research gaps. We find that local governance and health policies are vital determinants but rarely considered in the literature. We further discuss the role of different local health system characteristics for a subset of studies and we set out a future research agenda.

Paying Our Way to Better Health? the Impact of Primary Health Care Spending on Care-Seeking and Health Outcomes in Brazil

PRESENTER: **Everton Silva**, University of Brasilia

Background: Calls to increase primary health care spending in low- and middle-income countries are based on the premise that additional financial resources will improve health outcomes. Such claims are supported by economic modelling studies that typically combine evidence on the effectiveness of health care intervention with an ingredients approach. What is missing from the debate, however, is real-world evidence on the relationship between primary health care spending and health outcomes. There are several empirical challenges in addressing the question of whether an increase in primary healthcare spending leads to improvements in health. First, data on primary

health care spending are not readily available. Second, establishing a causal link between health spending and health outcomes is fraught with problems, not least because health budgets are often allocated on the basis of health care needs. In this study, we addressed these challenges using longitudinal data on primary health spending and health outcomes in Brazil.

Methods: We used data on public primary health care spending across almost 5,500 municipalities over an 11-year period (2006-2017). Our measures of health were under-five mortality and under-75 avoidable mortality. We pursued two alternative approaches to examining the relationship between primary health spending and mortality. First, we followed the standard approach and estimated panel log-log regressions with fixed effects for year and municipality. Second, using a difference-in-differences approach, we exploited the staggered rollout of PMAQ (Programa Nacional de Melhoria do Acesso e da Qualidade da Atenção Básica), a federal programme that provided municipalities with new funding for primary health care. We estimated a two-way fixed effect model, controlling for time-varying municipality characteristics.

Results: The panel regressions showed that there was no evidence of a relationship between primary health spending and health outcomes. A 10 percent increase in primary health care spending was associated with a non-significant 0.1 percent increase in under-five mortality and a -0.03 percent decrease in avoidable mortality. The quasi-experimental estimates of the effect of PMAQ confirmed that the programme led to an increase spending, of 9.8 percent in federal primary care spending and 5.6 percent in total public primary care spending, with no evidence of pre-trends in event study estimates. There was, however, no evidence on an effect of PMAQ on health outcomes.

Conclusions: The findings suggest that it should not be assumed that greater spending on primary health care translates into better health outcomes, at least in our study setting. These results stand in contrast to the large number of studies that examine country-level correlations, which almost universally find positive associations between total health spending and mortality.

The Effect of Increased Primary Healthcare Resources on Health Outcomes, Financial Protection and Health Equity during China's Health System Reform

PRESENTER: **Ping He**, Peking University

Background Stronger primary health care (PHC) is critical to achieving Sustainable Development Goals. However, there is scarce evidence on the impact of PHC on health system performance in developing countries. During the past decade, China has implemented an ambitious health system reform since 2009, among which PHC has received unprecedented attention. This study aims to investigate the effect of primary healthcare resources on health outcomes, financial protection and health equity during China's health system reform.

Methods We obtained province-level and individual-level longitudinal data to conduct a quasit-experimental study across the period of China's health system reform. The dependent variables included health outcomes and financial protection. The independent variables were the number and share of PHC physicians. Mixed-effect models were used for adjusted associations.

Results From 2003 to 2017, the number of PHC physicians increased by 31.75 per 100,000 persons and the share of PHC physicians in all physicians increased by 3.62 percentage points. In province level, greater PHC physician density was positively associated with life expectancy, negatively associated with age-standardized excess mortality, infectious disease mortality, perinatal mortality low birth weight, as well as the share of health expenses in total consumption expenses. In individual and household level, greater PHC physician density was positively associated with self-assessed health, and negatively associated with the incidence of catastrophic health expenses. Compared to other quintiles, the poorest quintile benefited the most.

Conclusions In China, the greater supply of primary care physicians improved health outcomes, financial risk protection and health equity, with the poorest groups benefiting the most. While China's PHC system has been strengthened in the context of China's health system reform, further effective incentives should be developed to attract more qualified PHC workers.

The Impact of Devolution on Individuals' Experienced Health and Well-Being: Evidence from Greater Manchester, England

PRESENTER: **Yao Wei**, University of Manchester

Over the past few decades, many countries have adopted more devolved governance in a variety of public sectors. Consequently, devolving health systems from national to local levels has become a consistent focus of policymakers as a strategy to meet the ever-increasing and diverging needs of local citizens and to improve population health. However, there are very few evaluations of such reform's impact on health. These studies often exploit area-level datasets and utilize infant mortality rates as the sole measure of health outcomes associated with the impact of devolution. Our study focuses on the devolution in Greater Manchester (England) in 2016, which was found to positively impact life expectancy, and adds to the evidence by assessing its impact on subjective measures of health and well-being. Subjective measures may best reflect how services have been tailored to meet local citizens' needs and preferences.

We analyse individual-level Short-Form 12 (SF12) scores for 13,938 adult respondents to the UK Household Longitudinal Survey between 2012 and 2020. We test parallel trends between Greater Manchester and the rest of England in the pre-intervention period. We use either difference-in-differences or, when trends are non-parallel, lagged-dependent variable regressions to compare changes in Greater Manchester and in the rest of England. We control for various individual and household characteristics. We test the consistency of our

results by using different sets of covariates and alternative control groups. We conduct sub-group analysis by age group, gender, income, and area-level characteristics to examine if the effects of devolution could be masked at the entire population level.

Devolution was associated with a small increase of 0.086 (CI: -0.300 to 0.473) in SF12 physical health scores and a 0.006 increase (CI: -0.336 to 0.348) in SF12 mental health scores on average over four years. Devolution was not associated with a statistically significant impact on individuals' experienced health and well-being, despite statistically insignificant trends of increasing effects on both physical health and mental health. The results were robust to alternative sets of control groups and/or covariates within the regressions and were generally consistent throughout the sub-group analysis.

Unlike other studies, our findings suggest that Greater Manchester devolution may have not improved health and well-being. In the context of existing evidence, this suggests that devolving health management alone without budgetary powers and local accountability mechanisms may be ineffective at least in the short term.

3:30 PM –5:00 PM   MONDAY   [Economic Evaluation Of Health And Care Interventions]

Cape Town International Convention Centre | CTICC 2 – Daisy
Applications Valuing Health

MODERATOR: **Richard Norman**, Curtin University

Unravelling the Elements of Value of Health Care and Assessing Their Importance Using Evidence from Two Discrete-Choice Experiments in England

PRESENTER: **Pamela Gongora-Salazar**, University of Oxford
AUTHORS: Rafael Perera, Oliver Rivero-Arias, Apostolos Tsiachristas

Background: In response to increasing demand for healthcare, rising care costs, and tighter fiscal policies, health systems are redesigned towards high value care. This is driven by care models that coordinate services around patients' needs. Most of these models are emerging as bottom-up innovations and are prioritised by local decision-makers based on a multi-composite perception of value. Despite the urgency to assess value, little is known about the elements of value of health care and their relative importance. In addition, there is an ongoing debate about whether healthcare costs should constitute part of the value alongside the benefits. Few stated-preference studies have investigated the impact of including costs as part of the value metric on the relative importance of other elements of value. None of them, however, has expressed cost as tax increases, which is a more realistic payment vehicle than the out-of-pocket cost in publicly funded healthcare systems. This information is essential for decision-makers in a tax-based healthcare system. This study aimed to define the elements of value of health care and assess their relative importance to the public in England.

Method: Elements of value of health care were identified by conducting 26 semi-structured interviews with local stakeholders and a systematic literature review. To determine their relative importance we surveyed a representative sample of the general public from England. We conducted two discrete choice experiments (DCEs) using a Bayesian D-efficient design: one including the cost attribute, defined in terms of income tax rise, and the second one excluding it. In each choice task, participants were asked to choose between two hypothetical care programmes for local decision-makers to fund and support. Respondent preferences were analysed using multinomial logit and mixed logit models. Preference weights between both designs were compared using relative importance scores (RI).

Results: Six elements of value (additional years of life, health-related quality of life, patient experience, size of the target population, equity and cost) were identified. 402 members of the public completed the surveys in November 2022. All utility coefficients had the expected signs and were statistically significant (<0.05). When cost was excluded, additional life-years (25.3%; 95% CI:22.5%-28.6%) and patient experience (25.2%; 95%CI: 21.6%-28.9%) received the highest RI, followed by size of the target population (22.4%; 95% CI:19.1%-25.6%) and quality of life (17.6%; CI 95%:15.0%-20.3%). Equity received the lowest RI (9.6%; CI 95%:6.4%-12.1%), which was substantially reduced by 8.8 percentage points when costs were included in the DCE. A similar absolute reduction was estimated in the RI of quality of life when cost was included in the trade-offs.

Conclusion: The general public assigns high importance to elements of value that are not captured in conventional value metrics, such as quality-adjusted life-years. Although considering costs as an element of value did not alter the overall preference ranking, its inclusion should be considered with caution.

Willingness to Pay for Health and Well-Being By Applying a Societal Perspective in the Netherlands

PRESENTER: **Daphne Voormolen**, Erasmus School of Health Policy & Management, Erasmus University Rotterdam, Rotterdam, The Netherlands

Interpretation of the outcomes of cost utility analyses requires defining appropriate thresholds for cost per quality-adjusted life year (QALY) and well-being adjust life year (WALY). Ten years ago, a study conducted by Bobinac et al. was the first to study direct empirical estimates of the willingness to pay for a QALY from a societal perspective. This paper is a replication of the study done by Bobinac et al., and in addition also determines appropriate thresholds for cost per WALY.

In this study, the contingent valuation approach was used, in which QALYs and WALYs were valued under uncertainty and corrected for probability weighting. Data was collected from 1,013 respondents, quota-sampled on age, sex, and education level. To elicit values for a QALY and WALY, two question formats were used: the 'social value' (SOC), which represents the value of an expected QALY/WALY gain achieved in others, and the 'social-inclusive-individual value' (SII), which represents the value of an expected QALY/WALY gain in others *or* the individual themselves. Respondents were evenly divided over both formats. Twenty-nine scenarios were designed by combining 42 different health states, described using the EuroQol-5D (EQ-5D) for health and the ICEpop CAPability measure for Adults (ICECAP-A) for well-being. QALY gain calculations were based on the Dutch tariffs for both instruments.

The key estimates obtained in a representative sample of the Dutch population range from €28,000 to €93,000 per QALY and €98,000 to €120,000 per WALY, depending on the specification of the societal perspective. The value of a year in complete health (value of a QALY) is slightly lower than 10 years ago. The value of a year in complete well-being (value of a WALY) is 25 to 65% higher than the value of a year in full health, depending on the assumptions.

These findings are very valuable input for the Dutch government and the decision-making on optimal resource allocation, especially when thinking about the Dutch beneficiary package and the funding or reimbursement of healthcare intervention. The value of health corresponds reasonably well with the value used by the Dutch government currently. The value of well-being is higher than the value of health, which has potential implications for the prioritization of prevention and care in relation to cure.

Understanding the Value of Post-Acute Care: Heterogeneous Preferences and Willingness-to-Pay for Different Types of Post-Acute Care: A Discrete Choice Experiment.

PRESENTER: **Fangli Geng**, Harvard University
AUTHORS: Brian E. McGarry, David C. Grabowski

Introduction

One in five Medicare hospital stays in the U.S. are discharged to a post-acute care (PAC) setting. Understanding what features consumers most desire in PAC is crucial to encouraging high-value care. However, consumer preferences are difficult to observe in the marketplace, and this issue has yet to be examined in previous research. Thus, this study aims to quantify consumer preferences and willingness-to-pay (WTP) for various features of PAC and the heterogenous preferences between patients and caregivers.

Methods
We conducted a discrete choice experiment through a nationally representative Internet-based panel recruited and maintained by the RAND Corporation. Of the panel members aged forty-five and older, 2,166 were invited to participate in our survey, and 1,555 completed the survey. All subjects were asked to sequentially choose between different pairs of PAC services, a skilled nursing facility and a home health agency, from a patient's or caregiver's perspective. The experiment included six varying attributes: travel time, room type, quality of care, time that the primary caregiver needs to spend taking care of the patient, patient's recovery period, and total out-of-pocket costs.

Results
We found that patients and caregivers preferred patients' receiving PAC at home than in skilled nursing facilities. Specifically, patients and caregivers were willing to pay $555 and $620 more for patients to stay at home, respectively. Additionally, if staying in skilled nursing facilities, patients and caregivers were willing to pay $15 and $21 to reduce 1min travel time between their home and the facility. Compared to average quality of care, patients and caregivers were willing to pay $2,000 to avoid care below average quality but not willing to pay more for above-quality care. Moreover, patients and caregivers were willing to pay $52 and $43 to reduce one day of recovery time at the skilled nursing facilities, while a more extended recovery period at home did not significantly affect their utility. However, patients and caregivers valued caregivers' time largely differently. Patients were willing to pay $63 to reduce one hour caregivers need to spend caring for patients. In contrast, caregivers were willing to pay $185 to reduce one hour of care time.

Conclusion
Our study revealed that patients and primary caregivers, the two key decision makers for choosing care models, preferred home settings than facility-based settings for post-acute care. However, primary caregivers valued their time more than patients, higher than the market value for caring for patients. In the era of alternative payment models and patient-centered care, as policymakers tried to incentivize high-value home-based care, our study offered insights into the value of different settings for patients and caregivers, and the key factors to consider when designing the new policies.

Capability Adjusted Life Years Sweden (CALY-SWE): Valuation Using an Online Self-Administered Time Trade-Off and Discrete Choice Experiment Survey

PRESENTER: **Kaspar Walter Meili**, Umeå University
AUTHORS: Brendan Mulhern, Richard Ssegonja, Jan Hjelte, Kerstin Edin, Inna Feldman, Fredrik Norström, Anna Månsdotter, Lars Lindholm

Background: Capability-adjusted life years Sweden (CALY-SWE) is a new measure for quality of life based on the capability approach by Amartya Sen. CALY-SWE aims to enable economic evaluations of public health and social welfare interventions with broad consequences beyond health. CALY-SWE includes the six attributes of Health, Social relations, Finance & housing, Occupation, Security, and Political and civil rights, with each 3 levels (Agree completely, agree partially, Do not agree). CALY-SWE targets the Swedish policy-making context and was developed with equity considerations in mind.

The aim was to derive a value set for CALY-SWE to enable cost-effectiveness evaluations with cost per CALY as an outcome, similar to evaluations in the health context that use cost per QALY.

Methods: We designed the study with DCE and TTO questions loosely based on Euroqol's EQ-VT protocol. Data collection consisted of an unguided, online-administered survey among a representative Swedish web panel sample. The survey was developed in multiple stages and the development also incorporated feedback from qualitative interviews on face validity. To assess the required sample size, we ran a simulation. To reach a high completion rate, we designed the survey to be short but compensated by increasing the sample size to collect enough data.

Using a score based on the severity of logical inconsistencies, we assessed TTO data quality, and explored the effects on model fit of excluding 30% to 100% of TTO data. We then combined DCE and TTO data in a Bayesian hybrid model with a logit and a linear component to estimate the value set. We also included a multiplicative factor in the model to anchor the weight for the best state to 1. We compared different models by the range of the resulting weights, consistency with DCE-derived preferences, predictive performance in a k-fold cross valuation, and the precision given by the 95% credible interval width.

Results: We excluded TTO data of participants (total n=1700) with the 20% worst inconsistency scores as their data did not improve the model fit. The DCE data quality was satisfying. The final value set with a range of 0.114-1 was generated with a basic hybrid model. We observed no benefits of including a varying intercept or a heteroskedasticity specification in the model. Most important was the health attribute, before social relations, finance and housing, occupation, security, and political and civil rights.

Discussion & Conclusion: Iterative development of a customized survey and excluding worse-quality TTO data allowed us to derive a value set for CALY-SWE using data from an unguided, self-administered online survey. The derived value set is representative of the Swedish population and will facilitate cost-effectiveness analyses with cost/CALY as an outcome. Interventions targeting for example school dropouts, homeless shelters, drug addiction, and disability assistance may be evaluated and compared; hopefully contributing towards a better resource allocation within social welfare.

3:30 PM –5:00 PM   MONDAY   [Supply And Regulation Of Health Care Services And Products]

Cape Town International Convention Centre | CTICC 1 – Room 1.42
Care Models and Healthcare Delivery in Teams [HEALTH WORKFORCE SIG]

MODERATOR: **Hanifa Pilvar**, Queen Mary University of London

Effects of Primary Care Team Implementation on the Attractiveness and Retention of Physiotherapists in Underserved Areas

PRESENTER: **Julien Mousquès**, Institute for Research and Information in Health Economics (IRDES)
AUTHORS: Yoann Galharret, Videau Yann

Introduction: The issue of access to primary care is central in France nowadays, particularly in rural areas, in the context of large shortage of GPs. Saving physician time is a cornerstone of most health care delivery policy and Physiotherapists (PTs), whose activity depends in France on physician's referrals, are one of healthcare professions with the most dynamic density growth that ends with large skill-mix opportunities. In order to promote cooperation and skill-mix, the State and the National Health Insurance highly support the development of multidisciplinary Primary Care Team (PCT) integrating at least two general practitioners (GPs) and two other allied healthcare professionals. Because PCTs are primarily located in underserved areas, it could be a way to reduce geographic imbalance in the distribution of PTs if they appear to be attractive for new PT, in addition to traditional financial incentives. The PCT could be attractive for PT through various channels: i) by spillover effect with the attraction of GPs in PCT, who are the main prescribers of physiotherapy, ii) by the opportunity to be associated with monodisciplinary and interprofessional collaboration enabled by the PCT. We aim to estimate the impact of PCT implementation in underserved areas on the attractiveness and retention of PTs, particularly the youngest one. The analysis is led at the smallest living area wherein inhabitants have access to usual health facilities called 'Health living area (HLAs)'.

Method: To estimate a causal effect of the establishment of PCT on the evolution of the density of PTs for a given level of public policy aiming at either fostering the location in underserved areas or discouraging the location in overserved areas, we compared HLAs with PCT (based on the first year of practice), the treated areas, to HLAs without PCT, the control groups. Based on the difference-in-differences estimators proposed by Callaway and Sant'Anna (2021) when the treatment in staggered, we consider both the heterogeneity in the treatment date, and therefore in the exposure duration, as well as the level of imbalance between supply and demand between HLAs.

Preliminary results: The estimation of the overall effect (excluding Corsica) does not reveal any causal effect of the establishment of a PCT on the increase in PTs density. This overall result may be explained by a differential effect of PCT opening based on initial levels of access to primary care.

Yet, restricting the analysis to the most underserved HLAs according to the primary care services, while controlling for other regulatory policies, we show that underserved HLAs with PCT new settlement exhibit larger recruitment and short-term retention of PT than

underserved LAs without PCT. Future estimations will focus on the impact for young PT and will more precisely detail the average treatment effect on the treated depending on the type or category of HLAs

Discussion: Knowing our quasi-experimental design, the exogeneity of the treatment is still a concern. The concentration of effects on specifics HLAs should be consideres by health policy stakeholders when addressing policy to attract and retain PT in underserved areas.

Did the Implementation of Team-Based Primary Care Models in Ontario and Quebec, Canada, Impact Appropriate Prescribing?

PRESENTER: **Erin Strumpf**, McGill University
AUTHORS: David Rudoler, Agnes Grudniewicz, Nichole Austin, Monika Roerig, Sara Allin, Elisabeth Martin

Context: Many older adults take multiple medications prescribed by a variety of providers, leading to concerns about medication management, appropriateness, and adverse drug events. Interdisciplinary, team-based primary care models can improve coordination of health care services, which could translate to improved medication management and related outcomes. We used impact evaluation methods to estimate the impact of interdisciplinary team-based primary care models implemented in two Canadian provinces — Ontario and Quebec — on outcomes related to medication use. Qualitative analysis of semi-structured interviews allowed us to describe and understand collaboration between family physicians and interdisciplinary health providers (IHPs) when managing medications for seniors.

Methods: We conducted a retrospective cohort analysis of eligible patients between 66 and 104 years of age. Population-level administrative health data housed at ICES in Ontario and the Institut national d'excellence en sante et services sociaux (INESSS) in Quebec were used for the impact evaluation. We focused on fiscal years 2001/02 to 2017/18. The two policy interventions we evaluated were Quebec's Family Medicine Groups (implemented in 2002) and Ontario's Family Health Teams (implemented in 2005). Outcomes of interest were any adverse drug event resulting in hospitalization, polypharmacy (5+ medication classes), and any potentially inappropriate prescription (adapted from Beer's and STOPP/START criteria). We used difference-in-differences analysis with matching (1-to-1 propensity score matching without replacement) to compare an exposure group of older adults who were rostered to a physician affiliated with a team-based primary care model to a comparison group of older adults rostered to non-team family physicians. Semi-structured interviews were conducted with 38 care providers and administrators across 6 teams in Ontario.

Results: Matched cohorts included 428,852 older adults in Ontario and 310,198 in Quebec. In the year before they rostered, 43% and 40% of older adults had a potentially inappropriate prescription in Ontario and Quebec, respectively. Rates of polypharmacy were 61% and 55% in Ontario and Quebec, respectively. In both provinces, 1% had an adverse drug event. Patients in Quebec's Family Medicine Groups were more likely to experience an adverse drug event (RR = 1.22; 95% CI: 1.18 - 1.26), but the absolute risk difference was less than 0.5%. We estimated no clinically important effects between the exposure and comparison groups. The style and degree of collaboration fit into 3 broad categories: physicians who did not engage IHPs, physicians who referred patients to IHPs and IHP-led programs for medication management but rarely engaged in ongoing communication, and some shared care and ongoing communication between physicians and IHPs. These differences were perceived to be a result of trust, hierarchy, work style and use of the electronic medical record, and expectations.

Conclusions: The implementation of team-based primary care models in Ontario and Quebec was not associated with a variety of outcomes related to medication management. Despite the FHT model's emphasis on teamwork, true collaboration and shared care for medication management was not evident. In order to support older adults and others with complex health needs, opportunities to improve teamwork, strengthen collaboration, and optimize team composition should be identified and pursued.

Efficiency and Impact of Skill-Mix and Technology on Productivity: Evidence from General Practices in England

PRESENTER: **Margherita Neri**, Office of Health Economics
AUTHORS: Bruce Hollingsworth, Eugenio Zucchelli, Patricia Cubi-Molla, Graham Cookson

Background and objectives: Primary care in the English National Health System (NHS) is currently under severe pressure due to unsustainable workload levels, increasingly complex patient case mixes and a shortage of doctors. Recent organisational changes have led to the introduction of new staffing roles (e.g. physiotherapists, paramedics, social prescribing workers) while, due to the COVID-19 pandemic, general practices have increasingly relied on technology (e.g. telemedicine) to deliver healthcare remotely. Understanding whether these changes might offer an opportunity to improve efficiency and productivity of general practices has never been as important as today.

This paper presents the results of an empirical analysis of efficiency across general practices in England and of the determinants of productivity, including staff skill mix and technology.

Methods: The analysis is based on a panel dataset of patient level data aggregated to quarterly observations from around 750 general practices (~10% of total practices in England) between 2015-2021, extracted from the Royal College of General Practitioners Research and Surveillance Centre. These data are linked to NHS data to provide additional information on general practices workforce, patient population and organisational factors.

We employ a transcendental-logarithmic production function to model the relationship between outputs, labour inputs, technology use and exogenous variables explaining the production structure and efficiency of general practices. General practice output is based on several measures of activity, including consultations, referrals, prescriptions, and medical tests performed.

To analyse efficiency variations across general practices, we employ a one-step Stochastic Frontier Analysis (SFA) specification of a best practice frontier by maximum likelihood. This approach allows exploring the marginal productivity of the workforce inputs and technology use, and the effects of explanatory variables (e.g. population demographics, comorbidities, practice area) on efficiency.

Analysis of the optimal skill mix is informed by the Hicks elasticities of input complementarities, to determine whether different inputs act as complements or substitutes.

Results: Results show efficiency variations across general practices owing, for example, to differences in the prevalence of population comorbidities, rurality and geography of general practice area. Efficiency changes over time are presented, including before and since the COVID-19 pandemic. Impact on productivity levels is explored through different labour input combinations (staffing roles) and comparison with technology-based health care. These highlight the need for more targeted resource allocation across general practices in the National Government's pursuit of 'levelling up' policies aiming to address regional disparities in productivity.

Conclusion: This research makes a significant contribution to the literature on the efficiency of general practices. It also produces new evidence for improving their productivity, with transferable learning to other countries experiencing pressure in primary care. Further research is planned in this space, aiming to improve the measurement of general practice output by means of suitable quality adjustments capturing the impact of general practice activity on related patients' health outcomes.

Excess Mortality Among Dutch Nursing Home Residents during the Pandemic: The Role of Organizational Characteristics

PRESENTER: **Marlies Bar**, Erasmus University Rotterdam
AUTHORS: Judith Bom, Pieter Bakx, Bram Wouterse, Cees Hertogh

Nursing home residents constituted a very vulnerable population during the COVID-19 pandemic. This paper documents the variation in excess mortality during the pandemic at the nursing home level and examines the role of nursing homes' organizational characteristics (such as staff absenteeism and the size of the nursing home) in explaining excess mortality. For this, we use data regarding all nursing home residents in the Netherlands and link this to information about nursing home organizations. We document large variation in excess mortality across nursing homes, which can to a large extent be explained by differences in Covid-19 mortality. The variation in excess mortality across nursing homes is not strongly correlated to structure, or process indicators. There are a few exceptions: in 2020 to spending on external staff, and in 2021 to pre-pandemic staff absenteeism. Our results highlight the importance of staffing indicators other than quantity in explaining differences in mortality outcomes across nursing homes during infectious disease outbreaks.

Cape Town International Convention Centre | CTICC 1 – Room 2.66

Gender Pays Gaps in the Health Workforce [HEALTH WORKFORCE SIG]

MODERATOR: **Michelle McIsaac**, World Health Organization (WHO)

DISCUSSANT: **Joanne Spetz**, University of California San Francisco

Global Analysis of the Gender Pay Gap in the Health and Care Sector

PRESENTER: **Michelle McIsaac**, World Health Organization (WHO)
AUTHOR: Joanne Spetz

Employment growth in the health and social care sector for both men and women has been much higher than other economic sectors in many countries over the past few decades. Using labour force surveys we find that 67% of the world's wage employees (weighted average of 189 countries) in the health and care sector in are women. We find that in many countries around the world women in this sector face a larger gender pay gap than in other economic sectors. We explore the gender pay gap in health and social care sector across 54 countries, which represent approximately 40% of the sector's wage employees across the world, with an aim to provide a detailed quantitative analysis of gender pay gaps in health and social care sector.

The methodology adopted for this analysis follows that from the ILO Global wage report 2018/19, we apply propensity score matching methods together with the method of unconditional quantile regression to identify, measure and decompose the explained and unexplained parts of the gender pay gap across countries. This methodological treatment involves the decomposition of the gender pay gap to identify how factors such as age, education, occupational category, working time modality and institutional sector, contribute to the gender pay gap at different points along the wage distribution.

The results find that in many countries the explained portion of the global gender pay gap is negative, whereas the unexplained portion is positive. Meaning that, in general, women earn less than men for their labour market attributes (the unexplained component is positive),

women tend to have better labour market attributes than men within the same quantile of the wage distribution (the explained portion is negative). Taken together, the average factor weighted gender pay gap across the world is estimated at approximately 24%.

The gender pay gap in health and social care sector has been very persistent globally over the past two decades. Although there is some evidence of a gradual shift among women to higher paying occupational categories, in all countries women continue to be overrepresented in occupational categories at the lower end of the pay scale. The gender pay gap globally has remained very persistent over the past two decades globally, even increasing over time in some countries, while it has declined or remained relatively static in others. More efforts are needed to address these pay gaps and the especially persistent unexplained portion of the gender pay gaps in the health and social care sector. Closing the gender pay gap in the sector would benefit the health workforce, and given the size of the sector and high proportion of women employed in it, it would also be an important step in reducing the overall gender pay gap in the global economy.

Gender Differences in Earnings for Australian Nursing Graduates

PRESENTER: **Ian Li**, The University of Western Australia

Findings of gender pay gaps have been persistent across labour markets globally. Further, the gender earnings disadvantage for females has been found to be particularly stark for highly feminised occupations and industries, including nursing. Understanding the gender differentials that exist in the nursing workforce is important as they have implications on retention, career aspirations, satisfaction and more broadly, the attractiveness of nursing as a profession. This study examines the gender differences for nursing graduates in Australia at the point of entry into the labour market as well as the medium term, using data from the national Graduate Outcomes Survey-Longitudinal study. Mincerian earnings models and Blinder-Oaxaca decomposition techniques are used to analyse the data.

Female nursing graduates are found to earn 4 percent less than their male counterparts at six months after graduation. Three years after graduation, the gender pay gap has widened to 13 percent. Separate analyses were performed for those working as registered nurses or who were employed in other occupations. For those working as registered nurses, evidence of a gender wage gap was found at both six months (5 percent) and three years (13 percent) after graduation. For those employed in other occupations, a gender wage gap was not found at six months after graduation but a 14 percent gender wage gap was found at three years after graduation.

In addition, the gender wage gap was also examined using a Blinder-Oaxaca decomposition approach. The Blinder-Oaxaca decomposition revealed that around 42 percent of the gender wage gap at six months after graduation can be attributed to differences in human capital endowments across male and female nursing graduates. However, 58 percent of the gender wage gap was found to be a result of the 'coefficient' effect, or due to labour market discrimination. At three years after graduation, the endowment effect was 26 percent while the coefficient effect accounted for 74 percent of the gender wage gap. Results from decomposition analyses on samples restricted to only those working as registered nurses were similar.

The findings indicate that gender disadvantage in earnings for female nursing graduates begins from an early point in their nursing careers and widens in the longer term. Further, most of the gender pay disparity can be attributed to labour market discrimination, rather than differences in human capital endowments by gender. This needs to be addressed to boost the attractiveness of the nursing profession, reduce the number of nurses leaving the profession, and eliminate gender disparities in economic opportunities.

The Impact of COVID-19 on Gender Earnings Differences of Nurses in the United States

PRESENTER: **Ulrike Muench**, University of California San Francisco

The COVID-19 pandemic disrupted labor conditions for nurses worldwide, impacting the supply and demand for nurses. During the pandemic, nurses left the workforce at higher rates, the pipeline of new nurses slowed because of nurse licensing delays, and certain geographic areas with high COVID outbreaks and clinical settings (e.g. intensive care), saw sharp increases in demand. These and other factors led to wage increases for nurses in many sectors of the labor market. Prior studies, including our own, have documented a persistent gender wage gap in the U.S. nursing labor market. However, little is known about how the pandemic affected the pay gap in nursing. The aim of this study was to examine the impact of COVID-19 on the male-female pay gap of nurses in the United States.

Using monthly data from the Current Population Survey (CPS) from January 2011 to April 2022, we estimated a series of ordinary least squares regressions with the log of weekly earnings as the outcome (adjusted for inflation). Our baseline model included gender, COVID (coded 1 after March 2020 and zero otherwise), an interaction of gender and COVID, and hours worked per week. We build upon this model with an increasing set of controls, including education, experience, experience squared, race/ethnicity, marital status, children in the household, work setting, union status, rural/urban area, region and time fixed effects (quarters). Our primary variable of interest was the interaction term of gender and COVID, indicating the additional premium male nurses earned during COVID. All analysis were adjusted for the complex survey weights of the CPS.

Results from the baseline model showed that the male earnings gap widened during the pandemic by 5.6 percentage point, reaching 15.2%. In the fully adjusted model, male nurses outearned female nurses by 13.4%, with a 4.7 percentage points pandemic increase. In terms of dollar amounts, this is approximately $77 per week, $4,100 per year, or $477,710 over the course of a 30-year career.

Findings indicate that the male-female earnings gap for nurses in the U.S. grew during the pandemic. It is likely that similar patterns would be observed in other countries, given that the pandemic affected working conditions of nurses similarly across the globe. Nursing is the largest health care occupation in nearly every country and as such a male-female pay gap affects a sizable share of women in the labor

market globally. This has detrimental effects not only on retaining a qualified nursing workforce but also on disparities in living standard and economic wellbeing of women more broadly. A combination of federal and local strategies is warranted to address these pay disparities, including efforts to narrow pay scale margins, annual firm compensation review with equity adjustments, and open-pay policies.

3:30 PM –5:00 PM   MONDAY   [Health Care Financing & Expenditures]

Cape Town International Convention Centre | CTICC 1 – Room 1.64

The Impact of Public Financial Management on Health Outcomes: What Does the Evidence Say?

MODERATOR: **Helene Barroy**, World Health Organization

DISCUSSANT: **Irene Papanicolas**, Brown School of Public Health; **Juliet Nabyonga**, World Health Organization - Regional Office for Africa

Public Financial Management and Health Services Delivery: Necessary but Not Sufficient?
PRESENTER: **Mr. Sierd Hadley**, Overseas Development Institute
AUTHOR: Bryn Welham

The issues of PFM and healthcare services delivery have grown in prominence in recent years; particularly within the health systems strengthening and health financing debate. However, empirical evidence for a relationship between strength of PFM systems and health system outputs or outcomes is relatively scarce. This study assesses the evidence for the relationship through a range of methods. It concludes that there are strong theoretical grounds for assuming a link. Through a literature review, it finds a limited number of other published studies that support such a link. Undertaking original statistical regressions, it finds some correlation between high-level measures of PFM systems strength and key health outputs. It also synthesizes results from numerous Public Expenditure Tracking Surveys (PETS) in the health sector to identify the precise areas where PFM systems strengthening might most positively affect health services delivery.

Does Public Financial Management Change Life? Evidence from a Quantitative Review of PFM and Health Outcomes in Sub-Saharan African Countries
PRESENTER: **Kingsley Addai Frimpong**, World Health Organization / AFRO
AUTHOR: Amna Silim

PFM theory argues that the management of public funding influences health services provision, and thus impacts health outcomes. Through the budget cycle, PFM impacts the quality, access and coverage of health services and this translates into improved health outcomes. Despite this theoretical foundation, the relationship between PFM quality on health outcomes is not well-demonstrated, with little empirical literature available. Therefore, the objective of this paper is to examine the relationship between PFM quality on health outcomes by using pooled ordinary least squares (OLS) estimator, covering a sample of Sub-Saharan African countries over 2005-2018. The findings indicate that PFM quality, approximated by Public Expenditure and Financial Accountability (PEFA) scores, reduces maternal and under-five mortality but it does not significantly affect NCDs mortality in a context of low prioritization of these diseases in the allocation of health budget. Predictability in public funding and effective budget execution are the PFM dimensions associated with the highest effect on maternal and under-five mortality. In addition, the analysis shows that PFM quality reduces maternal and under-five mortality in countries that place a high priority on health in their budget allocation. It does not significantly affect mortality indicators in countries with a low budget priority on health. Countries would need annual increases in their average PEFA score of 7.5 percent for maternal and 8 percent for under-five mortality to reach SDGs on maternal and child health. Expected outputs or outcomes are important for motivating decision makers to commit to PFM reforms, which are generally long complex and require long-term capacity building. The study demonstrates that PFM, when combined with high level political commitment backed by budget allocations, translates into positive results for the population. Specifically, the study shows the significance of improving levels, effectiveness and regularity of budget implementation as a critical driver for the sector's outputs. Governments should prioritize actions to unpack causes of chronic budget under-execution in health and identify solutions.

Public Financial Management, Health Financing and Under-Five Mortality: A Comparative Empirical Analysis
PRESENTER: **Moritz Piatti**, World Bank

This study examines the relationship between public financial management (PFM), the financing of health interventions and health outcomes. Specifically, the paper econometrically tests whether the effect of PFM on under-five mortality depends on the relevance of public sector health financing. Employing Ordinary Least Squares (OLS) on a sample of 215 observations indicates that a one unit increase in PFM quality reduces the U5 mortality rate with about 14 deaths per 1,000 live births. For countries that channel at least, 75 percent of health expenditures through the government system this rate increases to 17 deaths per 1,000 child births. Results are robust to using an alternative dependent variable, adding year fixed effects, a sensitivity test where the health financing threshold is varied and a falsification test that verifies whether findings are driven by unobserved governance aspects. Furthermore, the paper provides a comparative analysis for Latin America and Caribbean (LAC), a region which remains mostly overlooked in the literature. The findings for LAC are broadly consistent with the global sample, though less pronounced and without a differential effect for countries across the financing threshold.

Overall, the evidence indicates that the pursuit of universal health coverage and the progress toward related SDGs will be more costly if enabling systems are not in place.

Cape Town International Convention Centre | CTICC 2 – Freesia

Emerging Global Evidence on Regulating Tobacco and Nicotine Products Using Health Taxes [ECONOMICS OF RISKY HEALTH BEHAVIORS SIG]

MODERATOR: **Ce Shang**, Ohio State University

DISCUSSANT: **Estelle Dauchy**, Campaign for Tobacco Free Kids; **Kirsten Van der Zee**, University of Cape Town

Identifying Effective Tax Policies to Reduce Cigarette Consumption: Cross Country Empirical Evidence

PRESENTER: **Estelle Dauchy**, Campaign for Tobacco Free Kids

Background: Raising cigarette tax is considered an effective tool for reducing consumption Chaloupka2012. (Chaloupka, Yurekli, and Fong 2012). However, the effectiveness of tax policy in consumption reduction varies by the cigarette tax system (i.e., ad valorem, specific, mixed) and tax structure (i.e., uniform vs tiered).

Goal: In this study, we attempt to identify policies that can effectively reduce cigarette consumption and smoking prevalence using cross-country data from 2014 to 2020. Specifically, we analyze how tax share, tax structure, cigarette prices, and changes in affordability affect cigarette consumption and smoking prevalence.

Methods: To do so, we utilize the Tobacco Score card published by the Institute for Health Research and Policy, University of Illinois at Chicago. The Scorecard is an assessment of the performance of cigarette tax policies in four aspects, namely, the cigarette price, changes in affordability, the tax share of the price, and the tax structure used. We used OLS regression to assess the impact of scores on smoking and cigarette consumption.

Findings and conclusions: We find that scores measuring the strengths and designs of tax policies tax systems (overall score, tax shares score, prices, scores, affordability, types of tax) have improved over years and across countries, but not uniformly. The higher scores significantly reduce smoking prevalence among adults. A one unit increase in scores leads to a -0.03 to -0.83 percentage points reduction in smoking prevalence (depending on the score). A one unit increase in scores leads to a -2% to - 6.6% reduction in cigarette sales volumes (depending on the score). The effectiveness of price increases to reduce cigarette demand critically depends on being combined with tax increases.

How Much to Pay for a Track and Trace System: A Simulation Model for South Africa

PRESENTER: **Kirsten Van der Zee**, University of Cape Town

Background The illicit trade in tobacco reduces the effectiveness of tobacco-control policies. Independent track and trace (T&T) systems are considered one of the most effective measures available to reduce the illicit tobacco trade. South Africa, with an illicit trade estimated at over 35% of the total market, is yet to implement a T&T system.

Methods An Excel-based simulation model is used to determine the break-even T&T marker cost per pack. At the break-even cost per pack, the government would recover all costs associated with implementing T&T by collecting additional revenues. We conduct a scenario analysis to provide a range of break-even marker costs.

Findings A marker cost of between R2.68 (US$0.17) and R5.24 (US$0.34) per pack allows the South African government to collect enough additional revenue to recover all costs associated with T&T. Implementing such a system would reduce cigarette consumption by between 5% and 11.5%. Given that comparable systems cost significantly less than this range (roughly US$0.02 per pack), the government would in all likelihood be able to implement a system at a cost below the break-even rate, thus generating additional revenue.

Conclusion The break-even simulation model provides a practical tool for the government to plan the implementation of T&T and to set up an evaluation criteria for the T&T tender process. The simulations illustrate that implementing T&T in South Africa would both reduce consumption (licit and illicit) and generate additional revenue. With some modifications, the model can be applied to other countries as well.

The Pass-through of e-Cigarette Taxes to Prices

PRESENTER: **Estelle Dauchy**, Campaign for Tobacco Free Kids

Background and Objective:

At a time when many countries are seeing declines in tobacco use, electronic nicotine delivery systems and electronic non-nicotine delivery systems (ENDS/ENNDS) have increasingly attracted and hooked new generations of nicotine users, undermining the progress already done to reduce tobacco consumption. Though they still make up a small share of the global tobacco market, the market for ENDS/ENNDS and heated tobacco has grown rapidly over the past decade, with a compounded market value growth rate over ten years more than 14 times larger than that of cigarettes. Part of this rapid growth may be explained by the lack of strong tax and non-tax regulations on ENDS/ENNDS, compared to cigarettes. In fact most countries impose small excise taxes or no taxes at all on E-vapor products. This paper evaluates the tax burden of ENDS/ENNDS across countries, and estimate the potential degree of pass-through of taxes to prices of ENDS/ENNDS, relative to other conventional tobacco products, as well as heated tobacco.

Data and Methods: We use a unique database on the taxes and prices of E-vapor products, heated tobacco and cigarettes in more than 50 countries and 31 US states, constructed by authors from various sources. We estimate the pass-through of taxes to prices using a cross-sectional approach.

Findings and Policy Implications: We find that the pass-though of taxes to prices of ENDS/ENNDS is several times smaller than that of cigarettes, and somewhat smaller than that of heated tobacco.

The Price Elasticity of Heated Tobacco and Cigarette Demand

PRESENTER: **Ce Shang**, Ohio State University

Background and Objective: The market for heated tobacco products (HTPs) has grown exponentially in recent years and many governments have started to tax HTPs to regulate their use. Currently, the evidence on how prices and taxes of HTPs impact tobacco use behaviors (e.g., the own price elasticity of HTP demand and cross-price elasticity that reflect how HTP and cigarette costs would influence the consumption of each form) is lacking. In order to fill in this evidence gap, this study uses novel HTP price and tax data to assess own price elasticity for HTP demand, as well as cross-price elasticity between HTP and cigarette consumption.

Data and Methods: We use a unique database on quarterly retail prices of Marlboro-branded heated tobacco units and cigarettes from 2014 to 2022, developed by the Campaign for Tobacco Free Kids, in all countries where both HTPs cigarettes are sold. We link them to quarterly sales data obtained from PMI's investors' reports for cigarette and heated tobacco and estimate own- and cross- price elasticity of cigarette and HTP demand using a seemingly unrelated regressions model.

Findings and Policy Implications: We find that HTP demand is very elastic to HTP prices, with own-price elasticity ranging between -1.6 and -1.8 in preferred specifications. This is two to
three times larger than the own-price elasticity of cigarettes, which ranges between -0.4 and -0.6. We also find that the relationship between cigarettes and HTPs is not significant when country and year fixed effects are controlled for. Therefore, increasing HTP taxes will reduce HTP consumption while not leading to unintentional consequences such as increased cigarette consumption. The tax revenue impact of HTP taxes will depend on tax pass-through rate to prices and the price elasticity of demand, which require further assessment.

3:30 PM –5:00 PM   MONDAY   [Economic Evaluation Of Health And Care Interventions]

Cape Town International Convention Centre | CTICC 2 – Orchid
The Economics of Mental Health in Sub–Saharan Africa [MENTAL HEALTH ECONOMICS SIG]

MODERATOR: **Barbra Elsa Kiconco**, Medical Research Council /LSHTM & UVRI Research Unit, Uganda

DISCUSSANT: **Vimbayi Mutyambizi-Mafunda**, University of Cape Town

The Effect of Expanded Access to Mental Health Care on Economic Status of Households with a Person with a Mental Disorder in Rural Ethiopia: A Controlled before-after Study

PRESENTER: **Yohannes Hailemicheal**, Armauer Hansen Research Institute
Background

Poverty and mental illness are strongly associated. The aim of this study was to investigate the economic impact of implementing a district level integrated mental healthcare plan for people with severe mental disorders (SMD) and depression compared to secular trends in the general population in a rural Ethiopian setting.

Methods

A community-based, controlled before-after study design was used to assess changes in household economic status and catastrophic out-of-pocket (OOP) payments in relation to expanded access to mental health care. Two household samples were recruited, each with a community control group: (1) SMD sub-study and (2) depression sub-study. In the SMD sub-study, 290 households containing a member with SMD and 289 comparison households without a person with SMD participated. In the depression sub-study, 129 households with a

person with depression and 129 comparison households. The case and comparison cohorts were followed up over 12 months. Propensity score matching and multivariable regression analyses were conducted.

Results

Provision of mental healthcare in the district was associated with a greater increase in income (Birr 919.53, 95% CI: 34.49, 4573.56) but no significant changes in consumption expenditure (Birr 176.25, 95% CI: -1338.19, 1690.70) in households of people with SMD compared to secular trends in comparison households. In households of people with depression, there was no significant change in income (Birr 227.78, 95% CI: -1361.21, 1816.79) or consumption expenditure (Birr -81.20, 95% CI: -2572.57, 2410.15). The proportion of households incurring catastrophic OOP payments at the ≥10% and ≥40% thresholds were significantly reduced after the intervention in the SMD (from 20.3% to 9.0%, p=0.002, and 31.9% to 14.9%, p< 0.001) and in the depression intervention (from 19.6% to 5.3%, p=0.003, and 25.2% to 11.8%, p= 0.015). Nonetheless, households of persons with SMD or depression remained impoverished relative to comparison groups at follow-up. Households of people with SMD and depression were significantly less likely to be enrolled in community-based health insurance (CBHI) than comparison households.

Conclusions

District mental health care plan intervention increased household income and reduced catastrophic out-of- pocket payment.Our findings support global initiatives to scale up mental healthcare as part of universal health coverage initiatives, alongside interventions to support social inclusion and targeted financial protection for vulnerable households.

Key words: mental health interventions, task-shifting, severe mental disorders, depression, universal health coverage, controlled before-after study

Integrating Mental Health Services into Routine HIV Care in Uganda: How Much Does It Cost, and Can It be Done?

PRESENTER: **Barbra Elsa Kiconco**, Medical Research Council /LSHTM & UVRI Research Unit, Uganda
AUTHORS: Dr. Yoko Laurence, Dr. Giulia Greco, PhD, Anna Vassall, Eugene Kinyanda, Patrick Tenywa, Kenneth Roger Katumba, Leticia Kyohangwire, Christine Tusiime, Richard Stephen Mpango

Background: Sub-Saharan Africa accounts for over 70% of the global burden of HIV and approximately 30% of people living with HIV (PLWH) in the region suffer from depression. There is still a gap in mental health service provision for PLWH since most HIV/AIDs care providers do not routinely provide these services. Integrated management of depressive disorders (DD) at public health facilities for PLWH can lead to improved health outcomes. HIV+D is a cluster-randomized trial that sought to assess the effectiveness of integrating managed care of DD in adults (18 years+) receiving routine HIV care in Uganda.

Objective: To compare the provider costs of managing DD in routine HIV care in 10 facilities in Uganda.

Methods: Of the 40 public health care facilities participating in the trial, ten were randomly selected for the provider costing; five in the Enhanced Usual Care (EUC) and five in the intervention (HIV+D) arms. A unit cost was derived for each service output relevant to the trial, including health talk events and outpatient visits for screening, diagnosis and treatment (psychoeducation, behavioural activation and doctor consultations), medicine collection, follow-up care and patient support. At each facility, the average unit cost per patient treated for depression over a period of 12 months was then assessed based on service utilization obtained from trial data. The micro-costing approach of resource quantities multiplied by costs was used for all inputs, except training, where top-down costing was performed. Resource data collected included staff and lay health worker time, equipment time, quantities of supplies and drugs and service statistics. These data were collected via interviews with study and Ministry of Health staff at the selected facilities, as well as from trial data. Staff salaries and benefits, and the costs of training and supervision, equipment, supplies, recurrent expenditures, building, and transportation were obtained from facility payroll, expenditure reports and financial records, as well as invoices for anti-depressants, stationery and furniture provided by the HIV+D study. All costs were collected in 2021 Ugandan Shillings and converted into United States Dollars using the mid-year exchange rate of 3557UGX = 1USD ($). Capital costs were depreciated using the local discount rate of 10% (Ugandan Central Bank).

Results: The total mean unit costs (excluding overhead costs) of treating depression per patient per facility in the EUC and HIV+D arms were $9.43 and $18.34, respectively. When tertiary healthcare facilities were removed from the analysis, the mean cost per patient decreased by 25% and 39% in the EUC and HIV+D arms, respectively, to $7.08 and $11.18. We hypothesize that the unit costs will be between 10-50% higher with the inclusion of overhead costs, after allocation by building space and facility service statistics.

Conclusion: The costs of integrated care for depressive disorders by lay health workers were twice that of enhanced usual management of depression in PLWH, but total mean costs decreased substantially in non-tertiary health facilities, which is where the HIV+D intervention is likely to be most affordable and place the least demands on specialised mental healthcare staff.

Economic Burden of Depressive Disorders in Uganda

PRESENTER: **Patrick V. Katana**, London School of Hygiene and Tropical Medicine
AUTHORS: Ian Ross, Barbra Elsa Kiconco, Patrick Tenywa, Melissa Neuman, Wilber Ssembajjwe, Isaac Sekitoleko, Kenneth Roger Katumba, Eugene Kinyanda, Dr. Yoko Laurence, Dr. Giulia Greco, PhD

Economic burden of depressive disorder for people living with HIV in Uganda

Patrick V. Katana,[1*] Ian Ross,[1] Barbra Elsa Kiconco,[2,] Patrick Tenywa,[2] Melissa Neuman[2], Wilber Ssembajjwe[2], Isaac Sekitoleko[2], Kenneth Roger Katumba[2], Eugene Kinyanda[2], Yoko Laurence[3] and Giulia Greco[1]

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Introduction: Between 8–30 % of people living with HIV (PLWH) have depressive disorders (DD) in sub-Saharan Africa. Despite considerable gains in the treatment of people living with HIV (PLWH), depression is increasingly recognised as a threat to successful treatment and prevention. PLWH are generally known to suffer from stress and incur higher health-related costs compared to general population due to care management demand throughout their lifespan. There have been limited studies examining the extent of association between economic cost and depressive disorders specifically.

Objective: We aimed to estimate the economic burden of depressive disorder amongst people living with HIV and explores their mechanisms of coping with catastrophic health expenditure.

Methodology: This is a cost of illness study nested in an ongoing randomised trial assessing the effectiveness of integrating treatment of depression into routine HIV care in Uganda (HIV+D trial). The study is using cross-sectional data collected from 1,115 PLWH at trial baseline, using a structured cost questionnaire and Patient Health Questionnaire (PHQ-9). Forty public health care facilities that provide HIV care in Kalungu, Masaka and Wakiso Districts were randomly selected, and study participants were recruited amongst their patients. Eligibility criteria were patients attending the HIV clinic, aged $\geq$ 18 years who screen positive for depression (PHQ-9 $\geq$ 10). Economic costs (out-of-pocket expenditure and opportunity costs) were estimated from household perspective.

Results: Mean monthly economic costs were UGX 255,910 (US$ 68.64). Mean monthly out-of-pocket expenditures were UGX 94,500 (US$ 25.60). On average, respondents missed 6 days of work per month due to healthcare seeking or ill-health. Key cost drivers were facility bed charges and medication. The majority of respondents (73%) borrowed money from families and friends to cope with the economic burden. About 35% reported moderate (PHQ-9 $\geq$ 15) and severe (PHQ-9 $\geq$ 20) depressive symptoms. Respondents with moderate or severe depression had slightly higher average monthly costs than those with mild depression, but the difference was not statistically significant.

Conclusion: People living with HIV who experience depressive disorders incur in high out-of-pocket expenditure and productivity losses. The catastrophic health expenditure is in the range of 23% of their household income. Social protection mechanisms combined with the integration of the management of depressive disorder into routine HIV care could alleviate this burden.

keywords: HIV/AIDS, depression, economic burden, cost of illness, Uganda

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3:30 PM –5:00 PM   MONDAY   [Health, Its Distribution And Its Valuation]

Cape Town International Convention Centre | CTICC 1 – Room 1.44
Labour Market Outcomes Associated with Health Conditions

MODERATOR: **Tinna Laufey Asgeirsdottir**, University of Iceland

Households' Labor Responses to Cancer: Evidence from Canada
PRESENTER: **Tiffanie Perrault**, McGill University

Cancer is the main cause of death in Canada, as well as one of the major causes of morbidity. As such, it drastically impacts the daily life of survivors and their families, in particular their professional life. Existing research has revealed cancer to be responsible for a 5 percentage point decrease in labor force participation and 10% decrease in earnings of Canadian cancer survivors. Not only does cancer induce major socio-economic impacts, it also exacerbates inequalities. These effects are aggravated for patients who are either older, less educated or from the bottom part of the income distribution. Further, less educated patients are less likely to benefit from medical innovation.

While the literature documents the impact of cancer on survivors' labor outcomes, it does not provide a full understanding of the economic impact of cancer on households. For instance, research on the impact of strokes has shown that partners too adapt their labor supply and that households rely on self-insurance against losses induced by health shocks. This paper aims to contribute to the literature on the economic impacts of cancer by analyzing how this shock affects the labor supply and the earnings cycle of patients but also of their partners.

I take advantage of a data linkage newly made available by Statistics Canada: the Canadian Population Health Survey data (CCHS) linked with mortality, hospitalization, historical postal codes, cancer registry, tax return and Census data. These detailed, linked administrative and survey data cover the period from 2000 to 2017, providing an opportunity to not only track the labor outcomes of cancer patients, but also those of all members of their fiscal household, over a relatively long period of time.

Properly estimating the impact of cancer on households' labor outcomes requires addressing two challenges. First, the design of the treatment is staggered, i.e. individuals are not diagnosed with cancer at the same period of time, causing bias in standard difference-in-difference (DiD) and event-study estimates. The second challenge relates to socio-economic factors being linked with the probability of developing cancer in one's lifetime, which raises concerns of endogeneity. To overcome these challenges, I adopt a quasi-experiment design, in which all treated units are associated with a tailored control group. Refinements in the analysis will shed light on heterogeneous responses depending on the type of cancer – in particular making a distinction between high- and low- survival cancers –, socio-economic attributes, as well as demographics. In particular, responses may vary across family compositions as well as gender.

I derive stacked DiD and dynamic DiD estimates from the quasi-experiment described above. These estimates measure the labor supply responses of patients and their partners to cancer on the short and the medium run. They also analyze the income losses subsequent to these responses. By shedding light on the impacts of cancer on households, these results aim at helping build more informed health and welfare policies. Presenting preliminary results of this work-in-progress will provide me with the opportunity to solicit feedback from the international health economics community.

The Labor Market Prospects of the Visually Impaired

PRESENTER: **Melvin Vooren**, Vrije Universiteit Amsterdam
AUTHORS: Eline Heppe, Ilja Cornelisz, Chris van Klaveren

This paper analyzes the labor market outcomes of visually impaired persons following their education. The current literature on the labor market position of visually disabled persons is based on surveys. By definition, the results of voluntary surveys are affected by selective response bias (e.g. Goertz et al., 2010, 2017;).

In 2015, the Dutch government introduced a welfare reform that specifically promotes reemployment of unemployed workers, including those with a reduced working capacity. A recent evaluation of this reform by van Echtelt et al. (2019) shows that these goals have not been met in the first five years following the reform. Also, the employment opportunities for people with disabilities are still low when compared to the total workforce.

Apart from welfare reforms aimed at improving the labor market position of workers with disabilities, it is still relatively unknown how persons with disabilities perform in the labor market in a broader sense.

We use Dutch health insurance register data to identify the population of visually impaired individuals in the Netherlands. We use health insurance records, because only individuals with an official medical diagnosis for a visual disability can make claims for visual impairment-specific medical aids and receive a refund. Using register data eliminates the problem of selective response bias. We apply matching methods to construct a comparison group of comparable individuals without a visual impairment. After this, we link our matched data set to social security register data which allows us to track people over time.

For both groups, we estimate a competing odds duration model to analyze the probabilities to transition to different socio-economic states over time. We find that visually impaired persons exhibit lower rates of employment and higher rates of welfare dependency compared to the matched controls. This difference does not seem to be driven by higher rates of health-related income benefits among the visually impaired.

In both groups, the probability of transitioning into employment increases rapidly up until around 50 days after achieving the diploma. In the VI population, the probability of transition into employment is around 40% at this point. From there, this probability slowly increases over time. In the matched Dutch population, the same pattern appears. However, in this matched population, the probability of finding employment skyrockets up until it reaches around 50%.

At the same point in time, at around 50 days after achieving the diploma, something different happens in the VI population when compared to the matched Dutch population. Where in the matched Dutch population the probability of transition into employment slowly increases over time after the 50-day mark, there is an explosion in the probability of transitioning into welfare dependency in the VI population. This is an important finding, because based on this, it seems that the differences in employment rates and welfare dependency rates really become apparent at the 50-day mark.

Labour Market Outcomes for People with Mental Disorders : Does Continuity of General Practitioner (GP) Care Matter?

PRESENTER: **Kamrul Islam**, NORCE Norwegian Research Centre & University of Bergen, Norway
AUTHOR: Egil Kjerstad

Background:

The consequences of mental disorders for individuals, families and society can be severe and highly costly. The total costs of mental health problems are estimated at more than 4% of GDP across the EU countries and the UK. A large part of these costs is due to lower employment rates and productivity. Research shows greater continuity of GP care is associated with lower mortality rates, fewer use of emergency and specialist health care. Continuity of care (CoC) is hypothesised to be associated with quality and efficiency in delivering health care and with high degrees of CoC (patient satisfaction) in primary care may also affect the patients' labour market outcomes. To our knowledge, this is the first study to explore the quality of the patient-GP relationship (CoC) on the labour market outcomes for people with mental disorders by employing rich registry data sets.

Objectives:

The study aims to assess whether CoC does matter for the probability of a person with common psychological disorders being in the labour market and their wage income. We further aim to explore whether the associations between labour market outcomes differ with alternative measures of CoC.

Data and Methods

This study is based on detailed nationwide registry data for the entire population aged 15–70 years for the period 2014-2019. Data comes from Control and Payment of Reimbursement to Health Service Providers (KUHR), GP registry and Statistics Norway (SSB). The KUHR registry includes patient identifiers and the consultation date, the number of primary physician visits during a given period. From SSB, we obtained data on patient socio-demographic characteristics, and labour market outcomes. The dependent variables are defined as: (i) whether an individual is participated in the labour market, (ii) the yearly wage income standardized by the basic amount in the national insurance (G) is used as the basis for calculating Norwegian social security and pension benefits. Three alternative measures of CoC are used as an explanatory variable.

We use two-part regression model with municipality-fixed effects (where the GP practice is located), (also multilevel logistic and mixed models), to test the association between alternative CoC and patients' labour market outcomes. To reduce bias due to population heterogeneity, we included individual and GP-level covariates and regional unemployment rates.

Results

In total, 809698 patients (1837788 observations), enlisted with 5040 GPs, met our inclusion/exclusion criteria. We find that 35% of the sample are men, the mean age is 44.4 years and 36% are married, 72.4 % are in the labour market with an average wage income is 2.98G. Irrespective of CoC measures and regression analyses, we find a positive relationship between CoC and the probability of labour market participation and higher wage income. Moreover, the duration of the GP-patient relationship works in a dose-dependent way.

Conclusion

This study provides strong evidence that CoC by a GP is associated with higher labour market participation and increased wage income for patients with common mental disorders. CoC should be considered a policy measure to improve better employment prospects for people with common mental disorders.

The Dynamics of Loneliness and Labor Market Participation: Evidence from Australia

PRESENTER: **Mehdi Ammi**, Carleton University
AUTHOR: F. Antoine Dedewanou

Background: An epidemic of loneliness is affecting industrialized countries and may have worsen during the COVID-19 pandemic. A large body of evidence shows that loneliness has negative health effects. While there is some evidence on social isolation, an objective state of isolation, the economics literature on loneliness, a subjective perception of isolation, is sparser. An important consideration is that loneliness also affects working aged adults. Better understanding the dynamics of labor market participation and loneliness is an important area for investigation, especially given the casualization of labor trend.

Objective: To investigate the dynamics between the subjective perception of loneliness and labor market participation. Precisely to examine how part-time or full-time employment, casual or permanent employment, and unemployment affect loneliness.

Methods: We use panel data from eighteen waves of the Australian Household Income and Labour Dynamics survey (HILDA, 2001-2018). HILDA is particularly suitable because it includes a measure of subjective loneliness and a host of variables on labor market participation. Our data time coverage voluntarily precedes the COVID-19 pandemic. We focus our analysis on respondents of working age between 18-64 years old leading to a balanced panel of close to 79,000 person-years. An important feature of loneliness is its persistence, as the data confirms. To account for this specificity, we use Blundell–Bond system-GMM estimator with collapsed instruments and robust standard errors. This leads to a main model with three lags in our dependent loneliness variable. We run separate regressions with each of the different labor market participation regressors (part-time; full-time; casual; permanent; unemployment), controlling for several potential confounders, including whether individuals lost a close relative. In addition to these main regressions, we examine potential mechanisms by which labor market participation can influence loneliness. We also consider heterogeneity by subgroups, including by gender and types of job.

Results: We find that one- and two-year lagged loneliness are increasing the probability of current loneliness respectively by +8% and +5%, further justifying our econometric approach. While having a permanent, casual, or full-time job contract are not statistically significant, unemployment and part-time employment have an influence on loneliness. Being unemployed increases the probability of feeling lonely by about +5%, while holding a part-time job reduces loneliness by about -1.5%. Potential mechanisms include a reduction (increase) of life satisfaction and SF-36 mental health score for unemployment (part-time job), while holding a part-time job increases socialization with friends. For both unemployment or part-time, effects appear to be concentrated among women rather than men. The protective effect of holding a part-time job is focused on those also with a permanent contract, while the negative effect of unemployment is among those who involuntarily lost their jobs, and more so for blue-collar workers.

Conclusion: We explored the complex dynamics of loneliness and labor market participation. Loneliness, a persistent phenomenon, is particularly negatively affected by unemployment. While our finding of a protective effect of part-time job may be reassuring in the broader context of casualization of work, it shall be understood as being dependent on holding a permanent position.

3:30 PM –5:00 PM   MONDAY   [Health Beyond Health Care Services: Social And Related Determinants]

Cape Town International Convention Centre | CTICC 1 – Room 1.61
Panel Data and the Economics of Mental Health [ECONOMICS OF MENTAL HEALTH SIG]

MODERATOR: **Marcos Vera-Hernández**, University College London (UCL)

ORGANIZER: **Manoj Mohanan**, Duke University

DISCUSSANT: **Sean Sylvia**, University of North Carolina at Chapel Hill; **Arnab Mukherji**, IIM Bangalore

Understanding Peer Effects in Mental Health in Primary Schools
PRESENTER: **Ana Balsa**, Universidad de Montevideo

Background: Despite the importance of social relationships in children and adolescents' development, there is limited evidence on peer effects in mental health during this stage, and even less so when we consider long-term effects. The literature has mostly evaluated effects on test scores, leaving less evidence about the effects of peers with mental health diagnoses on students' wellbeing and mental health. The few papers that analyze this issue show mixed results. Zhang (2022) finds little evidence that the mental health condition of peers affects classmates' mental health, while Giulietti et al. (2022) find that exposure to peers with mental health disorders significantly affects girls' likelihood of depression, reduces college attendance and employment, and Jeung (2022) finds that sharing a class with peers with genetic predisposition to depression increases own's mental health problems.

Aim: We use extensive Danish register data to study how exposure to a student with mental health problems affects classmates' mental health and wellbeing, both in the short and the medium run.

Methodology: We study the effect on incumbent students' mental health diagnoses from receiving a new student with mental health problems (a treater) at school between grades 3 and 6. We use a time to event design, controlling for individual and grade fixed effects and using never treated classes as the control group. We condition on students being observed from grade 1 until treatment, and follow them after treatment irrespectively of the school or class they attend. Following the new difference-in-differences literature, we produce estimates that are robust to heterogeneity across cohorts and grades. As additional robustness check, we compare against classes that receive a new student without a mental health problem.

Results: We find that receiving a new student with a mental health problem in the class increases the likelihood of being diagnosed with a mental health problem for students in grade 6, but not earlier. These effects are long-lasting irrespective of the gender of the mover and of the gender of the incumbent student. We are currently working with well-being data to identify whether the effect works through direct student-to-student contagion (behavioral effect) or through a higher likelihood of diagnosis due to parental awareness of the condition (information effect).

Conclusion: Our results of positive peer effects in mental health can be used to inform and improve inclusive education policies, by underscoring the needs for resources and treatment at the school level. In addition, they contribute to understand the positive externalities of mental health treatment and public health school interventions.

Confinement Policies: Controlling Contagion Without Compromising Mental Health
PRESENTER: **Ariadna Garcia Prado**, Public University of Navarra, Spain

Background: In response to the rapid spread of COVID-19, governments around the world imposed different confinement policies and preventive measures to limit virus transmission and reduce pressure on health care systems. A number of studies have analyzed the effectiveness of confinement policies for reducing virus expansion. These papers are relevant because there is a clear need to determine which measures are most effective for reducing the spread of the virus. But it is also crucial to highlight the dramatic increase of mental health problems that can result from such policies. Although a growing literature shows that confinement policies used by governments to

slow COVID-19 transmission had negative impacts on mental health, few studies have focused on the potentially different effects of various confinement measures. This is an unattended and yet important and urgent policy question, essential to understanding which policies can effectively control the spread of COVID-19 without overly compromising mental health.

Aim: In this paper, we investigate the association between several COVID-19 confinement policies and mental health problems of older populations in Europe. We also analyze the effect of different confinement indicators on mental health. The World Health Organization has emphasized the risks of confinement policies for older adults during the Covid-19 pandemic, so we focus on these populations.

Methodology: We use a linear probability model to analyze the influence of a composite confinement index (that includes the eight confinement measures), and of each confinement policy taken separately, on the worsening in mental health. Our results hold under different estimation approaches such as multivariate discrete choice model estimations.

Results: Confinement policies are positively correlated with the worsening of mental health, after controlling for individual socioeconomic characteristics and exposure to the virus (i.e. number of people from the close network of an individual who have been sick or die due to COVID-19). This is in line with previous findings in the literature. Regarding particular policies, we find that restrictions on domestic and international travel and closing of public transportation do not seem to have worsened the mental health of older populations in Europe. Closing of schools seems to have aggravated insomnia and depression, while restrictions on gathering size have had only a slight negative effect on insomnia. The measures that seem to have had the largest influence on mental health deterioration are stay-at-home rules and workplace closures.

Conclusion: Our paper contributes to efforts to understand the effect of individual confinement policies on mental health, complementing previous work on the effects of these policies on virus transmission. Our more fine-grained analysis will help policy makers to decide which policies should be implemented, intensified or relaxed, to control the spread of the virus while minimizing impact on population mental health.

The Loss of Face-to-Face Interaction and Mental Health Among Senior Populations in Europe

PRESENTER: **Paula Gonzalez**, Universidad Pablo de Olavide

Background: The COVID-19 pandemic led governments around the world to implement a wide range of response measures to restrict citizens' mobility and reduce the transmission and incidence of the virus. However, while these measures have been crucial for limiting the spread of the virus and alleviating the pressure on health systems, they have had a dramatic economic impact and have triggered mental health problems linked to social isolation and lack of freedom. According to the World Health Organization, older populations are more vulnerable to the effects of social isolation and lack of face-to-face social interaction and therefore we focus on the impact of lockdown policies on the mental health of populations above 50.

Aim: The main goal of this paper is to investigate whether the COVID-19 lockdown policies implemented by governments during the first wave of the pandemic have caused mental health problems in senior and older Europeans.

Methodology: To quantify the causal impact of lockdown policies on mental health outcomes we combine differences across countries in the strictness of the lockdown policies with differences across individuals regarding their pre-COVID level of face-to-face social interactions in those countries. The latter differences allow us to define treatment and control groups (individuals with high and low frequency of face-to-face contacts before the outbreak of the corona, respectively), based on the assumption that individuals with high levels of face-to-face contacts prior to the outbreak will experience greater deterioration of mental health than individuals with low frequency of face-to-face contacts.

Results: Our estimates suggest that lockdown policies increased the incidence of insomnia, anxiety, and depression by 5, 7.2, and 5.1 percentage points, respectively. That is, lockdown policies increased the incidence by 74.6%, 39.5% and 36.4% of insomnia, anxiety, and depression for individuals of the treatment group relative to a situation with less strict lockdown policies. In addition to controlling for individual exposure to COVID and case fatality rates, we validate our identification strategy and results by presenting a wide battery of robustness exercises that include alternative model specifications, different sample criteria, and alternative outcome variables, among others. We also explore whether the effect of lockdown policies is concentrated in particular groups. We find that women's mental health deteriorated more notably as a result of the lockdown. Similarly, those who reported to have good health pre-pandemic also suffered more. Finally, the age group between 50 and 65 suffered the largest negative impact in mental health, especially in comparison to those above 75.

Conclusion: Our results indicate that the idea of implementing a selective confinement policy for certain population groups (such as those above 75 or those with poor health pre-pandemic) is recommendable. This policy would protect populations that are more vulnerable to the virus and its potential health complications while avoiding excessive damage to the economy, as suggested by Acemoglou et al (2020). Of course, this measure would make sense only if it is accompanied by adequate psychological and social support for confined populations.

Mental Health and Exposure to COVID-19 in India. Evidence from the Sehat Household Panel

PRESENTER: **Manoj Mohanan**, Duke University

Background: It is widely recognized that exposure to multiple stressors of the COVID-19 pandemic could have detrimental effects on mental health. Despite growing evidence of high mental health burden during the pandemic, there is less consensus on whether these

negative effects persist in the post-acute phase of the pandemic. Furthermore, given the wide reach of the pandemic, attributing elevated mental health burden to exposure to COVID remains especially challenging.

Objective: Our study aims to estimate the relationship between exposure to COVID-19 and adult mental health in India. We present new evidence on the effect of severity of COVID-related stressors in three key domains: (i) knowing someone who had COVID-related illnesses and deaths; (ii) changes in level and volatility of income relative to pre-COVID period, and (iii) social isolation during the pandemic.

Methodology: We use multivariate linear regression of mental health on whether they knew someone who was infected by COVID (three severity levels), ratio of pre and pandemic household income levels, ratio of the pre and pandemic household income volatility, as well as a rich set of covariates, state, and enumerator fixed effects. Future analyses will incorporate measures of isolation in the model.

Results: We find that women's mental health are negatively associated with knowing someone who was severely ill with COVID, or knowing someone who died of COVID (around 1.3 in the PHQ-9 scale and 0.9 in the GAD-7 scale), but no association was found for the least severe COVID exposure shock. For adult males, knowing someone who had died from COVID was significantly associated with (high) anxiety. However, when it comes to income shocks, adult males appear more sensitive than females: adult males' anxiety worsens with income loss during the pandemic as well as with increasing income volatility during the pandemic.

Conclusion: Both adult males' and females' mental health measured a year after the peak of the pandemic are negatively associated to COVID exposure, but through different channels. Adult females' mental health (both depression and anxiety) is negatively associated with knowing people who suffered from severe COVID or died from it. Adult males' anxiety (but not depression) is more linked to the income changes (in levels and volatility) that took place during the pandemic.

3:30 PM –5:00 PM   MONDAY   [Demand & Utilization Of Health Care Services]

Cape Town International Convention Centre | CTICC 1 – Room 1.62
Healthcare Utilization and COVID-19

MODERATOR: **Kavita Singh**, Heidelberg University

Disease and Economic Burdens of Severe Respiratory Conditions before and Since COVID-19 in a Healthcare Provider Shortage Area

PRESENTER: **Jay Shen**, University of Nevada at Las Vegas
AUTHORS: Zahra Mojtahedi, Heiley Ephrem, Parsa Khawari

Background. The COVID-19 pandemic results in more patients with severe respiratory conditions that require hospitalization, which creates challenges for the healthcare system in community. Nevada has been ranked at the bottom in terms of healthcare infrastructure and resources in USA, and has already been in the healthcare provider-shortage situation for decades. Further, disparities in healthcare also exist in this provider shortage area. Does the pandemic make the situation worse in terms of healthcare burdens and disparities in Nevada? This study, therefore, aimed to: (1) compare inpatient care volume due to respiratory conditions before and since the pandemic, (2) compare clinical and economics outcomes of in-patient care of patients with respiratory conditions before and since the pandemic, and (3) examine socioeconomic disparities in healthcare outcomes for patients with respiratory conditions, controlling for the pandemic situation.

Methods. The study used a pooled cross-sectional design, based on the 2018-2019 (2 years prior to COVID-19) and 2020-2021 (2 years since COVID-19) hospital discharge data of Nevada, USA. The study did not limited to the COVID-19 cases only and, instead, selected all respiratory conditions, including COVID-19 cases, for the purpose of making comparisons of the disease and economic burdens before and during the pandemic. The percentage of admission due to respiratory conditions as the total hospital admission was compared for the four years. Outcome measures included in-hospital mortality, length of hospital stay (LOS), and total charges (adjusted for annual hospital expenditure inflation). Generalized logistic and linear regression models were used for multivariable analyses.

Results. The percentage of patients hospitalized due to respiratory symptoms increased from 17.4 in 2018 and 17.9 in 2019 (the prior COVID period) to 22.4 in 2020 and 22.7 in 2021 (the during COVID period) among all hospital discharges. During the same two time period, the in-hospital mortality among patients with respiratory conditions increased from 8.1% and 7.8% to 10.1%, to 10.6%; the average LOS increased from 8.08 and 7.90 days to 8.61 and 8.96 days; and the total charges per discharge increased from $149,105 and $148,628 to $153,021 to $165717. Moreover, being elderly, of a minority race, with low income, or with no health insurance coverage was linked to a higher mortality rate as well as higher total hospital charges and length of stay.

Conclusions. The COVID-19 has created extra burdens of severe respiratory conditions for the healthcare delivery system, worsening the provider-shortage situation in Nevada, which may be associated with poorer clinical and economic outcomes. Furthermore, socioeconomic disparities persist. Policy and programs are needed to assist the healthcare provider-shortage areas in responding to challenges resulting from healthcare and public health emergencies, such as the COVID-19, to improve healthcare outcomes and to address socioeconomic disparities.

Hit By the COVID-19: Who Are Using Telehealth Services for Outpatient Care in USA?

PRESENTER: **Jay Shen**, University of Nevada at Las Vegas
AUTHORS: Lo-Fu Tan, Pearl Kim, Jill Kreston, Haniyeh Shariatmadari

Background. The COVID-19 pandemic creates barriers to accessing in-person healthcare services, but at the same time, results in certain significant changes in healthcare delivery venues and models, including the rapid increase in use of telehealth or telemedicine. Most of existing studies, however, have been based on surveys of providers and patients, little research has used clinical data to examine the use of telehealth during the pandemic. This study, therefore, aimed to (1) compare the utilization of telehealth outpatient visits among all outpatient visits prior and during the pandemic; and (2) identify social cultural factors associated with use of telehealth services.

Methods. The study used a pooled cross-sectional design. The first nine months of 2019 and the first nine months of electronic health record data for regular non-urgent outpatient care in a large healthcare provider in USA. were abstracted, respectively. Utilization of telehealth services in both years were examined. Social cultural factors, such as age, gender, race/ethnicity, primary spoken language, health insurance program, were examined in association with use of telehealth services. The 20 most frequent principal diagnoses for outpatient care prior and during the pandemic were also compared. Generalized logistic regression was used for multivariable analysis. Clinical departments, such as adult care, pediatric care, and specialty care were controlled in the analysis.

Results. The use of telehealth services was virtually zero (16 visits out of 237,997 visits) in the first nine months of 2019 but increased to 10.8% (24,159 visits out of 222,750 visits) in 2020, and the top 20 most frequent diagnoses for the visits, though, were similar between the two years. Among all outpatient visits in 2020, (1) males, as compared to females, were less likely to use telehealth (adjusted odds ratio (aOR) = 0.857, 95% confidence interval (CI) = [0.833-0.881]); (2) Asians and Latinos/Hispanics, as compared to Whites, were less likely to use telehealth (aOR = 0.853, CI = [0.805-0.904] for Asians, and aOR = 0.893, CI = [0.853-0.936] for Latinos/Hispanics); (3) Spanish-speaking patients and patients speaking other languages (all languages except for English and Spanish), as compared with English-speaking patients, were less likely to use telehealth (aOR = 0.676, CI = [0.627-0.730] for Spanish speaking patients and aOR = 0.927, CI = [0.882-0.973] for other language speaking patients); and (4) both Medicare and Medicaid patients were less likely to use telehealth than their privately insured counterparts. Further, among patients who did use telehealth services, Asian and patients speaking languages other than English or Spanish were less likely to have multiple telehealth outpatient visits, as compared with their White counterparts and English-speaking counterparts, respectively; whereas both Medicare and Medicaid patients were more likely to have multiple telehealth visits than patients covered by private health insurance.

Conclusions. Telehealth utilization has been increased dramatically since the pandemic, assisted by the technology advancement and availability. Nevertheless, barriers related to social demographic and cultural factors should be addressed in order to meet the new healthcare demand due to the current transformation of healthcare delivery models.

BMI and Its Association with Costs in Individuals Hospitalised for COVID-19: A Population Based Cohort Study.

PRESENTER: **James Altunkaya**, Health Economics Research Centre (HERC), University of Oxford
AUTHORS: Jose Leal, Koen Pouwels, Philip Clarke

Background:

Obesity was quickly recognised as a major risk factor for severe disease after infection with SARS-CoV-2 with deprivation levels also playing a significant role. When hospital resources are severely stretched, predictions regarding length of stay for patients with differing BMI are highly valuable for healthcare planners' organisation of bed and intensive care unit (ICU) capacity. They help reduce unforeseen supply-constraints and inform decisions regarding non-pharmaceutical interventions to reduce demand. However, data on hospital use given BMI and deprivation levels remains limited.

Objectives:

To examine the association between BMI and hospital length of stay and costs following a COVID-19 related admission. We further examine the role of deprivation and vaccination status in this association.

Methods:

In this English population-based cohort study, we linked patient-level data from the QResearch database of 1500 primary care practices with Public Health England's database of SARS-CoV-2 positive PCR tests, to identify individual patients' secondary care utilisation related to COVID-19 from Hospital Episode Statistics. The main outcome variables were 1) length of stay of hospital admissions, 2) transfer to ICU, 3) ICU length of stay and, 4) total hospitalisation costs. COVID-19 related admissions were defined using either primary or secondary ICD-10 codes for confirmed or suspected COVID-19 within hospital recorded diagnoses, or a positive SARS-CoV-2 PCR test.

We used generalised linear and logit models to estimate the association of BMI with all outcomes, while also taking into account age, sex, ethnicity, region, deprivation, smoking status, date of admission, COVID-vaccination status (first to third dose) and obesity-related morbidity. Deprivation was classified into quintiles.

Results:

The study population included 57,415 individuals hospitalised for COVID-19 between April 2020 and December 2021. Mean age was 63.6 years (SD 18.6), 53% were males and 76% were white. About 32% were overweight (25-30 kg/m2) and 44% were obese (BMI >30 kg/m2). Accounting for other covariates, we found a J shaped association between BMI and hospital stay with underweight (<18.5 kg/m2) and obese individuals being associated with longer hospital stays relative to healthy weight individuals, with incidence rate ratios (IRR) of 1.18 (p<0.001) and 1.04 (p=0.028) respectively. We found a linear association across the whole BMI range with transfer to ICU (odds ratio 1.04 per kg/m2, p<0.001) and obese individuals stayed longer in ICU relative to healthy weight (IRR 1.11, p=0.043). Hospitalisation costs were £615 (p=0.026) and £2357 (p<0.001) higher for overweight and obese individuals relative to healthy weight, holding all else constant. Hospitalisation costs were £1296 (p<0.001) higher per admission for the most deprived individuals compared to those least deprived, mostly due to longer length of stay (IRR 1.08, p=0.002).

Conclusion:

Individuals with high BMI were more likely admitted to intensive care and, as a result, had higher hospitalisation costs. Predictions based on patient characteristics identified in these regression analyses may help to more accurately forecast hospital and ICU bed capacity. Simultaneously, at a population level, efforts to reduce obesity may help lessen constraints on scarce hospital capacity, helping reduce the intensity of peaks in demand seen during the COVID-19 pandemic.

Effects of COVID-19 Pandemic on Health Care Utilization Among Older Adults with Cardiovascular Diseases and Multimorbidity: An Interrupted Time-Series Analysis Using National Health Insurance Database in Indonesia

PRESENTER: **Royasia Viki Ramadani**, Universitas Indonesia
AUTHORS: Mikael Svenson, Sven Hassler, Budi Hidayat, Nawi Ng

Background

The COVID-19 pandemic has posed disruptions and significant challenges to healthcare systems in many countries. The disruption in healthcare utilization due to the pandemic among those diagnosed with chronic diagnoses and multimorbidity is still unknown in Indonesia. This study aims to analyze the impacts of COVID-19 on healthcare utilization under the National Health Insurance (NHI) program for a different group of chronic diagnoses with cardiovascular diseases (CVD) and multimorbidity among adults (>30 years old).

Methods

This study was a retrospective cohort study based on the National Health Insurance (NHI) sample data from 2016-2020. The outcome is measured as the number of monthly outpatient and inpatient visits related to chronic diagnosis at the hospital and primary health care levels and presented as a monthly rate per 10,000 NHI members. We compared healthcare utilization before and after the COVID-19 outbreak in March 2020, January 2016-March 2020 (period before COVID-19), and March 2020-December 2020 (period during COVID-19). We adopted an interrupted time series analysis to assess the effects of the COVID-19 pandemic on healthcare utilization before and during the pandemic. The Incidence Rate Ratio (IRR) was obtained by exponentiating the Poisson regression coefficient and comparing the level of predicted (monthly visit rate), and counterfactual rate had the pandemic not occurred. The analysis was conducted in an overall group of chronic diagnosis and five groups of diagnosis consisting of (i) individuals with no CVD but with single chronic morbidity, (ii) individuals with no CVD but with multimorbidity, (iii) individuals with CVD diagnoses but no comorbidity, (iv) individuals with CVD and one comorbidity and (v) individuals with CVD and multimorbidity.

Results

The overall monthly visit rate decreased during the COVID-19 pandemic by 32% (Incidence Rate Ratio (IRR):0.68; 95% Confidence Interval (CI): 0.67–0.68)) for outpatient visits and by 31% (IRR 0.69; 95% CI: 0.68-0.70) for inpatient visit. The effect of COVID-19 disruption on outpatient visits was less substantial among individuals with multimorbidity (IRR 0.71 CI (0.70-0.72)) compared to individuals with single CVD diagnosis (IRR 0.62 CI (0.61-0.63)). A significant change in healthcare utilization was also observed for inpatient visits, where individuals with CVD and multimorbidity had a higher effect reduction in the inpatient visits (IRR:0.62; 95% CI: 0.60-0.63) than individuals with single CVD (IRR:0.75, 95% CI: 0.71-0.78).

Conclusion

This study showed that healthcare utilization under NHI fell significantly with the onset of COVID-19 among those with chronic diagnoses. The averted outpatient visits due to COVID-19 were higher among less severe individuals. However, the reduction of inpatient visits was higher among individuals with more severe conditions with multimorbidity. Policy intervention is needed to actively screen and implements NCDs management to mitigate the adverse effects of a continued pandemic or similar epidemics in the future.

Cape Town International Convention Centre | CTICC 2 – Nerina

Measuring the Impact of Health Technology Assessment (HTA) Institutions: Recent Progress and Approaches

MODERATOR: **Eleanor Grieve**, Glasgow University

ORGANIZER: **Peter Baker**, Center for Global Development

DISCUSSANT: **Andrew Briggs**, London School of Hygiene and Tropical Medicine; **Justice Nonvignon**, University of Ghana; **Kavitha Rajsekar**, Department of Health Research, Ministry of Health & Family Welfare, Government of India

ProSE – a Scale for Assessing Progress on Institutional Use of Evidence to Inform Priority-Setting in Health

PRESENTER: **Peter Baker**, Center for Global Development
AUTHORS: Sophie Gulliver, Adrian Gheorghe, Abha Mehndiratta, Javier Guzman

Background: Rigorous, explicit, evidence-informed priority-setting (EIPS) in healthcare, such as through HTA, is an essential instrument for achieving value for money in Universal Health Coverage (UHC). However, institutionalising priority setting in health is a complex intervention and there is currently no agreed way to measure progress or plan improvements.

Aims: This paper introduces *iProSE – iDSI's Progression Scale for institutionalising EIPS*. iProSE is a self-assessment scale that aims to help countries understand how far they have progressed in institutionalising EIPS such that it informs financing decisions and determine what their future priorities can be. It also helps development partners better tailor their country support in this area.

Methods: Based on a literature review and the international Decision Support Initiative's established Theory of Change, we propose an index resulting from the assessment of eight aspirational statements on EIPS: two statements relate to key spending decisions ("what health technologies to cover from public funds?" and "at what prices to procure health technologies from public funds?") and six statements relate to enabling factors for institutionalising EIPS. Statements are scored based on information available in official documents against the extent to which the statements fall on an implementation spectrum ranging from policy intention to full, systematic implementation. Based on the scored statements, EIPS institutionalisation can be categorised as Foundational, Breakthrough, Consolidating or Mature.

Results: An example retrospective application of iProSE is presented capturing India's rapid progress in moving from Foundational status in 2016 to Consolidating status in 2022. India showed progress in institutionalising a range of enabling factors for EIPS and using EIPS to make decisions about what health technologies to procure and reimburse. Through this pilot we found iProSE successfully captures relevant policy developments and is straightforward to implement.

Conclusions: iProSE and its accompanying tools (spreadsheet and how-to guide) can be useful in accelerating the development of EIPS processes and systems in low and middle income countries. We provide recommendations for further use of ProSE by countries, funders and the health priority setting community.

Evaluation of Health Technology Assessment in India

PRESENTER: **Pankaj Bahuguna**, Postgraduate Institute of Medical Education and Research
AUTHORS: Eleanor Grieve, Sophie Gulliver, Abha Mehndiratta, Kirti Tyagi, Peter Baker, Javier Guzman

Background: Health Technology Assessment (HTA) helps decision-makers to understand the consequences of alternative courses of actions and to select the options that produce the best outcomes at the lowest cost. Institutionalisation of HTA is seen as pivotal to supporting Universal Health Coverage (UHC) as a means of supporting better allocation of finite resources, cost containment and the maximisation of health. An increasing investment in HTA in low- and middle-income countries has generated greater interest from policy makers about the value and return on investment (ROI) of HTA. Few studies have, however, quantified the benefits of HTA in terms of its value to the health system. The International Decision Support Initiative, a network of partners working with governments in health priority setting, has supported the institutionalisation of HTA in India (HTAIn). Established in 2017, the main purpose of HTAIn is to generate evidence to support Indian Central and State Governments to make more transparent, inclusive, and evidence-based decisions related to healthcare spending and prioritisation. Establishing HTAIn was an important milestone in India's journey toward UHC. An impact assessment is important to support and advocate for ongoing investment in these processes.

Aims: This evaluation aims to quantify the impact and the return on investment (ROI) achieved by HTAIn by reviewing a set of selected HTA studies commissioned by HTAIn between 2017-2021.

Methods: A framework developed by University of Glasgow has been used to estimate the ROI in HTAIn taking into account the opportunity cost of investing in these processes. Net health benefits (NHB) are our measure of value in this quantitative framework. We calculated costs including the fixed costs for HTAIn and the costs for undertaking each HTA. Benefits were calculated by subtracting the counterfactual NHB (benefits that might have been realised without an HTA) from the current (modelled) NHB. The ROI is then calculated by aggregating the attributable benefits and offsetting these against the total costs.

Results: Findings based on four case studies undertaken suggest investing in HTAIn yields a positive return. ROI is based on attributable benefits which we derive from realised benefits (actual implementation). Our findings show that investing in HTAIn yields a positive return of 10:1, with potential to increase to 71:1 with full implementation of recommendations. It is important to note that ROI is an aggregate of both health gains and financial costs i.e. it is not a typical cash return, with the ROI – in these case studies - driven by the value placed on the large health gains.

Conclusions: While HTAIn requires financial investment, it is an efficient use of resources and offers value-for-money as a policy tool. To achieve impact on health outcomes and efficiencies it is essential that HTA evidence is translated to policy and effective implementation. Economies of scale and scope are also critical when considering the value of HTA at a systems level.

What Is the Value of Explicit Priority Setting for Health Interventions? A Simulation Study

PRESENTER: **Alec Morton**, University of Strathclyde
AUTHORS: Euan Barlow, Saudamini Dabak, Sven Engel, Wanrudee Isaranuwatchai, Yot Teerawattananon, Kalipso Chalkidou

Background: Many countries seek to secure efficiency in health spending through establishing explicit priority setting institutions (PSIs). Since such institutions divert resources from frontline services which benefit patients directly, it is legitimate and reasonable to ask whether they are worth the money. Several studies have assessed the contribution of priority setting agencies in various countries using modelling or implementation studies or a mixture of the two. However, a weakness of existing work is that it does not address directly the question of the counterfactual, that is, what would have happened in the absence of a PSI. The value of a PSI can only be gauged by the extent to which it recommends the acceptance of interventions which would otherwise be rejected, or the rejection of interventions which would otherwise be accepted.

Aim: This paper presents a novel simulation methodology which can give valuable insights into the contribution of PSIs to the nation and its health system.

Methods: We use portfolio simulation of health intervention funding decisions to provide a quantitative evaluation of the value delivered by health care priority setting institutions (PSIs). We compare, through simulation, the health benefits and costs from implementing two alternative funding approaches – one scenario in which an active PSI enables cost-effectiveness threshold-based funding decisions, and a counterfactual scenario where there is no PSI.

Results: We present indicative results for one dataset from the United Kingdom (published in 2015) and one from Malawi (published in 2018), which show that the threshold rule reliably resulted in decreased health system costs, improved health benefits, or both. Additional evidence is also presented from a further application of the approach in Thailand.

Conclusions: Simulation methods are underused in quantifying the economic and health impact of priority setting institutionalisation. This study represents a first step along the road that would help convince governments to invest in PSI (especially in LMICs, as HIC governments have widely recognised the importance of PSI), and to show the potential of simulation methods to answer policy relevant questions. Our model is implemented in Microsoft Excel and designed to be user-friendly, and both the model and a user guide are made publicly available, in order to enable others to parameterise the model based on the local setting. Although inevitably stylised, we believe that our modelling and results offer a valid perspective on the added value of explicit PSIs.

3:30 PM –5:00 PM   MONDAY   [Health Beyond Health Care Services: Social And Related Determinants]

Cape Town International Convention Centre | CTICC 1 – Room 2.63
Familial influences on mental and physical health [MENTAL HEALTH ECONOMICS SIG]

MODERATOR: **Bernice Hua Ma**, Monash University

The Effect of Peers' Genetic Predisposition to Depression on Own Mental Health

PRESENTER: **Yeongmi Jeong**, University of Georgia

This paper studies how peers' genetic predisposition to depression affects own mental health during adolescence and early adulthood using data from the National Longitudinal Study of Adolescent to Adult Health (Add Health). I exploit variation within schools and across grades in same-gender grademates' average polygenic score—a linear index of genetic variants—for major depressive disorder (the MDD score). An increase in peers' genetic risk for depression has immediate negative impacts on own mental health. A one standard deviation increase in same-gender grademates' average MDD score significantly increases the probability of being depressed by 2.3 and 3 percentage points for adolescent girls (an 8.7% increase) and boys (a 20% increase), respectively. The effects persist into adulthood for females, but not males. I explore several potential mechanisms underlying the effects and find that an increase in peers' genetic risk for depression in adolescence worsens friendship, increases substance use, and leads to lower socioeconomic status. These effects are stronger for females than males. Overall, the results suggest there are important social-genetic effects in the context of mental health.

This paper contributes to the literature in several ways. First, I add to the literature on the impact of peers on own mental health by considering peers' genetic predisposition to depression and avoiding one of the well-known challenges associated with identifying peer

effects--the reflection problem. The reflection problem arises when estimating own behavior as a function of average group behaviors (Manski, 1993). I overcome this issue by using individuals' genetic information. Human DNA is not affected by the behaviors of others or group formation as it is determined at conception and does not change over time. Moreover, using individuals' genetic information allows me to examine the short- and long-run peer effects on mental health, which have not been widely explored. Second, the results have implications for the design of interventions to curb adolescent depression, namely whether they should be individual- or group-based as well as gender-specific or gender-agnostic. I find that the effects of having same-gender peers with higher genetic risk for depression during adolescence persist for females. This may imply that group-based policy interventions can be more effective for girls in the long-run, with non-trivial social multiplier effects. Lastly, this work contributes to the growing literature on social-genetic effects. The importance of genetics in mental health has long been recognized, but little is known about the effects of the genes of those whom individuals interact with. My results suggest that there are significant social-genetics effects in the context of mental health, adding to a small but growing literature that documents genomic effects beyond just the family.

Characterizing Internal Migration Among Individuals Diagnosed with Dementia

PRESENTER: **Bishnu Bahadur Thapa**, Brown University
AUTHOR: Momotazur Rahman

Background

Informal (i.e., unpaid) care by families and friends is a major component of the overall care provided to individuals living with Alzheimer's disease and related dementias (ADRD). Reasons for why family members provide such care include physical proximity to allow for timely and responsive care, familial obligations, and the desire to provide homely and comforting environment. The importance of informal care for the well-being of the ADRD individuals is documented but what is not well understood is the extent to which individuals with ADRD change their residential location following ADRD diagnosis. The objective of this study was to characterize the pattern of internal migration among ADRD individuals in the US. This study is an important value addition to the scant migration literature involving older adults ADRD.

Methods

We used the 2012-2019 Medicare enrollment and claims data including the Medicare Beneficiary Summary File (MBSF). The study population consisted of a total of 1,121,038 Medicare fee for service (FFS) individuals, half of whom were diagnosed with ADRD in 2016. To isolate the natural rate of migration, we identified individuals without ADRD but had the same demographic characteristics and resided in the same county as the ADRD individuals. We identified these individuals by matching 1:1 on the following covariates: age, race, gender, dual-eligibility, and residential county. Both the ADRD and non-ADRD individuals were tracked monthly for a total of eight years, four years before and four years after the month of diagnosis.

Our main independent variable was the indicator of whether an individual had ADRD. We defined two outcome variables: intercounty migration (movement between one county to another) and interstate migration (movement between one state to another). We fit a linear probability model of migration onto ADRD diagnosis controlling for pair fixed effects.

Findings

We found that relative to non-ADRD individuals, ADRD individuals migrated at higher rates after being diagnosed with ADRD. This was true for both intercounty migration and interstate migration. Individuals diagnosed with ADRD were 9.2 percent more likely to migrate to another country compared to the non-ADRD individuals. The ADRD individuals also were 3 percent more likely to migrate to another state relative to the non-ADRD individuals. Additionally, ADRD individuals were more likely to migrate if they were females, lived in rural areas, and lacked access to healthcare.

Conclusion

Our study showed that elderly individuals diagnosed with ADRD change their residential location comparatively more than individuals without ADRD. The decision to move is influenced by individual characteristics (such as gender) but also by the characteristics of the origin counties (such as the availability of home health agencies and nursing home beds).

Implications for Policy & Practice

The findings not only point to the potential role of informal familial care in shaping migration outcomes, but also suggest that the characteristics of healthcare markets influence migration choices. Future research should focus on understanding and quantifying better the role of informal care on ADRD-specific migration. In doing so, the research should consider examining both the pull and push factors of internal migration.

Perspectives of Homeless U.S. Military Veterans Living with Substance Use Disorders (SUD) and Mental Illness

PRESENTER: **Dr. Christian Alexis Betancourt, PhD**, Uniformed Services University of the Health Sciences
AUTHORS: Debora Goetz Goldberg, Beth A Hawks, Panagiota Kitsantas

As America's veterans return to the civilian world from serving in the military, some find themselves facing difficult challenges such as homelessness and substance use addictions. Numerous studies have shown strong correlations between homelessness and substance use, especially among veterans who already struggle with comorbid mental illnesses. Veterans who suffer from substance use disorders (SUD) and homelessness in particular have a greater likelihood of struggling with depression and suicidal behaviors. Further, SUD relapse creates a negative externality as it constitutes a serious problem not only for veterans themselves but also presents an economic burden to society. The purpose of this study is to understand homeless veterans' lived experiences, through their eyes, of their everyday life and social interactions.

Data were collected from semi-structured interviews and were used to conduct a phenomenological study on 14 homeless US military veterans with known SUDs. Veterans were recruited from two homeless organizations in the Washington D.C.-Baltimore Metropolitan area. A Social-Ecological Model (SEM) was used to create themes, a priori, then used open coding analytic methods to identify emerging themes from the respondents' data. Most homeless veterans were male (92.9%), African-American (64.3%), and 35-64 years old (64.3%). More than two-thirds used illicit drugs or abused alcohol (78.6%) and nearly all veterans reported having a history of depression or anxiety (92.9%). Suicidal behaviors (ideation, plan, and attempt) were present in 35.7% of all veterans. Themes that resulted from using the SEM codes were substance use/addiction and suicidal behaviors (Individual), military traumatic events (Relationships), homelessness (Community), and veterans' perception of the Veterans Affairs health system (Societal). Themes that openly emerged were substance use to cope with death, social influence of substance use in high-risk communities, and violence and crime in homelessness.

We find that veteran homelessness and substance use are strongly associated with both physical and psychological trauma suffered while on active duty. Consequently, once veterans become homeless, the communities that they live in generally encourage and exacerbate substance addiction and impede a path toward recovery and ultimately sobriety. Homeless veterans who already struggled with SUDs in the past, and later experience a death in their family, often relapse to drug and alcohol use. Further qualitative research on homeless veterans suffering from SUDs is warranted to expand initial findings from this study. Deeply exploring a veteran's personal relationships with family, friends, and their immediate community, may reveal opportunities to address these issues using special healthcare financing and community interventions.

What Is the Hand without the Cradle? The Effect of Filial Co-Residence on Intergenerational Health

PRESENTER: **Deepthi Sara Anil**, Indian Institute of Technology, Kanpur
AUTHORS: Debayan Pakrashi, Sarani Saha

Revised Title(03/07/2023): The Gendered Effect of Filial Co-residence on Health. Reconciling Labour and Autonomy responses.

Background:
Patrilocal co-residence can limit a married woman's autonomy through gender norms and restricted mobility. On the other hand,the entrenched nature of gender roles prescribes that the In-laws share the household responsibilities; both domestic duties as well as outside chores. A sudden distortion in this social support structure can lead to consequential changes in the daughter-in-law's(DIL's) well-being. The absence of a family member might require the women to compensate by taking on additional responsibilities and roles such as working on the family farm or business, managing domestic affairs, childcare, etc. Accumulating further roles requires physical effort and its repetition limits recovery after the task. In this paper, we therefore investigate the effect of the death of parents-in-law on the DIL's health marker.

Hypothesis: We hypothesize that the expansion of roles undertaken by a married woman might interact with pre-existing socioeconomic inequalities to affect her health in two opposing ways.

1. The absence of gender roles enforcement has been argued to weaken traditional norms and create instances where women gain more freedom to visit major cities, health centers, take HIV tests and seek medical care This argument suggests that women benefit from having the autonomy or opportunity to entertain multiple roles (***role benefit effect)*** and tend to be healthier than those who operate in a limited domain.

2. Unfamiliar tasks may feel challenging, increasing stress levels in daily lives. Taking up spaces previously occupied by elder members of family might also invite judgements about performance and social gossip that can increase anxiety on top of additional physical effort. This mechanism may result in an accumulating physical strain on the body and diminishing returns from nutrition, subsequently affecting her health negatively (***role burden effect)***.

Emprical Design: We exploit the exogenous variation in the Parent-in-law's death across two waves of a longitudinal survey(Indian Human Development Survey) to explain the unintended impact of both opposing effects on the DIL's health.

Findings: Making use of a DID framework with individual fixed effects, we show that the death of either or both In-laws results in a deterioration in her anthropometric indicators, i.e., a decline in BMI and an increase in IU. We explain our results by highlighting an increase in the DIL's household responsibilities after the death of the In-law(s), both at intensive and extensive margins. We also provide suggestive evidence to show that with that her newfound autonomy, educated daughter's-in-law take up wage employment outside her home. Our findings support the hypothesis that the sudden uptake of multiple roles both at
home and outside is at the cost of her leisure, leading to burnout which would explain the adverse health markers.

Conclusion: Easing of patriarchal institutions, indicated by the death of an In-law, implies a simultaneous distortion of existing roles and loss of familial support/safeguards which should ideally be compensated by a reconfiguration of household responsibilities (among male members, children, etc.) for empowerment gains to materialize as a positive impact.

3:30 PM –5:00 PM   MONDAY   [Health Care Financing & Expenditures]

Cape Town International Convention Centre | CTICC 1 – Room 2.61-2.62

How to Make Health Financing Responsive at the Frontlines: Lessons from Domestic Resource Mobilization Interventions Applying Strategic Public Financial Management Frameworks in 3 African Countries

MODERATOR: **Suneeta Sharma**, Palladium

ORGANIZER: **Frances Ilika**, Palladium

DISCUSSANT: **Veena Menon**, USAID; **Emily Chirwa**, Malawi Ministry of Health

Kenya's Public Financial Management Interventions to Increase Domestic Public Funding for Family Planning Commodities.

PRESENTER: **David Khaoya**, Palladium

Background: Donor financing in Kenya contributes a significant proportion of the total resources available for primary health care priorities such as HIV, malaria, and family planning (FP). With diminishing resources from donors, the government must transition to domestic public funding for strategic priorities, especially funding for commodities that consume a substantial proportion of the budgets. To prepare for the transition to domestic financing for FP commodities, the Ministry of Health's (MOH's) Department of Family Health (DFH) recently signed a memorandum of understanding with key external donors outlining a framework that progressively reduces donor funding and increases the government's contribution until it takes on full FP commodity procurement by 2026. Despite the impending commodity funding gap left by donors, the MOH team was not adequately prepared to mobilize public domestic resources. Urgent support was needed to build capacity of FP program management teams to effectively participate in the Medium-Term Expenditure Framework (MTEF) budgeting process to ensure sufficient financing.

Methods: In 2021, USAID's Health Policy Plus (HP+) project collaborated with the MOH's Department of Policy and Planning to build the DFH's capacity for planning and budgeting. HP+ provided technical support to the DFH throughout the planning and budgeting process, with particular focus on the sector working groups (SWGs). In addition to capacity strengthening, HP+'s technical support focused on the generation and use of evidence to inform medium-term planning, budgeting, and advocacy. HP+ also fostered intersectoral consultative discussions between DFH technical teams and key MOH senior officers to promote high-level advocacy and provided technical backstopping during strategic political retreats and public resource-sharing engagements.

Results: As a result, budget allocation for HIV, family planning, and malaria commodities increased for FY 2022/23 after successful budget negotiations with the national treasury and approval by the national assembly. HP+'s training on the MTEF budgeting process helped improve the understanding of family health department team in the budget making process, thereby enabling their effective participation in crucial resource-sharing meetings. The timely training and capacity building efforts coincided with the family health program transition plan negotiated between the MOH and donors (the Gates Foundation, the UK's Foreign Commonwealth & Development Office, the United Nations Population Fund, and USAID) in which Kenya's government committed to fully finance FP commodities by 2026. Family health department staff were well-equipped to reinforce the momentum created by the government's commitment, elevating the urgency of their budget proposals. The government's budget allocation to FP commodities increased from 0.5 billion Kenya shillings (KES) (USD 5 million) in FY 2021/22 to 0.9 billion (USD 9 million) in FY 2022/23. HP+ also supported the DFH to forecast the level of government funding required to meet its commitment to fully fund the program's commodities by FY 2024/25. The forecast established that the government budget allocation should increase by 25 percent each year between FY 2022/23 and FY 2024/25 to be on track to fully finance FP commodities.

The Public Financial Management As a Tool for Responding to Health Emergencies in Aid Dependent Healthcare Systems: The Case of Covid-19 Response in Malawi

PRESENTER: **Atamandike Chingwanda**, The Palladium Group, Malawi

AUTHOR: Kate Langwe

Background

The importance of the Public Financial Management (PFM) System in the Covid-19 response has been well documented in health systems financed by domestic public resources. However, the evidence is limited for healthcare systems like Malawi's, which are characterized by high aid dependency and multiple, fragmented financial pools. Malawi conducted a Covid-19 National Health Accounts (NHA) study to,

inter alia, understand the effect of the Malawi health financing system structure, including the PFM system, on the response to the pandemic. However, the NHA did not cover the role of the political economy on the PFM system, hence this study.

Methods

We use the political economy analysis framework proposed by Sparkes et al (2019) to examine the role of stakeholders, their interests and influence, and historical context in determining the usefulness and effectiveness of the PFM system as a health emergency response vehicle.

Results

Budget planning: The National Covid-19 Plan was developed to guide stakeholders in their response to the Covid-19 health emergency. Key stakeholders involved in the development of the Covid-19 health sector plan included central government and donors, both of which had financing capabilities. Sub-national health service providers and civil society organizations were largely excluded, both of which had limited financing capabilities. Thus, the national planning process, though useful for implementation using the PFM framework, was characterized by power differentiation based on ability to finance the plan.

Budget execution: Government as a financing agent managed only 17.5% of total Covid-19 health expenditures (TCHE), indicating that the PFM structures were not dominant in budget execution of the National Covid-19 Plan. Path dependency, due to the previous on-budget aid mismanagement by the government, was a critical contributor to decisions made by donors not to fund the plan using PFM mechanisms. The formulated plan was also characterized by non-adherence. Donors, who contributed over 80% of the TCHE, financed activities based on their own government's priorities and not the plan. This led to huge variances (up to 1240%) across strategic pillars of the plan. Also, at the decentralized level, the national plan was seen as irresponsive to service delivery needs, leading to spending on unplanned items, wastage, and corruption. Eventually, individual districts were allowed to formulate their own Covid-19 health plans but in alignment to the pillars of the national plan.

Budget accountability: The Covid-19 plan was developed without an appropriate risk management and accountability framework. This can be explained by the absence of stakeholders who specialize in audits, risk management, and accountability during the formulation stage.

Conclusion

The performance, validity, and usefulness of the PFM system as a mechanism to respond to pandemics in aid-dependent health systems depend on the involvement of all critical stakeholders in designing the plan, donors' trust in the PFM system as a service delivery tool in normal times, and the existence of strong accountability measures from the onset.

A Holistic Approach through Multisectoral Collaboration to Advance Improvements in HIV Financing in Nigeria Using a Public Financial Management (PFM) Framework

PRESENTER: **Frances Ilika**, Palladium

Background

Nigeria has the second-largest HIV epidemic in the world with an estimated 1.9 million people living with HIV. Although Nigeria's national response in recent years has scaled up to provide treatment to over one million people living with HIV, this effort has relied heavily on external assistance. Significant and sustained resources must be mobilized to achieve Nigeria's ambitious goal to end AIDS by 2030. Healthcare financing challenges including weak institutional structures and inconsistent policy implementation compound low government investment. During the Covid-19 pandemic, most health funding was diverted to Covid-19-specific activities, effectively deprioritizing essential services and creating a need for strategies to secure HIV funding.

Methods

Health Policy Plus (HP+) focused on building state-level capacity to effectively allocate and execute HIV funding, using evidence from PFM and political economy analysis, and enabling policies aimed at raising additional revenue for HIV response through an integrated process. HP+ strengthened national and Lagos State government entities including the Federal and State Ministries of Health, Lagos Agency for the Control of AIDS (LSACA), state health insurance schemes, implementing partners, and civil society organizations to lead multisectoral, evidence-based engagement with ministries of finance, the State Treasury, Parliament, Governors' offices, and other important stakeholders across the PFM cycle. A multisectoral technical working group fostered this process and strengthened health actors' capacity to develop program-based budgets; submit compelling, evidence-based funding requests; and plan, develop, and defend annual HIV and health budgets. The team also supported the early development, submission, and follow-up of memos to the government to release budgeted funds.

Results

These efforts resulted in a 67 percent increase in LSACA's budget allocation, from NGN 516 million (US$1.29 million) in 2018 to NGN 766.3 million (US$1.86 million) in 2022. Additionally, funds released to LSACA for HIV program activities, including procurement of 396,500 rapid test kits, increased by 193 percent, from NGN 137million in 2018 to NGN400 million in 2021. Cumulatively, funds released

to the HIV agency increased by 147 percent from 2018 to 2022 for HIV program activities, including HIV testing for pregnant women in priority local government areas, monitoring and evaluation. Furthermore, NGN750 million was made available in equity funds to enroll poor and vulnerable populations into health insurance, thereby increasing their access to quality healthcare and HIV services without financial hardship. The increase in HIV funds budgeted and released by the government demonstrates an increased national commitment to the HIV response and improved access to HIV testing for priority groups, including pregnant women, orphans and vulnerable populations, and key populations.

Conclusion

USAID's HP+ project, through its country-driven and locally led systems, catalyzed and built upon efforts by the government to identify and implement sustainable financing mechanisms for HIV interventions in Nigeria. This highly scalable approach is viewed as a potential game-changer in sustainable HIV epidemiological control. Improved public financial management understanding and processes reduces the state's dependence on donors and draws Lagos closer to achieving financial sustainability for its HIV response.

5:15 PM –6:15 PM   MONDAY   [Special Interest Group Sessions]

Cape Town International Convention Centre | CTICC 1 – Room 1.61
Meeting of the Health Workforce Special Interest Group

5:15 PM –6:15 PM   MONDAY   [Special Interest Group Sessions]

Cape Town International Convention Centre | CTICC 1 – Room 2.44-2.45
Meeting of the Financing for Universal Health Coverage Special Interest Group

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5:15 PM –6:15 PM   MONDAY   [Special Interest Group Sessions]

Cape Town International Convention Centre | CTICC 1 – Room 1.42
Meeting of the Economics of Obesity Special Interest Group

5:15 PM –6:15 PM   MONDAY   [Special Interest Group Sessions]

Cape Town International Convention Centre | CTICC 1 – Room 1.44
Meeting of the Health Preference Research Special Interest Group

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5:15 PM –6:15 PM   MONDAY   [Special Interest Group Sessions]

Cape Town International Convention Centre | CTICC 1 – Room 1.43
Meeting of the Economics of Palliative and End-of-Life Care Special Interest Group

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5:15 PM –6:15 PM   MONDAY   [Special Interest Group Sessions]

Cape Town International Convention Centre | CTICC 1 – Room 1.41
Meeting of the Economics of Children's Health and Wellbeing Special Interest Group

5:15 PM –6:15 PM   MONDAY   [Special Interest Group Sessions]

Cape Town International Convention Centre | CTICC 1 – Room 1.62
Meeting of the Proposed Special Interest Group on Environmental Sustainability and Health Economics

Tuesday

8:30 AM –10:00 AM   TUESDAY   [Economic Evaluation Of Health And Care Interventions]

Cape Town International Convention Centre | CTICC 1 – Room 2.64-2.65
Economic Evaluations of Cancer

MODERATOR: **Samantha Pollard**, BC Cancer

Determining Cost and Cost-Effectiveness of Childhood Cancer Treatment in Haiti
PRESENTER: **Nancy Bolous**, St. Jude's Children's Research Hospital
AUTHORS: Miguel Bonilla, Paola Friedrich, Monika Metzger, Nickhill Bhakta, Pascale Gassant

Background: Haiti is a Caribbean, low-income country (LIC) and ranks amongst the least developed countries in the world with a human development index ranking of 170/189. Despite multiple healthcare priorities, childhood cancer services are provided at Nos Petit Frères et Soeurs St. Damien Hospital (NPFS-SDH) in Tabarre, Port-au-Prince, Haiti, the only dedicated pediatric oncology department in a country with a population of 11 million. Our objective was to assess the cost and cost-effectiveness of all childhood cancers in Haiti in order to prioritize investments and support national cancer control planning.

Methods: All costing data were collected from the hospital records for either year 2017 or 2018, based on the completeness of data. Costs were classified into 11 cost-categories and the proportion of each was calculated from the overall budget. Conversion from Haitian Gourde to United States Dollars (USD) was carried out using the average exchange rate between January and December 2017 of $63.78. A healthcare costing perspective was adopted which was inclusive of all costs regardless of the source of funding. Five-year survival rate was calculated based on hospital statistics and estimated to be 35%. Cost and survival data were then used to calculate the cost-effectiveness of disability adjusted life year (DALY) averted. Base-case scenario assumed normal life expectancy of 64 years, and 3% discounting rate. Eleven additional sensitivity analysis scenarios were conducted accounting for late-effect morbidity and early mortality (15% and 30% reduction in normal life expectancy) and discounting rates of 0%, 3% and 6%.

Results: The annual cost of operating a pediatric oncology unit in Haiti that treated 68 newly diagnosed patients over a year period was $913,675 overall or $13,436 per patient. The single largest cost category was pharmacy constituting 22.3% of the overall budget. Medical personnel (17.5%), imaging (13.3%) and administration (11.8%), ranked second, third and fourth, respectively. The cost per DALY averted in the base-case scenario was $1,397 which is 94% the GDP per capita, demonstrating that treating children with cancer in Haiti is very cost-effective according to the World Health Organization Choosing Interventions that are Cost-Effective (WHO-CHOICE) cost-effectiveness threshold (GDP per Capita of Haiti in 2018: $1,479). Sensitivity analyses revealed a cost per DALY averted of $665–$2,584, which translates into 45%–175% of the country's GDP per Capita. Thus, even in the most conservative scenario, the cost per DALY averted was less than 3 times the national GDP per capita and thus cost-effective by WHO-CHOICE criteria.

Conclusion: Treating childhood cancer in Haiti, an LIC is very cost-effective, a finding aligned with previous research from low- and middle-income countries. Our data will add to the growing body of literature illustrating a positive return on investment associated with the diagnosis and treatment of children with cancer in even the most resource limited environments. We anticipate these data will aid local stakeholders and policymakers when identifying cancer control priorities and making budgetary decisions.

Economic Evaluation of Inguinal Versus Ilio-Inguinal Lymphadenectomy Surgery for Patients with Stage III Metastatic Melanoma to Groin Lymph Nodes: Evidence from an International Randomised Trial
PRESENTER: **Rashidul Alam Mahumud**, University of Sydney
AUTHORS: Chi Kin Law, Rachael Lisa Morton
Introduction:

The spread of metastatic melanoma to the groin lymph nodes is common in patients with melanoma. Two groin lymphadenectomy surgical procedures are used in clinical practice: a less extensive inguinal lymphadenectomy (IL) and the standard care which is a more extensive ilio-inguinal (or pelvic) lymphadenectomy (I-IL). Despite the various guidelines, policies, and management strategies, there is an ongoing debate about which surgical approach is safe, effective and cost-effective. Of importance to patients is whether they can be spared a pelvic lymph

node dissection. Adopting a health system perspective, this study aimed to compare the within-trial cost-effectiveness of two different surgical approaches: IL versus I-IL, for the removal of metastatic melanoma in the lymph nodes of the groin.

Methods:

A within-trial cost-utility analysis was performed alongside a prospective, international, multi-centre, phase III, two-armed, non-inferiority, randomised clinical trial with 36 months of follow-up. This is an example of a trial to "de-intensify" surgical care and its findings are important to reduce overtreatment and improve high-value care in the health systems. Participants' health-related quality of life at baseline and subsequent follow-up was measured by the EuroQoL EQ-5D-5L instrument and then converted to health utility scores for the calculation of quality-adjusted life years (QALYs) using Australian value sets. An incremental cost-utility ratio (ICUR) was calculated by dividing the difference in total costs between the two surgical approaches with the difference in total QALYs. Means and 95% confidence intervals (CIs) around the ICUR were calculated using non-parametric bootstrapping with 1000 replications. Robustness of results was assessed using a series of deterministic sensitivity analyses.

Results:

99 trial participants (50 randomised to IL and 49 to I-IL surgery) were included in this economic evaluation. The average hospital stay among patients randomised to IL surgery (4.38 days) was slightly shorter (0.82 days) compared with those randomised to I-IL surgery (5.20 days). Per-patient healthcare costs in the IL surgery (AUD $16,503, SD = 27,551) were about AUD $5,666 lower (mean difference = AUD $5,666, 95% CI: –18,078 to 6,746) than in the I-IL surgery (AUD $22,168, SD = 36,026). Patients in the IL surgery group had slightly higher mean QALYs (1.59, SD = 0.81), than in the I-IL surgery group (1.55, SD = 0.74) at 36 months. In the first 36 months, the IL surgery increased QALYs (0.04/patient, 95%CI: – 0.27 to 0.34) and decreased healthcare costs (AUD –5,666/patient, 95%CI: –18,078 to 7657) compared with I-IL surgery group. The IL surgery was dominant (more effective and less expensive) for treating melanoma patients. Sensitivity analyses confirmed the robustness of the main analysis.

Conclusions:

Findings suggest the less extensive surgical approach may improve quality-adjusted survival, and can reduce health system costs. This finding is robust, with a high probability that the less extensive surgical approach is cost-effective across a range of feasible willingness-to-pay values. This evidence will define clinical practice and transfer knowledge to future national and international melanoma treatment guidelines and policies. In addition, it may assist with clinical decision-making for cost savings for the healthcare system.

Cost Utility and Budget Impact Analysis of Dexamethasone Compared with Bortezomib and Lenalidomide for the Treatment of Second Line Multiple Myeloma from a South African Public Health Perspective

PRESENTER: **Lineo Marie Matsela**, University of the Witwatersrand
AUTHORS: Susan Cleary, Tommy Wilkinson

Background

Multiple myeloma is a cancer of the blood that develops in the bone marrow and leads to the inhibition of normal blood cell and antibody production. The nature of the myeloma tumour makes patients prone to resistance to chemotherapy and multiple relapses leading to the development of relapse/refractory multiple myeloma. Novel drugs are recommended as clinically effective second-line treatment for relapsed patients. Given the substantial financial cost of these drugs, we assessed their cost-effectiveness as second-line treatment for relapsed/refractory multiple myeloma (RRMM) patients in the South African public health care system.

Methods

We modelled 3 treatment strategies for second-line RRMM treatment: dexamethasone (standard of care), bortezomib (BORT) and lenalidomide plus dexamethasone (LEN/DEX) from the South African with costs expressed using a public health care provider's perspective and outcomes measured as Quality Adjusted Life Years (QALYs). Base case results are presented using a 5% discount rate. For each strategy we modelled a hypothetical cohort of RRMM patients using a three-state Markov model (pre-progression, progression and death) over a 15-year time horizon. Efficacy, health related quality of life and utilization data were obtained from the MM009/010 and APEX trials and published studies. Price and cost data were from local sources and presented in 2021 South African Rands. Incremental cost effectiveness ratios (ICERs) were calculated for BORT and LEN/DEX and compared to a local indicative cost-effectiveness threshold of R38 500 per DALY averted, using the assumption that 1 DALY averted is equal to 1 QALY gained. A budget impact analysis was conducted to evaluate the financial impact of the introduction of BORT and LEN/DEX, respectively, at a national level for the South African public sector. Deterministic sensitivity analysis was undertaken to account for parameter uncertainties.

Results

The discounted modelled total costs per patient for DEX, BORT and LEN/DEX were estimated to be R8,312, R234,996 and R1,135,323, respectively, over the 15-year time horizon. DEX treatment provided 1.14 QALYs while BORT and LEN/DEX treatments provided 1.49 and 2.22 QALYs, respectively, when the QALYs were discounted. The ICER of BORT versus DEX was R654,649 per QALY gained and that of LEN/DEX versus BORT was R1 225 542. Both BORT and LEN/DEX treatments were not cost-effective relative to the cost-effectiveness

threshold. Both BORT and LEN/DEX also significantly increase the 1 year budget-cost of RRMM treatment by 3136% and 8684%, respectively. The results indicate that the drug prices of lenalidomide and bortezomib are key drivers of value for money.

Conclusion

Both BORT and LEN/DEX treatments are unlikely to be cost-effective strategies for second-line treatment of RRMM in South Africa. Thus, the introduction of these treatments into the public health system at current drug prices will have implications for equitable access to healthcare. Price reductions could, however, potentially make BORT more cost-effective.

8:30 AM –10:00 AM   TUESDAY   [Health, Its Distribution And Its Valuation]

Cape Town International Convention Centre | CTICC 1 – Room 1.41
Framing, Valuation and Mapping Health States

MODERATOR: **Kim Dalziel**, Health Economics Unit, Centre for Health Policy, Melbourne School of Population and Global Health

This Dead or That Dead: Framing Effects in the Evaluation of Health States
PRESENTER: **Stefan Lipman**, Erasmus University Rotterdam
AUTHORS: Michal Jakubczyk, Paul Schneider, Chris Sampson

OBJECTIVE
Current approaches to health state valuation rely on credible classification of states as either `better than dead' (BTD) or `worse than dead' (WTD). We investigate how the evaluation of health states is affected by the framing of the BTD/WTD distinction in pairwise comparison tasks.

METHODS
We conducted an online survey with 361 participants to compare the propensity to value a state as WTD under six frames: derived from regular time trade-off (TTO; frame A) or from lead-time TTO (LT-TTO; frame B), dismissing with immediacy of death (C) or with the process of dying (D), corresponding to CUA by measuring whether extending lifetime is desirable (E) or how health improvements from a given state are perceived (F). Each participant valued 9 EQ-5D-5L health states using three frames. The frames were compared in several approaches to confirm the robustness against indirect comparisons or respondent heterogeneity and inattentiveness.

RESULTS
The median time it took participants to complete the survey was 5.3 minutes, with a median response time of 9 seconds per question. Implausible responses (i.e. considered 11111 WTD) were rare (1-4%), except for frame F (53%), which many participants did not seem to fully understand. We found that the odds of a state being considered WTD, compared with frame A, increase 2.7-fold in frame B and 1.5-fold in frame E, and decrease >5-fold in frame F. Frames C and D did not differ significantly from frame A. Moreover, further investigation of the heterogeneity of preferences showed that accepting euthanasia and being <40 years old independently increase the odds of considering a state WTD.

CONCLUSION
Different framings of the question whether a health state is WTD or BTD – even if theoretically equivalent – yield substantially different results. In our study, we find clear evidence of framing effects between frame A and each of the frames B, E, and F. In particular, the considerable difference between frames A and B seem problematic, as it suggests that the standard TTO and LT-TTO are not fully compatible in a sense that they evoke different reactions from respondents. In consequence, the positive and negative utilities elicited in composite TTO are effectively incomparable. Then, mixing of results from the two tasks when constructing a single value set may have unwanted consequences.

Describing the Health-Related Quality of Life of Māori Adults in Aotearoa Me Te Waipounamu (New Zealand) Using Personal EQ-5D-5L Value Sets
PRESENTER: **Trudy Sullivan**, University of Otago
AUTHORS: Georgia McCarty, Emma Wyeth, Robin Turner, Sarah Derrett
Background

In Aotearoa me Te Waipounamu (New Zealand; NZ) there are considerable inequities in health status and outcomes for Māori, the Indigenous peoples of NZ. It is therefore important that the health status and preferences of Māori are specifically considered in health care policy and decision making. This study illustrates how personal (i.e. individual) EQ-5D-5L value sets can be used to describe and evaluate the health-related quality of life (HRQoL) of sub-groups of the population, in this case Māori adults.

Methods

Using the personal value sets of 390 Māori adults from the NZ EQ-5D-5L social value set (a generic measure of health-related quality of life (HRQoL)), participants' responses on the five dimensions of the EQ-5D-5L – mobility, self-care, usual activities, pain/discomfort and anxiety/depression – were dichotomised into "no problems" and "some problems", summarised and disaggregated by age group. Mean preference weights were reported by age group and overall. Utility values (calculated using each participant's EQ-5D-5L profile and preference weights for 3125 different health states) were summed and their respective means and standard deviations calculated. Mean utility values were reported by age, gender, chronic disease status and disability.

Results

The EQ-5D-5L dimensions with the highest proportion of participants reporting problems were pain/discomfort (61.5%) followed by anxiety/depression (50%). The dimension considered most important (i.e. the dimension participants most want to avoid) was anxiety/depression (0.211) followed by self-care (0.209), pain/discomfort (0.199), mobility (0.198) and usual activities (0.184). The mean utility value was 0.83 with the lowest value (0.79) found among the youngest participants (18-24 years). More than half the sample had at least one chronic disease (n=220, 56.4%) with 32.8% reporting more than one. When grouped by condition, the most common chronic diseases were mental illness/distress (24.6%), musculoskeletal (18.2%) and respiratory (17.2%). Participants with a chronic disease or long-term disability had lower mean utility values (0.76 and 0.69, respectively) compared to those without (0.91 and 0.89).

Conclusion

The NZ EQ-5D-5L social value set, comprised of 2468 personal value sets, enables the preferences of sub-groups of the population, including Māori, to be examined. Although existing HRQoL measures are unlikely to encompass all aspects of health important to Māori (which we are currently investigating), understanding the health status of Māori and the values they place on HRQoL will assist in health decision making and ultimately help reduce inequities experienced by Māori.

Feasibility of Mapping between EQ-5D-5L and Ascot- an Exploratory Anlalysis.

PRESENTER: **Akanksha Akanksha**, CHERE, University of Technology Sydney
AUTHORS: Brendan Mulhern, Deborah Street, Rosalie Viney

Background and aim

The Quality-Adjusted Life Year (QALY) is widely used to inform decision-making in health technology assessment. QALY is often estimated using preference-based measures (PBMs) which are generic instruments used to capture patient-reported outcomes. Recent literature suggests that for equitable allocation of scarce healthcare resources, it is necessary to expand the scope of what QALY measures. A novel approach to achieving this goal is by combining existing PBM descriptive systems. This study contributes to the methodological process of creating a combined instrument for measuring health and social care-related quality of life using EQ-5D-5L and ASCOT. The aim is to explore the relationship between the instruments and use psychometric evidence to inform the mapping process between them.

Methods

The exploratory analysis used pre-existing data collected from the Australian general population with and without common health conditions. A descriptive assessment of the sample and the instruments (EQ-5D-5L and ASCOT) was conducted to explore the relationship between item response patterns and demographic characteristics. The convergent validity of the instruments was assessed using Spearman's rank correlation. Known group validity was tested across health conditions using one-way ANOVA and effect sizes. Mapping between the two instruments was explored using ordinary least squares (OLS) as the estimation method for direct mapping.

Results

The dataset had 794 respondents, of whom the majority were females (52.1%) and were born in Australia (78.7%). The mean EQ-5D-5L utility score (0.75) was slightly lower than the mean ASCOT utility score (0.81). However, 7.5% of respondents reported that they were in the best state described by the EQ-5D-5L, and none reported being in the best state described by ASCOT. The correlation between the EQ-5D-5L and ASCOT utility values was moderate (0.55). Correlation across dimensions from both instruments ranged between 0.05 to 0.46, with a moderate correlation (>0.4) between ASCOT dimensions of social contact, occupation and cleanliness and the anxiety-depression dimension of EQ-5D-5L. Known group validity results show that all indicators are sensitive to differences at the 0.01 significance level using the one-way ANOVA, with effect size generally in the moderate range. The direct mapping function for the EQ-5D-5L utility score had a root mean squared error (RMSE) value of around 0.16 and an adjusted R-squared value of 0.34. The mapping function for the ASCOT utility score had an RMSE of 0.16 and an adjusted R-squared value of 0.38. This provides weak evidence of the predictive capacity and accuracy of the estimated model.

Conclusion

This exploratory analysis has revealed a divergence between the EQ-5D-5L and ASCOT descriptive systems, although some areas overlap in the psychosocial sphere of QoL. It provides valuable insight into interactions between responses to items from the two instruments in a

general population sample which will help select the final items appropriate for measuring broader concepts of QoL by a combined instrument. Further extensive exploration of the relationship and mapping methods is ongoing.

8:30 AM –10:00 AM   TUESDAY   [Demand & Utilization Of Health Care Services]

Cape Town International Convention Centre | CTICC 1 – Room 1.63

Hospitals and Inpatient Services Provision

MODERATOR: **Jacob Novignon**, Kwame Nkrumah University of Science and Technology

Medicare's Hospital Readmissions Reduction Program and Treatment Choice: AMI Excess Readmissions Penalties and the Utilization of Revascularization Procedures

PRESENTER: **Benjo Delarmente**, Johns Hopkins University
AUTHOR: Darrell Gaskin

Objective: Evaluations of Medicare's Hospital Readmissions Reduction Program (HRRP) have shown consistent reductions in excess 30-day readmissions for acute myocardial infarctions (AMIs) and other covered conditions after its implementation in 2012. While the mechanisms underlying these declines are not fully understood, the impact of HRRP on inpatient treatment decisions is less fully understood. This study explores the association between HRRP hospital penalties and the receipt of revascularization procedures for AMI patients.

Data: We utilize 550,492 total discharges from the Healthcare Cost and Utilization Project State Inpatient Databases for Arizona, Colorado, Florida, New Jersey, New York, North Carolina, and Washington for the years 2009, 2011, 2013, and 2015. We linked the discharge data with HRRP penalty data from Hospital Compare and hospital characteristics data from the American Hospital Association (AHA) Annual Survey. The main sample includes Medicare patients who have an AMI and were admitted as inpatients. Primary outcomes of interest were the receipt of percutaneous coronary intervention (PCI), and coronary artery bypass graft (CABG).

Methodology: Our main independent variable is the HRRP hospital penalty attributable to excess AMI readmissions. The sample was divided into four subgroups of patients who are 1) 80 years and older, 2) treated in hospitals with an interventional cardiology lab, 3) STEMI patients and 4) NSTEMI patients. We estimate for each state the elasticities between the receipt of either a PCI or a CABG and hospital AMI penalties using linear probability models with year fixed effects and error clustered at the hospital level. We control for patient characteristics (age, gender, race/ethnicity, Elixhauser comorbidities, supplemental insurance, county income) and hospital characteristics (total admissions, diagnostic catheterization capability, interventional catheterization capability, and adult cardiac surgery capability).

Results: The association between receipt of cardiovascular procedures and the hospital penalty varied across states. States that have higher hospital AMI penalties on average (NY, NJ, FL) have small but consistently positive and significant associations between hospital penalty and the receipt of revascularization in models that include both patient and hospital level characteristics across all subgroups. In NC, there is also a positive association between hospital penalty and the receipt of a CABG but a negative association between hospital penalty and receipt of a revascularization procedure. No significant associations were found in AZ, CO, and WA.

Conclusion: Our results show variation in the impact of HRRP AMI penalties on revascularization procedure utilization across states. The penalty was associated with more aggressive treatment of AMI patients in NY, NJ, and FL but less aggressive treatment in NC. This may reflect state-level differences in the organization of AMI care. NY, NJ and FL have higher numbers of interventional catheterization-capable hospitals, while in NC these resources are more regionalized. In states where the penalties are low there is no evidence that treatment choices were affected. Further research into variation, clinical implications, and outcomes of the changes in utilization patterns should consider state level variation in the impact of the HRRP.

How Do Inpatients' Costs, Length of Stay, and Quality of Care Vary across Age Groups after a New Case-Based Payment Reform in China? An Interrupted Time Series Analysis

PRESENTER: **Yajing Chen**, Fudan University
AUTHORS: Xinyu Zhang, Mengcen Qian, Xiaohua Ying

Context: In recent years, a new patient classification-based payment system called diagnosis-intervention packet (DIP) was developed and piloted in China to increase transparency of resource consumption by standardising reimbursement and achieve greater efficiency by reducing unnecessary services, such as DRGs-based payment. In 2018, DIP payment pilot reform launched in a large city in southeast China, relying on a new classification of patients based on combinations of diagnoses, identified by the first four digits of ICD-10 code (International Classification of Diseases-10th revision) and procedures, identified by the ICD-9-CM3 code (ICD-9th Revision, Clinical Modification), resulting in a thorough classification of more than 10,000 groups. Based on historical data, the DIP-based budgeting payment system reimburses hospitals for inpatient hospital services with unit price per DIP point determined by the total insurance funds of the region. It differs from the previous fixed rate per admission with a cap on annual total compensation policy. Furthermore, it considers institutions at all levels for treatments and different scores for each health issue.

Objective: This study evaluates the impact of DIP payment reform on total costs, out-of-pocket (OOP) payments, length of stay (LOS), and quality of care in hospitalised patients of different age.

Methods: An interrupted time series model was employed to examine the monthly trend changes of outcome variables before and after the DIP reform in adult patients covered by the the urban employee basic medical insurance scheme, who were stratified into a younger (18-64 years) and an older group (≥ 65 years), further stratified into young-old (65-79 years) and oldest-old (≥80 years) groups.

Results: We identified 1,721,889 discharge cases covered by the UEBMIS before the DIP reform, and 2,106,654 cases after the reform.The distribution of age groups was similar in the pre- and post-reform period, with about 60% of younger patients, 25% of young-old patients and 15% of oldest-old patients.The adjusted monthly trend of costs per case significantly increased in the older adults group (0.6%, P=0.001). The trend of OOP payments increased significantly in the oldest-old group (2.6% per month, P=0.047). The adjusted monthly trend of average LOS decreased in the younger and young-old groups (monthly slope change: -0.058 days, P=0.035; -0.025 days, P=0.024, respectively), and increased in the oldest-old group (monthly slope change: 0.107 days, P=0.030) significantly. The changes of adjusted monthly trends of in-hospital mortality rate were not significant in all age groups.

Conclusion: Implementation of the DIP payment reform associated with increase in total costs per case and reduction in LOS in the older group without deteriorating quality of care. The oldest-old group had more diagnoses and higher admission severity of diagnosis per patient, demonstrating higher OOP payment and longer LOS. These findings suggested that the DIP-based payment system may be adequate for older adults and support the continued implementation and enlargement of the DIP-based payment system in China, given its potential for inducing a shift in hospital supply services.

Effect of Medical Consortium on Inpatient Costs for Stroke Patients in Guangzhou City Southern China: Using a Difference-in-Difference Approach

PRESENTER: **Xuezhu LI**, Sun Yat-sen University
AUTHOR: Hui Zhang

Background: China enhances its efforts in building medical consortium and arranges closer partnerships among tertiary hospitals, secondary hospitals and community health service centers. The purpose of this study was to evaluate the effect of medical consortium on inpatient costs for stroke patients in Guangzhou City, Southern China.

Methods: A Propensity Score Matching with difference-in-difference (PSM-DID) approach was performed to examine the effect of medical consortium. Data were drawn from the Urban Employee Basic Medical Insurance (UEBMI) claims databases of Guangzhou City between 2012 and 2015. We identified 130,521 stroke patients, using the International Classification of Diseases codes tenth version (ICD-10) I60-I69. The total inpatient costs and out-of-pocket (OOP) spending were two main outcome variables. The covariates included age, gender, hospital level, length of stay, intensive care unit(ICU) admission, comorbidities and subtypes of stroke. Finally, we identified the patients in the medical consortium group as the treatment group (n=39,826) and patients in the non-medical consortium group as the control group (n= 90,695).

Propensity scores matching (PSM): Since patients admitted to medical consortium hospitals may systematically differ from those in non-medical consortium hospitals, we constructed a 1:1 PSM model with seven covariates to match each patient enrolled in medical consortium hospitals with a similar counterpart in non-medical consortium hospitals. Finally, 39,817 cases in the medical consortium group and 39,817 cases in the non-medical consortium group were included.

Difference in difference model (DID): After matching, we used the following empirical strategy to investigate the effect of medical consortium on inpatient costs with a DID framework. Due to the skewed distribution of costs, we constructed the following model.

$$\ln Y_{it} = \beta_0 + \beta_1 time_t + \beta_2 treatment_i + \beta_3 time_t \times treatment_i + \theta_{it} + \varepsilon_{it}$$

Where the dependent variable Y_{it} denoted the inpatient costs and OOP spending for individual *i* in year *t*. The treatment$_i$ was a dichotomic variable taking a value of 1 if patients were treated in medical consortium hospitals and 0 if patients were NOT treated in medical consortium hospitals. All statistical calculations were processed in R 4.1.1.

Results: A total of 79,634 stroke patients were identified in our study. The mean age was 69.63 years old. More than half of the patients were male (50.8%). Most of the patients received medical treatment in tertiary hospitals (95.1%). The mean length of stay was 26.49 days. Patients with chronic diseases accounted for 18.2%. After the implementation of medical consortium, the total inpatient costs (CNY 26,149.53 vs CNY 27,842.73) and OOP spending (CNY 3,835.53 vs CNY 4,027.94) of the medical consortium group were lower than those of the non-medical consortium group. The results of PSM-DID model suggested that the implementation of medical consortium can significantly reduce total inpatient costs and OOP spending of stroke patients in medical consortium group (*p*<0.01).

Conclusions: This study found that the implementation of medical consortium could reduce total inpatient costs and OOP spending for stroke patients, which suggested that medical consortium might contain health care costs, improve the effectiveness of disease management, and provide health services for urban residents on a more inclusive and coherent basis in China.

Cape Town International Convention Centre | CTICC 1 – Room 2.44-2.45

Field Experiments That Study Quality of Care in Low- and Middle-Income Countries

MODERATOR: **Manoj Mohanan**, Duke University

ORGANIZER: **Zachary Wagner**, RAND Corporation

DISCUSSANT: **Sean Sylvia**, University of North Carolina at Chapel Hill; **Duane Blaauw**, University of the Witwatersrand; **Radhika Jain**, University College London

What Drives Poor-Quality Care?: Experimental Evidence from Private Providers in India

PRESENTER: **Manoj Mohanan**, Duke University
AUTHOR: Zachary Wagner

We use a randomized controlled trial in two states in India to study the role of patient preferences, providers' financial incentives, and medication stock-outs in inappropriate prescribing for child diarrhea. Using simulated standardized patients (SSPs), we show that, although knowledge of appropriate prescribing was high, providers were highly responsive to patient preferences even when they went against the standard of care. Expressing a preference for ORS (the correct treatment) doubled ORS prescribing and reduced prescribing of inappropriate antibiotics. Expressing a preference for antibiotics increased inappropriate antibiotics prescribing. We find no evidence that financial incentives affect prescribing; SSP who informed the provider they would purchase medicines elsewhere got similar prescriptions. Randomizing increased supply of ORS improved the likelihood that providers dispensed ORS but only in one State. Taken together, our findings suggests that the provider's perception of patient preferences play an important role in inappropriate prescribing, supply of correct treatment is important in some contexts, and financial incentives at the point of sale are not important. Our results suggest that interventions to shift provider perceptions of patient preferences could improve prescribing for child diarrhea and that increasing supply could be effective in some contexts.

Management Practices and Quality of Care: Evidence from the Private Health Care Sector in Tanzania

PRESENTER: **Timothy Powell-Jackson**, London School of Hygiene & Tropical Medicine (LSHTM)

We measure the adoption of management practices in over 220 private for-profit and non-profit health facilities in 64 districts across Tanzania and link these data to process quality of care metrics, assessed using undercover standardised patients and clinical observations. We find that better managed health facilities are more likely to provide correct treatment in accordance with national treatment guidelines, adhere to a checklist of essential questions and examinations, and comply with infection prevention and control practices. Moving from the 10th to the 90th percentile in the management practices score is associated with a 48 percent increase in correct treatment. We then leverage a large scale field experiment of an internationally-recognised management support intervention in which health facilities are assessed against comprehensive standards, given an individually tailored quality improvement plan, and supported through training and mentoring visits. We find zero to small effects on management scores, suggesting that improving management practices in this setting may be challenging.

Health Insurance and Provider Behaviour: Evidence from an Audit Study in South Africa

PRESENTER: **Mylene Lagarde**, London School of Hygiene & Tropical Medicine (LSHTM)

The expansion of formal health insurance in many parts of the world has been accompanied by rising healthcare costs. Part of this increase is driven by higher healthcare utilization resulting from patients' expanded financial protection. Yet rising health expenditures are also fueled by increased treatment intensity and costs, including from wasteful or even harmful care. While much attention has been given to the effect of insurance on patient behaviour and healthcare consumption choices (patient moral hazard), little is known about the impact of insurance on provider behaviour. We designed an experimental audit study to explore the effect of patients' insurance cover on doctors' treatment choices and effort. We recruited 89 doctors in the private healthcare market in Johannesburg, South Africa. Each doctor received the visit (in a random order) of two standardized patients who presented identical clinical cases but differed in the degree of financial protection granted by their private health insurance: high insurance cover or low-insurance cover for primary care expenses. We find that doctors recommend more unnecessary diagnostic tests to patients with a higher financial protection, resulting in consultation charges higher by 10pp. They also prescribe more and more expensive drugs to these patients, which increases drug costs by 17pp in spite of the absence of any financial incentives to do so. Second, we find that doctors provide a higher level of observable clinical effort to better insured patients, but a lower level of technical care quality: doctors are less likely to diagnose correctly better insured patients, and more likely to recommend unnecessary antibiotics. Overall, these findings highlight the potential of health insurance for exacerbating inefficiencies in healthcare provision.

Can Demand- and Supply-Side Incentives Improve Quality of Malaria Care? Evidence from a Randomized Controlled Trial in Kenyan Pharmacies

PRESENTER: **Maria Dieci**

We conducted a randomized experiment in 140 Kenyan pharmacies to understand the impact of demand- and supply-side financial incentives for malaria testing and treatment on patient and pharmacist decisions, malaria case management, and quality of care. We randomized patient discounts and pharmacist performance incentives for testing and appropriate treatment use and compare their effectiveness to the status quo standard of care. We find that both patient subsidies and pharmacy incentives for diagnostic testing significantly increase usage of testing and encourage more appropriate malaria treatment use. We use data collected from 411 Standardized Patient visits to understand implications of

these interventions on patient and pharmacist decision-making and quality of care. We find that patient subsidies for diagnostic tests are partially passed through to patients in the form of reduced prices for tests, but that pharmacists do not pass through incentives they receive directly. However, we find that pharmacists who are incentivized directly to encourage diagnostic testing and appropriate treatment use provide more comprehensive information about testing and treatment recommendations to patients who seek care. We find suggestive evidence that patient preferences may matter: Standardized Patients who were randomly assigned to demand malaria treatment at the beginning of the interaction with pharmacists were significantly less likely to be administered a diagnostic test. However, the presence of pharmacist performance incentives reduces this likelihood, suggesting that pharmacists may be effective at convincing the marginal patient to be tested for malaria prior to receiving treatment when directly incentivized.

8:30 AM –10:00 AM   TUESDAY   [Cross-Cutting Themes And Other Issues]

Cape Town International Convention Centre | CTICC 1 – Room 2.41-2.42
Healthcare Financing and Policy Issues [FINANCING FOR UHC SIG]

MODERATOR: **Ravindra Rannan-Eliya**, Institute for Health Policy

SPARC's Lessons from Applying the Coaching Approach in Burkina Faso: A New Approach to Providing Technical Assistance That Considers the Politics of Health Financing Reforms

PRESENTER: **Seyni Mbaye**, Results for Development
AUTHORS: Ebube Nwaononiwu, Jean Paul Dossou, Cheickna Toure, Pierre Yameogo, Lamine Traoré

Background: To achieve Universal Health Coverage (UHC), African countries are designing or implementing health financing reforms to provide quality healthcare to their citizens in a way that reduces financial hardship to households. Simultaneously, there is a growing recognition of the importance of politics and power relationships in designing and implementing health financing reforms. It is from this perspective that the Strategic Purchasing Africa Resource Center (SPARC) adopted a different approach to providing technical assistance called the "Coaching Approach" that looks beyond the technical aspects of health financing reform. The coaching approach draws on country and regional experts – referred to as coaches – who are familiar with the country context to support reforms. Coaches are supported by global experts as needed. This approach emphasizes working through existing infrastructure and processes, to co-create context appropriate solutions with country stakeholders.

Objectives: This paper describes SPARC's coaching approach applied in Burkina Faso, and highlights key learnings from the implementation of the approach, the importance of understanding the political economy in health financing reforms and highlight key considerations for partners supporting similar reforms in countries.

Methodology: To respond to the objectives of this study, we employed a qualitative retrospective cross-sectional study design. A desk review was conducted on Burkina Faso's health financing system and pertinent documents to SPARCs engagement in Burkina Faso. Key informant interviews supplemented the desk review. A thematic analysis of the information was conducted using the health policy triangle framework (Walt and Gilson, 1994) to obtain key learnings from the engagement.

Results: Our study elicited four key considerations when implementing health financing reforms, based on the health policy triangle framework. 1) **Content** - Simplify complex concepts to maximize participation of stakeholders for progress, 2) **Process** – Co-create solutions with stakeholders to promote ownership, systems thinking, accountability, and optimize implementation processes, 3) **Context** -Coaches brought in as technical experts into the process must understand the political context of a country to ensure the right actors are included in reforms processes, and 4) **Actors** - The coach must be perceived as competent and neutral, to build trust and ensure transparency among stakeholders during reforms processes.

Conclusion: Health financing reforms go beyond technical solutions, and must take into consideration the political economy of different stakeholders for interventions to succeed. A good understanding of the political economy of a country is a major part of the reform process, which can either support implementation of the process or stall the reform. Technical assistance providers must be competent and neutral brokers, capable of bringing national stakeholders, together and facilitate collaborative process, develop context-appropriate solutions that achieve health system objectives.

Applied Financial Modeling and Policy Development Supports of the National Health Insurance System: Case of Indonesia

PRESENTER: **Royasia Viki Ramadani**, Universitas Indonesia
AUTHORS: Budi Hidayat, Zahrina Zahrina, Taufik Hidayat, Afra Inayah Dhyaniputri, Amila Megraini, Atik Nurwahyuni, Yuli Farianti

Background: Indonesia moved to a single-payer system by implementing a national health insurance (*Jaminan Kesehatan Nasional* -JKN) program in 2014. While JKN has made incremental improvements, its financial sustainability remains a substantial concern. The funding gap of the scheme will increase in the coming years. Policymakers consider steps to balance *JKN's* finance to render the system more stable and move from passive to strategic purchasing. This study aims to provide a holistic approach to addressing sustainability, mainly to assist the Government of Indonesia in accelerating progress toward universal health coverage by translating emerging policies to investigate the impact of adopting a selected approach on JKN's financial status.

Methods: We established two workstreams in this study: (1) an analytical work consisting of *JKN* financial modeling (*JFM*) for different scenarios of revenue and expenditure and (2) providing Policy Development Support, Communication, and Capacity Building. *JKN* database provides substantial modeling resources, primarily financial and service utilization data at aggregate and individual levels. Actuarial cost models were applied to estimate actual and future *JKN* financial performance under the assumptions of status quo and policy changes. Outcome metrics include the annual medical loss ratio and *JKN* fund finance state. We generated model parameters, including (cost per member per month, CPMPM), unit costs, and utilization rates. We developed a baseline revenue and expenditure model into several scenarios by including parameters derived from various policy options to leverage revenues and control expenditures. We conducted an iterative process discussion with key stakeholders regarding the details policy option and their impact on the JKN finance state.

Result: The result of JFM provides empirical evidence, showing that JKN's financial status will sustain up to 2026 without or with implementing various policy scenarios. The policy scenario reform will be implemented consisting of: (i) benefit adjustment with 12 disease screening as a benefit of JKN, policy on restriction on the benefit that has potential moral hazard), and redistributing members of public primary health care to private clinics, (ii) adjustment of healthcare tariff in primary health care and hospitals, and (iii) standardized inpatient care. The calculations carried out have also accommodated current issues regarding increasing capacity at health facilities and assumptions about the impact of Covid on health service utilization. Finally, the consequences of policy scenarios are translated into concrete recommendations and inputted during the policy development process. Dialogues and engagements become critical components for ensuing policy buy-in, endorsements, and implementations.

Conclusion: Consensus in determining assumptions, parameters, and various policy issues is essential in strengthening the government of Indonesia's decision-making. The decision-making process needs standardization and legitimacy to determine the assumptions, parameters, and justification for JKN financial modeling to minimize contradictions in policy adjustments between stakeholders. Further, not only BPJS-K (Social Security Management Agency for Health) as the payer but also DJSN (National Social Security Board) & Ministry of Health should have equal capacity and authority in carrying out an actuarial approach in JKN financial modeling to identify sustainability in adopting policy reforms.

Keywords: Financial Modeling, Policy Support, JKN, Indonesia, Lesson learned

Being Strategic in Purchasing to Finance Health Care: Political Economy Considerations for India's Health Insurance Reforms

PRESENTER: **Sumit Mazumdar**, University of York
AUTHORS: Mayur Trivedi, Indranil Mukhopadhyay

Background and Introduction: Recent health financing reforms in LMICs has involved health system payers engaging in contracts or purchasing services from health providers – notably from the private sector – allowing the payer to consider specific objectives that ensures key health system goals. Strategic purchasing (SP) has the potential to be an effective policy lever which can be employed to achieve the twin objectives of expanding financial risk protection coverage and improve quality of services. Often, this crucially hinges on political and institutional contexts cross-cutting the structure and organization of health systems in LMICs but remains less clearly understood and emphasized in policy discourses.

Research Questions: Applying a political economy perspective to SP towards achieving universal health coverage in the context of implementing national health financing programmes, this paper (a) introduces a framework to assess the scope, feasibility and key political and institutional drivers of designing and implementing SP under health insurance/financing (HF/HI) programmes, and (b) discusses these using the typical organisational features of the market for health care in India and the governance structures for implementing the HF/HI programmes across two provinces as an illustration.

We discuss the evolution and recent reform experiences involving purchasing health care services from the private sector in India to identify the key agents, policy parameters and processes that are crucial in leveraging purchasing functions towards UHC goals. Finally, we recommend a structured process to institutionalise political economy analysis as an essential component of evidence-based decision-making for purchasing reform programmes.

Data and Methods: We combine a (a) desk-review of key policy documents and relevant literature to identify political economy issues identified as having influence on designing and implementing purchasing or provider payment reforms with (b) in-depth interviews of key policy makers and programme managers involved in implementing SP programmes, nationally and in the states of Tamil Nadu and Gujarat. The states are chosen as they have relatively well-established SP programmes under the national (and state-specific) HI programmes, but we bring in the national perspective, highlighting the challenges in laggard states through interviews with key specialists at the National Health Authority responsible for implementing India's national flagship HI programme, PMJAY. We adopt 'process-tracing' approach using Kingdon's multiple streams framework to analyse the facilitators and barriers at different stages of the policy adoption process, and map the trajectories of formal and informal power across key decision-making actors and other interest groups.

Initial Results: Our initial results suggest considerable variation and fragmentation in key policy decisions around implementing purchasing mechanisms under PMJAY in both states, which is highly correlated with (a) the dominant role of the private sector players in both these states and (b) weak technical capacities and lack of effective coordination among the public purchaser. Nationally, new measures to streamline purchasing involving a growing influence of the technical cadre among the health bureaucracy, and efforts to implement a quality-

pegged payment model is having mixed results again highly associated with relative power and influence on the health care market by private sector players.

Cape Town International Convention Centre | CTICC 1 – Auditorium 2

Economic Evaluation of Community-Based Interventions

MODERATOR: **Lander Willem**, University of Antwerp

The Cost-Effectiveness and Cost-Consequences of a School-Based Social Worker Intervention: A within-Trial Economic Evaluation

PRESENTER: **Elizabeth-Ann Schroeder**, university of Oxford
AUTHORS: Shahd Daher, David Westlake, James White, Sharon Ayayo, Fiona Lugg-Widger, Philip Pallmann, Linda Adara, Lena Meister, Verity Bennet, Melissa Meindl, Stavros Petrou

Objectives:

The Department for Education in England has funded approximately 15% of local authorities (LAs) to embed social workers into schools (SWIS) to work with teachers, children and families to safeguard children. Schools have long been a source of referrals to Children's Social Care (CSC), contributing the second highest proportion of all referrals, behind the police.[1] Since 2014 they've also been associated with the highest increase in referrals of any service.[2] Social workers have the lead responsibility for safeguarding children. A within-trial (pragmatic two-arm cluster randomized trial) economic evaluation estimates the cost-effectiveness of embedding SWIS compared to no embedded social worker, on referrals to CSC.

Design:

The analysis uses a health and social care perspective. The primary objective is to estimate the incremental cost-effectiveness of SWIS in reducing rates of child protection enquiries, compared to usual practice. A cost-consequences analysis presents resource use and costs associated with outcomes of child in need assessments, days lived in state, foster or residential care, school attendance, and educational attainment.

Methods:

Mixed methods approaches included a process evaluation and logic model, and an implementation evaluation of the intervention's mediators, enablers and barriers. They also explore how the scale up is implemented across the LAs, and the extent to which the is implemented as intended.

Resource use data for the intervention was collected directly using purpose-designed data collection instruments. LAs returned completed datasets reporting aggregated outcomes for schools by year group. Micro-costing and consensus building approaches were undertaken to address wide-ranging variability surrounding key unit costs and to estimate appropriate ranges for sensitivity analyses. Data on attendance and attainment are obtained separately and linked from the United Kingdom's National Pupil Database.

Analysis:

The analysis utilised an "intention to treat" principle. Mean differences in in trial arms were estimated using t-tests for continuous variables with bootstrapped 95% confidence intervals of 1,000 (or more) replications. Incremental cost-effectiveness (ICERs) and net monetary benefit (NMB) statistics were estimated for a range of willingness to pay (WTP) thresholds, and cost-effectiveness acceptability curves (CEACs) were constructed to identify the probability of cost-effectiveness. Additional sensitivity analyses explored uncertainty, including key cost drivers specifically for proportional time of social workers and management time for SWIS, with incremental cost-effectiveness ratios then recalculated.

Sub-group analyses mirrored the main analysis, and also utilised findings from the process and implementation evaluations. Child protection enquiries and other outcomes were scaled to incidence rate ratios per thousand students per year. Cluster robust standard errors took account of school size and percentage of free school meals within local authorities. Temporal effects explored intervention dose and hypothesised intervention mediators by fitting an interaction term for implementation fidelity (Gold, Silver, Bronze).

A cost-consequences analysis was additionally conducted presenting resource use, costs and outcomes in disaggregated and unweight format, with estimates of the mean costs with the appropriate measures of dispersion. Analyses were conducted in Stata v17.

Results and Recommendations <currently embargoed, available for iHea Congress 2023>

[1] Department for Education (2019) [online] Available at: https://www.gov.uk/government/collections/statistics-children-in-need

[2] SchoolsWeek (2022). Available at: https://schoolsweek.co.uk/childrens-social-service-referrals-from-schools-soar-to-record-high/

Assessing the Equity of Investments in Malaria Control : A Case Study of a Housing Modification Intervention in Uganda

PRESENTER: **Katherine Snyman**, London School of Hygiene & Tropical Medicine (LSHTM)
AUTHORS: Samuel Gonahasa, Agaba Katureeba, Joyce Aber, Angelo Arturia, Joaniter Nankabirwa, Catherine Maiteki, Moses R Kamya, Nelli Westercamp, Sarah G Staedke, Walter Ochieng, Catherine Pitt

Introduction: Equity is of growing importance in economic evaluations and the data demands for equity-informative economic evaluations are high but the optimal methods for incorporating equity are not clear. Disaggregated cost data are needed to understand variability in cost-per-person receiving a given intervention, but these data are rarely collected. To further examine the equity of intervention costs, we present a case study from a cluster-randomised trial to compare the impact of different housing modifications to control malaria in Uganda.

Objective: The Uganda Housing Modification Study aims to: (1) analyse the costs of implementing two novel housing modifications for malaria prevention (screening and eave tubes), (2) assess equity using equity-informative economic evaluation methods, and (3) analyse willingness-to-pay (WTP) for both interventions and how it varies by equity-relevant variables.

Methods: A pilot study was conducted in 200 homes (January to April 2021); the main trial is ongoing in 6,000 homes (December 2021 to August 2023). Financial costs of housing modification including materials and labor were estimated using a micro-costing approach, and economic costs using a disaggregated societal perspective. Cost categories included training, community sensitization, materials, labor, local and international transportation of the materials and equipment. Micro-costing data on the resources used per house were collected, which allowed for individual household level cost estimations. Household costs and WTP data were collected through cross-sectional household surveys in the pilot, and baseline and 12-month follow-up surveys. WTP data were collected using the modified structured haggling technique to estimate feasibility of scale-up. Household socio-economic status (SES), the primary equity-relevant variable of interest, was analyzed by wealth indices derived from assets using principal components analysis and concentration curves. Variation in intervention costs and WTP by different household characteristics (SES, size, housing materials, occupation, age, and gender of members) were explored using regression analysis.

An Economic Evaluation of a Community Intervention Programme for Enhanced Leprosy Control in Northern Nigeria

PRESENTER: **Charles C Ezenduka**, University of Nigeria

Objective: The state of leprosy in Nigeria and the realities of post elimination era require evidence- based cost-effective approach to early case detection for more effective control and elimination of leprosy. As a core activity in leprosy control and elimination, early detection of cases is crucial in achieving the objectives of control measures and prevention of disabilities. This study evaluated the operational cost-effectiveness of a community delivered Legacy Innovative Project (LIP) implemented to enhance leprosy case detection in northern Nigeria.

Methods: The study was an explorative cross-sectional study, undertaken in a routine practice setting, targeting endemic communities in three states in northern Nigeria. Primary and secondary data were collected from the project, routine records and annual reports. Costs and effects were measured from both providers' and patients' perspectives, and outcome expressed as cost per new case detected. Incremental estimates of costs and effects of the project compared to routine practice were used to obtain the cost-effectiveness result, as incremental cost-effectiveness ratio (ICER). All costs were converted to the US Dollar (US$) at 2018 exchange rate (N350 = US$1.00). Univariate sensitivity analysis was performed to evaluate uncertainties around the ICER.

Result. The community Project (LIP) overall detected a total of 347 newly confirmed leprosy cases at a total annual cost of US$49,337.19, averaging US$142.18 per new case detected. Key cost drivers were routine meeting which accounted for 28% of total expenditure, Social Mobilization and Training/Workshop expenses at 17% respectively. Findings were similar at individual state levels. Overall, the Legacy Project dominated routine practice with ICER of US$-17.73 per additional case detected. The study demonstrated that greater gains/more cases are identified for every dollar spent with the community strategy compared to routine practice, and with the ICER at a negative value imply that greater resource savings are associated with the Legacy Innovative Project.

Conclusion: From both provider and patient's perspective, the Legacy Project at all levels demonstrated a more efficient and cost-saving approach to leprosy case detection, identifying more cases at a lower cost compared to routine practice, making the strategy a preferred option for leprosy detection for enhanced elimination. Integration of the Legacy Project into routine practice and combination with related community based programmes such as tuberculosis control and routine immunization will leverage shared resources for enhanced efficiency for improved outcome. Findings present important information to policy and programmes for enhanced control and elimination of leprosy. The cost of implementation offers the best option for scale-up to increase coverage and achieve optimum control of leprosy in Nigeria and similar settings.

Keywords; Economic evaluation, Cost-Effectiveness analysis, Legacy Project, Leprosy case-detection, cost per case, Nigeria

Economic Evaluation of Human Resource Approaches in Active Case Finding for Tuberculosis in a High Burden Country: The Case of Vietnam

PRESENTER: **Joseph Kazibwe**, Department of Clinical Sciences, Lund University

AUTHORS: Phuong Bich Tran, Andrew Codlin, Rachel Forse, Luan Nguyen Quang Vo

Background

Tuberculosis remains one of the top major infectious causes of mortality globally. According to the World Health Organisation, in 2021 alone, an estimated 10.6 million people fell ill with TB globally, of which 1.6 million died. About 50% of households with a person that fell ill with TB, spent 20% more on costs above their household income. Active case finding (ACF) has been highlighted as one of the important strategies that facilitate quicker enrollment to care and cure; thus reducing the chance of infecting others within the communities, as well as leading to better health, financial and psycho-social outcomes. A number of cost-effectiveness analyses have been conducted comparing ACF to passive case finding. However, there is a scarcity of evidence on the different ACF strategies.

Aim

The aim of this study is to assess the cost and cost-effectiveness of deploying salaried workers compared to community volunteers in the implementation of TB ACF in Vietnam.

Methods

We conducted an economic evaluation using data from a study carried out in 6 districts in Vietnam between 2017-2019. Randomisation was done at the district level. In the six intervention districts, three districts deployed salaried workers as the case finders, and the other three recruited community volunteers to carry out TB ACF. We collected both cost and health outcome data in the respective study sites; following patients throughout the patient pathway, from screening to the end of treatment. The health system perspective was used for the estimation of the costs, which are presented in 2020 USD. A Markov decision modeling was used to determine the cost-effectiveness of the human resource approaches for TB ACF.

Results

A total of 72,732 people were included in the study. The total number of TB cases detected by the community volunteers and salaried employees were 2,247 and 1,276, respectively.

With the inclusion of intervention relevant costs (both project and existing health system costs), the incremental cost-effectiveness ratio (ICER) was USD 1,257.28 per DALY, community volunteers were found to becost saving. When we excluded all project costs (since this cost will be non-existent when the government scales up the intervention), the ICER was USD 337.14 per DALY, with community volunteers still cost saving. We performed the probabilistic sensitivity analysis but this did not change the findings.

Conclusion and Policy Implications

We found that deploying community volunteers was more cost saving compared to salaried workers in the implementation of TB ACF. However, with a threshold of one GDP per capita for Viet Nam, salaried health workers were the prefered option to maximise health. A qualitative study on the two human resource models for ACF in Vietnam also found that community volunteers were in a good position to address patient-level barriers to ACF implementation (stigma, discrimination, and mistrust) and had local community networks that fed into the implementation of ACF. This is important evidence that can be used to strengthen existing community health worker models in TB high burden countries, as this can be the key to TB eradication.

A Social Return on Investment Evaluation of the Green Social Prescribing Programme Opening Doors to the Outdoors to Improve Mental Health, Social Connections and Physical Activity

PRESENTER: **Abraham Makanjuola**, Bangor University

AUTHORS: Ned Hartfiel, Andrew Cuthbert, Mary Lynch, Rhiannon Tudor Edwards

Background: Evidence indicates that increased levels of physical activity is associated with decreased levels of anxiety and depression and improved well-being and quality of life. Individuals who suffer with low mental wellbeing have a shorter life expectancy, tend to neglect physical health, and lead sedentary lifestyles. The Outdoor Partnership's 'Opening the Doors to the Outdoors' (ODO) programme is aimed at inactive individuals who experience low mental wellbeing in North Wales. The ODO programme is a 12-week outdoor activity and climbing intervention which provides people with low mental wellbeing the opportunity to increase levels of physical activity, confidence, and quality of life in a supportive environment enabling socialisation with peers.

Aim: To estimate the social return on investment of the ODO programme by comparing the costs of delivering the programme with the monetised outcomes experienced by ODO clients in terms of improved overall health, mental wellbeing, social connection, and physical activity.

Methods: The ODO programme evaluation was conducted between April 2022 and November 2022. Clients recruited to the ODO programme engaged in a 12-week walking or indoor climbing intervention. The SROI evaluation involved a mixed-method approach with

pre and post intervention questionnaires as well as semi-structured interviews. Questionnaires included the Short Warwick Edinburgh Mental Wellbeing Scale (SWEMWBS), International Physical Activity Questionnaire – Short Form (IPAQ-SF), and the New Economics Foundation (NEF) social trust question, and an overall health question. Wellbeing valuation methods were used to quantify and value the outcomes from SWEMWBS, IPAQ-SF, NEF social trust question, and the overall health question. SROI ratios were generated from two separate wellbeing valuation methods: one from the social value calculator and the other from the mental health social value calculator. Both calculators are derived from wellbeing valuation, a consistent and robust method recommended in HM Treasury's Green Book (2022) for measuring social cost-benefit analysis. The purpose of the semi-structured interviews was to further explore the clients' experience of ODO programme.

Results: 75 clients completed baseline questionnaires and 52 participants (69%) completed follow-up questionnaires. The results showed that for every £1 invested in ODO programmes, £4.90 to £5.36 of social value was generated for participants. In addition, interviews with clients indicated improved mental wellbeing, confidence, social connection, and overall health from participating in the ODO programme.

Discussion: This was the first study to use wellbeing valuation in estimating the social value to clients who participated in a 12-week low-level walking or climbing programme. Although the reliability of the results may have been limited due to the lack of a control group, the HACT mental health social value calculator considered this by subtracting a 'deadweight' percentage of 27% from the total social value. The HACT social value calculator subtracted percentages for deadweight, attribution, and displacement to avoid overestimating the social value generated from the programme.

Conclusion: The results showed that the ODO programmes generated positive social value to clients. Quantitative and qualitative data from baseline and follow-up questionnaires indicated that many clients improved in mental wellbeing, physical activity, social trust, and good overall health.

Understanding the Costs and Resource Requirements for Offering a Smoking Cessation Programme at Primary Health Care Facilities in South Africa

PRESENTER: **Refiloe Lerato Cele**, University of the Witwatersrand
AUTHORS: Richard van Zyl-Smit, Lineo Marie Matsela, Paul Ruff, Jacqui Miot

Background

Tobacco dependence poses a significant public health challenge for South Africa, with its use being associated with an increased risk for lung cancer, pulmonary tuberculosis and chronic obstructive pulmonary disease (COPD); and subsequent preventable mortality. The health benefits of quitting smoking have been well-established with improved quality of life through reduced disease risk. Smokers are unlikely to quit without any form of support. In South Africa, smoking cessation support is mainly through private support, and is currently not a public health service offered at scale. As such, it is still unknown how much it will cost to make such a service available publicly. Therefore, we aimed to estimate and highlight expected costs when offering a smoking cessation programme as a public health service at Primary Health Care (PHC) facilities.

Methods

We costed a smoking cessation program using an ingredients-based methodology from a provider perspective. The program structure was based on current South African Tobacco Smoking Cessation Clinical Practice Guidelines. The programme consists of four sequential phases with varying time frames depending on patient success i.e. 1) Smoker identification through an information session; 2) Brief intervention: brief counselling and information, education and communication (IEC) materials; 3) Intensive intervention: Counselling and nicotine replacement therapy (NRT); 4) Intensive intervention: Counselling and Pharmacotherapy.

An Excel-based costing model was developed to consider resources required and their associated costs at each phase. Cost categories considered included: staff costs, overheads, capital equipment, follow-up costs (airtime), training costs (fixed), medicines (Varenicline/NRT), and IEC materials. We estimated the cost per patient per intervention phase. All costs were collected in South African Rand (ZAR) value then converted to US dollars (USD) (16.00 ZAR/USD). One-way sensitivity analyses were conducted.

Results

The baseline cost per client per visit for each of the phases is; Identify smokers (R2.60/$0.16), Brief intervention (R33.94/$2.12), NRT (R1 144/$71.50) and Pharmacotherapy – Varenicline (R477/$29.80). The cost for 6 months of intervention for NRT and Varenicline is R6 869/$429.31 and R2 867/$179.18 respectively. The highest costs are for the NRT phase given the high cost of NRT, especially patches in South Africa. The next highest cost phase is for Pharmacotherapy, driven by medicines as well as by staff costs to prescribe, dispense, counsel and monitor clients.

If the price of NRT and other Pharmacotherapy is reduced by 50% which typically mimics tender pricing, the cost per client per visit for NRT and Pharmacotherapy phase reduces to R278.84/$17.40 and R322.61/$20.16 respectively.

Conclusion

Our study estimates the costs and highlights the cost drivers that can be expected in implementing a smoking cessation programme as a national public health service; and provides evidence to negotiate reduced NRT and pharmacotherapy prices for state tender purchase. While

a smoking cessation programme has proven health benefits for both the individual and the health system, it is however, useful to understand implementation costs for planning, programme structuring and budgetary purposes. Future studies should compare programme costs against the costs to the public health system of not providing such a programme.

Cost-Effectiveness of a Nationwide Physical Activity Intervention for Diabetes and Hypertension Prevention: A Modelling Study of 654,500 Adults

PRESENTER: **Cynthia Chen**, National University of Singapore
AUTHORS: Gregory Ang, Chuen Seng Tan, Falk Müller-Riemenschneider, Yot Teerawattananon

BACKGROUND

Increasing physical inactivity is a primary risk factor for diabetes and hypertension, contributing to rising healthcare expenditure and productivity losses. Large-scale physical activity interventions could potentially reduce the disease burden but face challenges in the uncertainty of long-term health impact and high implementation costs, hindering their adoption. We examined the cost-effectiveness of the Singapore National Steps Challenge^{TM} (NSC), an annual nationwide mHealth intervention to increase physical activity.

METHODS

We used a Markov model to assess the long-term impact of increased physical activity from NSC on adults aged 17 and above. The model compared two situations: NSC conducted yearly for 10 years against no NSC. The model projected costs and mortality arising from diabetes and hypertension, and their complications. Health outcomes were expressed in terms of the quality-adjusted life-years (QALYs) gained. Sensitivity analyses were done to test the robustness of our model results.

RESULTS

Conducting NSC yearly for 10 years on a mean cohort size of 654,500 participants aged 17 and above is projected to prevent 6,120 diabetes cases (95% credible interval: 3,690 to 9,040), 10,300 hypertension cases (6,260 to 14,700) hypertension cases and 4,950 death cases (3,280 to 7,040), leading to 78,800 QALYs (56,500 to 102,000) gained.

From the health system perspective, assuming no differentiation of cost among different physical activity levels within each health state, the healthcare cost savings from the averted cases is estimated to be SGD674 million (239 million to 1.48 billion), with SGD364 million (57.8 million to 1.04 billion) for diabetes and SGD311 million (95.0 million to 690 million) for hypertension. Using a willingness to pay threshold of SGD10,000, NSC was cost-saving at -SGD4,510 (-14,000 to 1,430) per QALY gained. There was also a 92.2%, 100% and 100% probability that NSC was cost-effective at a willingness-to-pay of SGD0, SGD5,000 and SGD10,000 per QALY gained, respectively. This suggests that NSC would be cost-effective at a willingness to pay threshold of SGD10,000 per QALY gained. From the societal perspective, NSC was estimated to reduce societal costs by SGD1.97 billion (645 million to 4.72 billion) and was even more cost-saving at -SGD21,000 (-54,800 to -4,530) per QALY gained. There was also a 100% probability that NSC was cost-effective at a willingness-to-pay of SGD0, SGD5,000 and SGD10,000 per QALY gained.

CONCLUSIONS

This modelling study provides evidence of the cost-effectiveness of a nationwide physical activity intervention targeting individual behaviour using an app. We projected that increased physical activity from a yearly nationwide physical activity intervention delayed the incidence of diabetes and hypertension, and reduced mortality. With a conservative estimate of $674 million in direct healthcare cost savings, our results suggest that this physical activity intervention is cost-saving and improves the quality of life. The estimated cost savings are more significant when indirect costs are considered. Hence our results provide important information for decision-making in countries that may consider introducing similar physical activity programmes.

Economic Aspects of Physical Inactivity in Germany – Health Service Utilization, Productivity Losses, and Costs Depending on the Level of Physical Activity.

PRESENTER: **Sophie Gottschalk**
AUTHORS: Hans-Helmut König, Judith Dams

Background: Physical inactivity is one of the main risk factors for chronic diseases, which are associated with high costs for healthcare systems and society. Previous studies indicate that physical inactivity is associated with higher resource utilization and costs. These studies often looked only at leisure-time physical activity, or the definitions of 'sufficient' or 'insufficient' physical activity were not in accordance with current guidelines. Moreover, few studies have examined this association in a German population, and these are restricted to populations from specific regions or age groups. Therefore, the aim of this study is to examine the economic aspects of physical inactivity in a large population-based sample from Germany.

Methods: The analyses were conducted using cross-sectional data from n=148,586 individuals (20-69 years) of the German general population who participated in the baseline examination of the German National Cohort (NAKO). Healthcare costs and productivity losses in the previous 12 months were calculated by monetarily valuing the information on health-related resource utilization using standardized unit costs for the German healthcare system and average gross labor costs. Self-reported physical activity in the domains leisure, occupation, and

transport was assessed using the Global Physical Activity Questionnaire (GPAQ). For the primary analysis, the sample was classified as 'sufficiently' and 'insufficiently active' according to current WHO guidelines. For the secondary analysis, physical activity was categorized into different intensity levels, based on all physical activity domains as well as separately for the different domains. The association between physical activity level and costs was analyzed using two-part models adjusted for relevant covariates (e.g., sociodemographic characteristics, behavioral risk factors, study center, and number of chronic diseases).

Results: When accumulated in all physical activity domains, insufficiently active people incurred on average €117 (95% CI [-47, 281]) higher societal costs within a 12-month time horizon. The cost difference was more pronounced in older age groups and when considering only leisure-time physical activity for the categorization into 'sufficiently' and 'insufficiently active'. The association between PA intensity and costs does not seem to be linear and the direction differs by PA domain.

Discussion: Since data from follow-up waves of the NAKO are not yet available, examining the association between the level of physical activity and the healthcare and societal costs longitudinally and using objective, real-world physical activity data remains a future research perspective.

8:30 AM –10:00 AM   TUESDAY   [Health Beyond Health Care Services: Social And Related Determinants]

Cape Town International Convention Centre | CTICC 1 – Room 1.61

What Happens after Childcare? Short- and Long-Term Consequences of Early Educational Experiences [ECONOMICS OF CHILDREN'S HEALTH AND WELLBEING SIG]

MODERATOR: **Laia Bosque-Mercader**, University of Oxford

ORGANIZER: **Joaquim Vidiella-Martin**, University of Oxford

Age-Specific Effects of Early Daycare on Children's Health
PRESENTER: **Mara Barschkett**, DIW Berlin

Motivation. Since the early 2000s, the share of very young children (0–2 years) in daycare has increased significantly in many OECD countries. Germany experienced one of the largest increases among all OECD countries (OECD, 2020). Along with this development, the body of literature studying the effects of early daycare attendance of children on their (non-)cognitive outcomes has grown. Previous research shows that health is one of the most important determinants of (non-)cognitive development in the short- and long-run and of labor market outcomes (e.g., Heckman, 2007). However, despite the relevance, the effect of early daycare attendance on health receives little attention in the literature. The few existing studies mostly focus on children aged three and older, study subjective and broad health measures obtained from survey data, or focus on small and targeted programs. Instead, less is known about settings with a universal daycare program targeted at children below three years and the effects on objectively assessed health outcomes.

Objective. This study evaluates a German universal daycare reform, which implied a large-scale expansion of daycare slots for children aged one and older starting in the mid-2000s, and its effects on age-specific short- and mid-term health outcomes.

Data. The analyses are based on administrative health records covering all individuals insured through the public health system in Germany (about 90% of the population) between 2009 and 2019. The sample includes children from birth cohorts 1999 to 2015 aged one to ten years, which amounts to about 11 million children. The data covers the outpatient register that contains all ambulatory care contacts. Comprehensive diagnoses by practitioners based on the International Classification of Diseases (ICD-10) are recorded for each visit. Specifically, physical (communicable diseases, such as infections and respiratory diseases; non-communicable diseases, such as obesity, injuries, and vision problems) and mental health outcomes, healthcare consumption, and costs are considered. Enrolment rates of children below three for the 320 West German counties are obtained from the Federal Office of Statistics.

Methods. The large-scale daycare expansion in Germany is exploited to overcome the endogeneity of the decision to attend daycare at an early age. The reform generated large temporal and spatial variations in the expansion speed of daycare slots at the county level. Using this variation, I employ difference-in-differences and event-study approaches to identify causal effects.

Results. The results provide evidence for a substitution of illness spells from elementary school to the first years of daycare. Specifically, I find that early daycare attendance increases the prevalence of respiratory and infectious diseases at ages one to two but decreases the prevalence at older ages. Specifically, a ten percentage point increase in the daycare coverage rate leads to an increase of 5.7% for infections, 5.1% for ear diseases, and 5.6% for respiratory diseases compared to the sample means. Heterogeneity analysis reveals more pronounced effects for children from deprived areas. Similar patterns are visible for healthcare consumption. There is no evidence of a change induced by daycare attendance for the remaining outcomes.

The Unintended Consequences of Universal Childcare
PRESENTER: **Laia Bosque-Mercader**, University of York
AUTHORS: Núria Rodríguez-Planas, Judit Vall Castello

Motivation. Discrepancies on whether preschool should be targeted or universal have played the lead in early education policy debates in the United States. Countries also differ in their approach in Europe where less than half of them provides universal access to preschool at age three and only eight guarantee a place in preschool before age three in 2018/19 (European Commission/EACEA/Eurydice, 2019). Given how decisive early life conditions are for child human capital development (Almond et al., 2018), policymakers aim at assessing which type of preschool (whether targeted or universal) benefits children and countries more. Research on early preschool and childcare policies has however mainly focused on targeted programmes to disadvantaged families and less is known about the effects of universal early education programmes on child outcomes, in particular on mid- and long-term health outcomes.

Objective. This study evaluates a Spanish universal preschool reform, which implied a large-scale expansion of full-time high-quality public preschool for three-year-olds from 1991/92 academic year, and its effects on mid- and long-term health outcomes.

Data. The study uses data on three-year-old enrolment rates for 1987/88-2002/03 from the *Statistics of Non-tertiary Education* reported by the Ministry of Education and Vocational Training. Mid- and long-term hospitalisations are calculated from the *Hospital Morbidity Survey* for 1999-2018, which provides annual census data on all overnight hospitalisations in public, private, and military hospitals by hospital diagnosis. Mid- and long-term fertility outcomes are calculated from the *Birth Registries* for 1999-2021, which contain administrative data of all annual birth certificates in Spain. The Spanish National Statistics Institute publishes both administrative datasets. Individuals considered are in their adolescence and young adulthood (aged 15-30).

Methods. Despite being nationally enacted, the implementation of the reform was the responsibility of the Spanish regions allowing to exploit the fact that the initial intensity in public preschool expansion varied across regions. Using a difference-in-differences approach, we exploit the timing of the policy and the differential initial speed of implementation of public preschool expansion across regions. We thus compare health outcomes of cohorts aged three before (pre-reform cohorts) to those aged three after (post-reform cohorts) the start of the policy residing in regions with varying initial implementation intensity of the programme.

Results. We find that a greater initial intensity in public preschool expansion increases the number of hospitalisations per 1,000 individuals. To be more precise, an increase of 10 percentage points in the initial intensity in public preschool expansion increases hospitalisation rates by 2.7% for individuals aged three post-policy. This result is driven by individuals aged 20-27, women and pregnancy-related diagnoses. This finding seems to be explained by a change towards a higher utilisation of healthcare services and an increase in the number of births per 1,000 women around age 20 instead of a negative effect of the policy on long-term health (Bosque-Mercader, 2022).

School Starting Age and ADHD

PRESENTER: **Joaquim Vidiella-Martin**, University of Oxford
AUTHORS: Cheti Nicoletti, Catia Nicodemo

Motivation. Children who start school at a younger age tend to have higher rates of diagnosis and medication for attention deficit hyperactivity disorder (ADHD) than their relatively older classmates. While this topic has been thoroughly explored, some questions remain unanswered.

Objective. This project sheds light on three underexplored aspects of the relationship between ADHD and school-starting age. First, we propose a theoretical framework that allows us to understand the relative importance of several driving factors at the same time. Second, we characterise the age profile of the link between ADHD and school-starting age. Third, we investigate if the higher rates of diagnosis and prescription of ADHD among early starters are more likely due to the over-diagnosis of relatively young children or the under-diagnosis of relatively old children.

Data. To answer our questions, we leverage individual-level patient data on diagnoses and prescriptions from QResearch, a large consolidated database derived from the anonymised health records from general practices in England.

Methods. In our empirical strategy, we follow a large body of evidence leveraging a discontinuity in school starting age based on the date of birth. To characterise the profile of children pushed into ADHD diagnosis by school-starting age, we follow the theoretical framework to profile compilers and non-compliers for instrumental variable analyses proposed by Marbach and Hangartner (2020).

Results. We begin by showing that the larger rates of ADHD diagnosis and prescriptions among early starters persist during childhood and adolescence. Next, we provide evidence that the effects of starting school early on ADHD could run through environmental stress due to lower psychological maturity at the school entry and peer comparison bias arising from teachers and parents rating the behaviour of early school starters more harshly because comparing them with older classmates who tend to be more mature. Finally, we show that an early start of school is more likely to increase medication among females and children from deprived areas, which have often been reported to suffer from under-diagnosis.

Cape Town International Convention Centre | CTICC 1 – Room 1.42
Maximizing Value in Health Care

MODERATOR: **Xuanzi Qin**, University of Maryland School of Public Health

Association of Income with Delivery of High- and Low-Value Health Care in the United States
PRESENTER: **Sungchul Park**, Korea University
AUTHOR: Rishi K Wadhera

Importance: Healthcare reform in the US has focused on improving the value of health care, but little is known about whether the receipt of high- and low-value care differs by income. Understanding these patterns is critical to informing policies to advance the equitable delivery of value-based care.

Objectives: To examine whether the receipt of high- and low-value care differs by income levels.

Design, Setting, and Participants: Cross-sectional analysis of younger adults (ages 18-64 years) and older adults (ages 65 years and over) from the 2010-2019 Medical Expenditure Panel Survey.

Exposures: Household income as % of federal poverty level (FPL) (<200%, 200-399%, and 400% FPL).

Main Outcomes and Measures: Eight high-value services in three categories (cancer screening, diagnostic and preventive testing, and diabetes care) and nine low-value services in three categories (antibiotic use, medication, and imaging).

Results: We included 196,906 younger adults (41.3 years, 53.2% women) and 44,725 older adults (73.9 years, 56.2% women). Among younger adults, those in the highest income group were significantly more likely to receive all high-value services than those in the lowest income group. The magnitude of the difference varied markedly by service (4.8 [95% CI: 1.8-7.8] to 19.0 [95% CI: 17.4-20.7] percentage points for HbA1c measurement and colorectal cancer screening). For low-value care, those in the highest income group were significantly less likely to receive low-value medication than those in the lowest income group, including benzodiazepine for depression (-3.7 [95% CI: -6.4--0.9] percentage points), opioid for back pain (-2.4 [95% CI: (-4.5--0.2] percentage points), opioid for headache (-11.8 [95% CI: -14.0--9.7] percentage points), and nonsteroidal anti-inflammatory drug for hypertension, heart failure, or kidney disease (-4.5 [95% CI: (-5.9--3.0] percentage points). The magnitude of the difference decreased after controlling for education and health insurance status, but the results remained consistent. Similar patterns were found among older adults.

Conclusions and Relevance: Compared to low-income adults, high-income adults were more likely to receive high-value cancer screening, diagnostic and preventive testing, and diabetes care and less likely to receive low-value medication. Policymakers need to develop structured approaches to promoting the equitable delivery of value-based care.

Slack in Hospital Infrastructure and Trade-Offs between Length of Stay, Admission Rates, and Procedures
PRESENTER: **Shane Murphy**, University of Connecticut

There is great variation in the amount of slack in US hospital infrastructure; the amount of time hospitals spend at or near capacity. Hospitals with very little slack face patient care tradeoffs that have profound impacts on patient outcomes. These tradeoffs involve admission volume, length of stay, and procedures offered. Variation can be seasonal and can be affected by factors such as weather and infectious disease rates which are specific to a time period and a location. These factors also are exogenous to hospital volume, although they may not be exogenous to hospital slack. This paper uses these variations to develop a model of hospital trade-offs and to estimate their health impacts. We then model what characteristics make a hospital most able to weather periods of exceptionally high volume. The model focuses on resilience to shocks to volume which are developed by having experienced previous shocks and having high levels of capital relative to peak volume. We also create a choice model where hospitals have some control over which procedures to offer or not offer during periods of high volume which may reduce length of stay but also harm patient outcomes. We test this model using a large US hospital inpatient data set. This allows us to present a robust estimate of resilience as well as model determinants of resilience. We use a multi-level Bayesian estimation strategy that allows us to robustly perform multiple-hypothesis testing. Initial results do find hospital resilience is strongly correlated to hospital capital and that hospitals with unusually high volume see shorter lengths of stay. However, we do not find that hospital procedure choice is significantly related to hospital volume and thus does not explain variation in patient length of stay.

Disentangling the Value Equation: A Step Forward in Value-Based Health Care
PRESENTER: **Borja Garcia-Lorenzo**, Kronikgune Institute for Health Service Research
AUTHORS: Itxaso Alayo, Arantzazu Arrospide, Ania Gorostiza López de Subijana, Ane Fullaondo-Zabala

The so-called value equation of the Value-based Health Care (VBHC) is the one introduced by Porter et al. in 2009, where the VBHC is defined as the ratio of the healthcare outcomes divided by the costs to achieve those outcomes. However, the VBHC as single figure lies still ambiguous closer to a theoretical framework than useful tool to make decisions. The main challenge lies in the way the Patient- Centred Outcome (PCO) might be combined to produce a single value for the multidimensional numerator of the value equation. This paper aims to

explore the ways to estimate the PCOs' weights in the context of breast cancer to disentangle the figure of the numerator of the value equation, which ultimately allows to reach a VBHC single figure.

A cohort of patients diagnosed with breast cancer (n=690) with a 6-month follow-up were recruited in 2019 across 6-European hospitals. Patient-Reported Outcomes (PROs), Clinical-Related Outcomes (CROs), and clinical and socio-demographic variables were collected. Being the numerator defined as a composite indicator of the PCOs, principal component analysis and regression analysis were applied to estimate their weights and consequently, its single figure.

Regression analysis results were robust to sensitivity analysis. As common pattern, *Pain* turned up as the PCO with the highest weight first followed by p*hysical, emotional functioning* and *ability to work*, and then by a symptom, either *peripheral*, *arm* or *breast symptom*. Some PCOs' weights pattern over time-periods turn up.

To our best of knowledge, this is the first research attempting to quantitatively explore the ways to combine the PCOs of the value equation to reach a single VBHC figure. This research might not only of use for breast cancer, but also for any other medical conditions as a methodological pathway.

The Impact of Health Insurance Information Provision on Willingness-to-Pay for Value-Based Insurance Design: Manipulating Information in a Discrete Choice Experiment

PRESENTER: **Ms. Tess Laura Camille Bardy, MSc**, University of Lucerne

Value-based insurance design (VBID) can shape managed healthcare systems to be centered on value via the promotion of high-value care use and disincentivize use of low-value care. VBID can be implemented by adapting health plan elements such as lowering deductible or copayment levels for specific care that is considered high-value and vice-versa. VBID showed some promising results in curbing healthcare cost growth the United States. However, concerns arise that without appropriate information, not all individuals might understand VBID and display different levels of resistance to change in health plan elements. We elicit individuals' willingness-to-pay (WTP) for hypothetical elements in health insurance plans promoting high-value care and disincentivize the use of low-value one. We employ an experimental design that involves manipulating information received by the participants prior to a discrete choice experiment (DCE) and use WTP to identify the role of information provision about health plan elements in choosing a health plan with VBID elements. Participants were randomly assigned to a control or two treatment information groups. Respondents in the control group did not receive support information. Participants in both treatment groups received identical information about health insurance elements (e.g., definition of a deductible). Additionally, the third treatment group received information about VBID benefits in the managed care healthcare system. Participants took part in an online survey (n=6033) representative of individuals between 26- and 75 years old living in Switzerland. In addition, the survey included sociodemographic questions (e.g., age, gender, income, education, and region of residence) as well as participants' healthcare utilization, health insurance preferences, and health insurance literacy. Preliminary evidence on WTP suggests information provision is associated with a reduction in status quo bias, with participants showing higher WTP for models promoting high-value care. Similarly, information provision increased resistance to low-value care use. These results show that specific information is relevant in health plans decision-making, probably reducing the associated cognitive burden. This is particularly relevant in mass media context where consumers' preferences can be easily manipulated. Further heterogeneity analyses using mixed logit specification, based on posterior WTP estimates, will be run to identify population groups more likely to resist VBID health plans according to the type of information received. According to these results, new tailored communication strategies could be set up to help shape future health policy decisions and ensure consumers make health plan informed-decisions.

8:30 AM –10:00 AM   TUESDAY   [Health Beyond Health Care Services: Health Behaviors]

Cape Town International Convention Centre | CTICC 1 – Room 1.62

Family Planning and Fertility

MODERATOR: **Olatubosun Akinnola Akinola**, Clinton Health Access Initiative

Family Planning and Female Labor Supply: Experimental Evidence from Urban Malawi

PRESENTER: **Mahesh Karra**, Boston University
AUTHORS: Daniel Maggio, David Canning

Significance and Motivation

Although much of the promise of the Demographic Dividend is derived from the potential macroeconomic consequences of demographic transition, there are inherently micro-economic relationships that drive these dynamics. In this study, we estimate the causal effect of improved access to family planning and reproductive health services on outcomes related to women's labor supply, work, and income. We study the impact of a randomized family planning intervention on women's labor force participation, work, and income. We also study the intra-household allocation of labor by studying the effects of the intervention on husbands' labor market outcomes.

Methods

We conduct a two-arm randomized controlled trial that was conducted in Lilongwe, Malawi between November 2016 and February 2019. As part of the trial, 2,143 women who were either pregnant or up to six months postpartum at baseline were recruited in 2016. Following a baseline survey, women were randomized into either an intervention or a control arm. Women who were assigned to the intervention arm received home-based counseling, transport to a high-quality family planning clinic, and free family planning services.

For our analysis, we utilize data on women's labor market outcomes that was collected over three survey waves throughout the intervention period. We estimate the intent-to-treat effects of our intervention on women's work, labor supply, and income.

Key Findings

We find that women who were assigned to the intervention arm were 5.3 percentage points more likely to be employed. This change is driven by a 4.5 percentage point increase in wage-earning labor. As a result, women are more likely to report earning income, although conditional on income earning, women do not necessarily earn more. Our results are much larger among women who were pregnant at baseline, where we also observe an 8.9 percentage point increase in labor force participation, suggesting that the intervention may have allowed women to better transition into the labor market post-pregnancy. When examining women's time use, we observe that women report spending more hours on productive labor, matched by compensatory decreases in time spent on childcare or housework.

Contribution

Our results contribute to a large literature linking women's family planning use, fertility, and labor market outcomes. Much of this evidence to date is based on findings from quasi-experimental studies; we are able to contribute to this literature with experimental evidence from a randomized controlled trial. We also contribute to a growing literature on the long-term impacts of family planning programs. Although our study covers a shorter time frame, our results stand in opposition to recent quasi-experimental evidence that did not find an impact of a long-term family planning program on women's labor market outcomes.

More generally, our findings provide evidence of the Demographic Dividend at the household and individual level and highlight the need for policymakers to consider the broader potential of family planning and reproductive health programs for improving women's labor market outcomes and economic well-being.

Family Planning and Children's Human Capital: Experimental Evidence from Urban Malawi

PRESENTER: **Daniel Maggio**, Cornell University
AUTHORS: Mahesh Karra, David Canning

Significance/Background

Roughly 14 million *unintended pregnancies occur in Sub-Saharan Africa each year. Raising a child is costly, and this high rate of unintended pregnancies may influence how limited household resources are allocated among children, potentially adversely affecting children's growth and development. As such,* improved access to and use of family planning and reproductive health (FP/RH) services, which allow couples to prevent unintended births, have the potential to improve child health and human capital accumulation.

Research Question

We assess the causal impact of improved access to family planning on child health and human capital outcomes using experimental evidence from a randomized controlled trial in urban Malawi. Motivated by economic models of fertility and human capital accumulation that introduce uncertainty into the "quality-quantity" trade-off, we assess the impact of a multi-component family planning intervention on measures of child growth (height) and cognitive development.

Methods

We present evidence from a field experiment conducted in Lilongwe, Malawi between November 2016 and February 2019. 2,143 women, who were either pregnant or postpartum at baseline, were randomly assigned to receive a comprehensive family planning package that included home-based counseling, transport to a high-quality family planning clinic, and free family planning services.

This paper presents the effects of the intervention on child growth and development outcomes among 1,034 children born to participating women directly prior to the intervention rollout. We report intent-to-treat effects of the intervention on children's height-for-age Z-scores and standardized scores from a caregiver-reported measure of cognition. Across survey waves, we observe high rates of non-measurement. As such, we present estimates using Heckman selection models, inverse propensity score weighting, and bounding techniques to estimate the extent to which this non-measurement biases our results.

Key Findings

We find that children born to mothers assigned to the intervention arm were 0.28-0.34 standard deviations taller for their age and were 10.7-12.0 percentage points less likely to be stunted within a year of exposure to the family planning intervention. Children born to mothers assigned to the intervention arm also scored 0.19-0.23 standard deviations higher on a caregiver-reported measure of cognitive development after two years of intervention exposure. Using multiple methods, we show that these results are robust to adjustment for attrition bias except under the most extreme assumptions on bounded estimates.

Knowledge Contribution

Although a growing literature has identified associations between family planning and child health, there is little high-quality evidence on the causal impacts of improved access to these services on downstream health outcomes. We contribute to this literature by providing experimental evidence linking FP/RH services to child health and human capital accumulation. Our results are largely consistent with recent theoretical work linking couples' fertility decisions to decisions about child health and human capital.

Our results also suggest that improved access to family planning may have positive downstream effects on health that extend beyond outcomes related to contraceptive use and fertility. As such, they highlight the need for policymakers to consider the potential benefits of family planning beyond its immediate effects on contraceptive use, fertility, and birth outcomes.

Simulated Power Analyses for Post-Dobbs Fertility Rates Using Pre-Dobbs Fertility Data

PRESENTER: **Daniel Dench**, Georgia Institute of Technology-Main Campus
AUTHOR: Mayra Pineda-Torres

Dobbs v. Jackson Women's Health Organization has restricted access to abortion for women living in states with trigger laws that went into effect immediately following the ruling on June 24th 2022. In the wake of this ruling, abortion counts in states restricting abortion can no longer be used to estimate first-stage effects since most abortions in those states will be considered illegal. Natality data, therefore, becomes the last refuge for abortion research to detect effects on completed fertility. The effect of the restriction of abortion on fertility in an era of increasing access to abortion pills (mifepristone and misoprostol), decreasing cost of travel distances and increasing access to contraception as compared to the Roe era is an open one.

Using the PRE-DOBBS era, we use baseline estimates of expected effect size on fertility to simulate whether we will be powered to detect fertility effects from DOBBS. By imposing effects on the pre-era data, we can estimate what level of fertility increase or decrease will be required to detect statistical effects at conventional power levels in the post-period. We allow the effect size to vary by pre-DOBBS levels of restriction, distance to the nearest out-of-state abortion clinic and pre-DOBBS abortion rates. We use two types of analysis. For a state-level analysis we test the required effect size for a difference-in-difference analysis where each state that imposes restrictions are considered independent from one another. As an alternative, we aggregate all trigger-law states and test what effect size would be required to detect effects in an interrupted time series or comparative interrupted time series model. We discuss the advantages and weaknesses of each approach.

In each approach, we control for PRE-DOBBS era policies such as targeted regulations of abortion provider laws (TRAP), parent consent and notification laws, economic conditions, and initial covid-19 intensity. We also test parallel trends assumptions in the difference-in-difference framework. In each approach, we test effects overall, and by demographic groups of interest. These groups include splits by race, education, marital status, payer group, age, and interactions of these groups.

Improvements in Schooling Opportunities and Teenage Fertility

PRESENTER: **Mayra Pineda-Torres**, Georgia Institute of Technology
AUTHORS: Lucas Nogueira Garcez, Maria Padilla-Romo, Cecilia Peluffo

Teenage pregnancy is a global issue, with 15 percent of women giving birth before the age of 18 globally. Teenage motherhood can change the course of a young woman's life since it has been associated with lower educational attainment, labor force participation, income, a higher probability of relying on public assistance and living in poverty.

Although the relationship between educational attainment and teenage fertility has been a topic of long-standing interest in the social sciences, identifying their causal relationship is difficult because socio-economic factors may drive changes in both. Therefore, researchers have relied on variation in educational attainment induced by compulsory schooling laws, individuals' birth dates, construction of new schools, and scholarships or cash transfer programs conditional on attendance. However, some of these studies find weak impacts on enrollment because the treatment effects are local to students who would drop school, the treatment may be endogenous, or the setting lacks external validity.

In this study, we present evidence of the causal relationship between educational attainment and teenage pregnancy by focusing on a set of large-scale, country-wide, exogenous shocks to public high-schools capacity. In 2012, high school was included in the Mexican Constitution as one of the compulsory levels of education. For students to comply with this law, the Federal, state, and local governments committed to providing students with the necessary school availability by eliminating existing capacity constraints in public high schools through the opening of new schools and improvements and expansions of the existing schools. To incentive students to stay in school and improve high school access and coverage, the governments also implemented other strategies, such as scholarship programs to retain students in high school until completion. Changes to high school availability can change teenagers' education and career expectations. With a different perspective about the future, they may adjust their sexual behavior and fertility decisions to prevent or delay an early pregnancy.

Using administrative data on enrollment and event-study and difference-in-differences (DiD) frameworks that exploit variation across municipalities and over time, we observe that the number of schools and students increased by 82 percent and 6 percent, respectively, in municipalities with high-intensity exposure to the Reforms to High School Education (RHSE) relative to low-exposure municipalities.

We next explore the impacts of the high school reforms on teen fertility. Using administrative data on births recorded in Mexico and event-study and DiD frameworks that exploit variation in the timing of the RHSE, maternal age group, and the municipality's intensity of exposure to the RHSE, we find that births to 15-19-year-old women relative to births to 20-24-year-old women across high vs. low-intensity municipalities decreased by 2.5 to 5 percent after the implementation of the RHSE. These findings are confirmed with counterfactual analyses based on a Bayesian Structural Time Series Method.

8:30 AM –10:00 AM   TUESDAY   [Supply And Regulation Of Health Care Services And Products]

Cape Town International Convention Centre | CTICC 1 – Room 2.46

Pharmaceutical Prescribing and Access

MODERATOR: **Habib Farooqui**, Qatar University

Opioid and Non-Opioid Pain Prescribing in People Living with and without Dementia in the United States

PRESENTER: **Ulrike Muench**, University of California San Francisco
AUTHORS: Kyung Mi Kim, Zachery Zimmer, Todd Monroe

Background:

Managing pain in people living with dementia (PWD) is challenging. Prior research suggests that pain prevalence is high, and that pain is underrecognized and undertreated in PWD. Clinicians, especially primary care clinicians, do not feel they have the skill to adequately assess and manage pain in this population. The aim of this study was to examine whether pain medication management using opioids and non-opioids differs for PWD versus people without dementia who experience pain in a nationally representative sample of adults 55 years or older who reside at home in the United States. We hypothesized the PWD received less pain medication than people without dementia.

Methods:

We used the Medical Expenditure Panel Survey (MEPS) years 2002 to 2017, a nationally representative household survey of the noninstitutionalized population in the U.S. We identified Alzheimer's Disease and Related Dementias (ADRD) with ICD 9/10 codes and we used the question "Did you experience pain during the past 4 weeks" to identify whether individuals experienced chronic pain. Clinically, chronic pain is defined as pain lasting >6 months, and we used data from two rounds of the MDS to measure chronic pain. We analyzed four prescribing measures: any opioid, any non-opioid pain medication, the number of opioids, and the number of non-opioid pain medications. Our predictor of interest was ADRD versus no-ADRD. Covariates included: age, gender race/ethnicity, marital status, education, inflation-adjusted log-transformed income, urban/rural status, type of insurance, Elixhauser comorbidity index, depression, region, and survey year. We conducted multivariate logistic regression to estimate unadjusted and adjusted odds ratios (ORs) of any opioid and non-opioid and we analyzed the number of medications using a negative binomial regression. As a robustness analysis we also estimated propensity score models, using inverse probability weighing. Results are reported in predicted probabilities with covariates at their means.

Results:

We identified 22,583 people of the age 55 years or older who experienced chronic pain, with 6.4% living with a ADRD diagnosis. In covariate-adjusted logistic regressions, PWD were 6 percentage points more likely to receive an opioid and 9 percentage points more likely to receive a non-opioid analgesic. For the count of medications, PWD had a predicted opioid count of 1.09 medications versus 0.69 for people without dementia, and 1.99 non-opioid analgesics versus 1.08 non-opioids for people without dementia. Results for the propensity score adjustment analysis revealed quantitatively similar results.

Discussion/Implications:

In contrast to prior research mostly documenting undertreatment of pain for PWD, our results found that PWD who experience pain were more likely to receive any pain medications and a greater quantity of analgesics, including both opioids and non-opioids. This raises the question if clinician might be overprescribing analgesics, especially opioids in this population, potentially using opioids to treat behavioral health symptoms. Given that clinicians do not feel equipped to treat pain adequately in PWD nor to manage the complex behavioral symptoms of dementia, developing pain management guidelines for PWD seems warranted.

Pharmaceutical Availability and Access: How Does the U.S. Compare to Other High-Income Countries?

PRESENTER: **Irene Papanicolas**, Brown School of Public Health
AUTHORS: Olivier J Wouters, Huseyin Naci

The United States (US) spends more on medicines, per person, than any other country. Yet US patients are also more likely to report that they cannot afford their medications than patients in comparably wealthy countries. Despite pressure for policymakers to address high drug prices in the US, there is little consensus about what the appropriate policy actions are. A key concern is that price regulation could restrict or delay access to new therapies for US consumers.

To better understand the basis for these concerns, we examine the performance of the US pharmaceutical sector to those in 7 other high-income countries (Australia, Canada, England, France, Germany, Japan, and Switzerland) in terms of the availability and pricing of new pharmaceutical products. For the cohort of drugs approved by the US FDA from 2014 through 2018, we extracted data from national regulatory documents, IQVIA MIDAS and IQVIA ARK Patent Intelligence to examine: (1) what proportion of FDA-approved drugs were authorized in other countries by 2022, (2) how long it took for these medicines to be authorized in each country, (3) what prices other countries paid for these drugs, and (4) the estimated duration of market exclusivity for each product.

The US FDA approved 213 drugs from 2014 to 2018. There was substantial variation in the proportion of these drugs authorized in the other countries. England, France and Germany authorized the highest share (n=163, 75%), and Japan the lowest (n=68, 32%). All countries approved some drugs prior to the US FDA, although this accounted for a small percentage of the total (up to 16% of the cohort, depending on the country). The median time from US FDA approval until a drug became available in the peer countries ranged from approximately 6 months to just over 1 year. The median duration of regulatory and health technology assessment reviews ranged from 91 days in Germany to 328 days in England. Countries which conducted health technology assessment reviews differed in the number of drugs they recommended for coverage, with Australia and England giving positive recommendations for the fewest drugs (86 and 89, respectively). In all years, drug prices were consistently higher in the US than in the other countries; drugs also generally had longer periods of exclusivity in the US than elsewhere. Drugs with little therapeutic benefit were less likely to be made available in the peer countries than in the US

This study revealed that while more drugs were made available to US consumers faster, these drugs also cost much more than in other rich countries. However, this may come at the expense of covering more drugs with lower value

Medicine Shortages during Demand and Supply Shocks – a Regression Discontinuity Approach

PRESENTER: **Eva Goetjes**, Hertie School Berlin
AUTHORS: Jan Panhuysen, Mujaheed Shaikh, Katharina Blankart

The COVID-19 pandemic has laid bare the multidimensional nature of medicine shortages leading to unexpected changes in both, demand and supply of medicines. We investigate the impact of the global unexpected shock in medical supply during the COVID-19 pandemic on the incidence and prevalence of medicine shortages in Germany. We examine the role of global and local factors, like dependency on global production sites or if competition exacerbate or mitigate medicine shortages.

We combine the German national medicine shortage repository with pharmaceutical reference data for medicine characteristic and weigh our data by market volume using health insurance claims data. We consider 2,365 prescription-only active ingredients with marketing authorization in Germany between 2018 and 2021. Using European catalogues that document location of certified production sites and approval data of biopharmaceuticals from industry reports, we calculate a global dependency of 758 active ingredients weighing the number of producers by distance to the production site. Using a regression discontinuity in time design, we quantify the effect of a worldwide unexpected shock caused by the COVID-19 pandemic on medicine shortages, considering February 2020 as a starting point when global supply chains were interrupted.

Across the observation period, shortages were reported for 336 active ingredients, of which 58.3% are classified as essential medicines in Germany. We utilize the share of volume of the active ingredient that is short in a month as our primary outcome. We find a discontinuity in short volume at the cut-off February 2020. At times of a worldwide shock, the percentage of market volume of an active ingredient that is short rises by 0.7 percentage points (p-value < 0.001). This accounts for more than two thirds of the mean volume that is short. For active ingredients with a high global dependency, the short volume increases by 1.7 percentage points (p-value < 0.001), for active ingredients with a high dependency on one or few producers we find a 0.9 percentage point increase in volume shortfall.

Global shocks on health systems and supply chains increase the shortfall in volume due to shortages especially for active ingredients with a high dependency on global production sites or few producers.

Determinants of Antibiotic Overprescribing Amongst Public and Private General Practitioners: Experimental Evidence from a Patient Audit Study in Tunisia

PRESENTER: **Rym Ghouma**, London School of Hygiene and Tropical Medicine
AUTHORS: Timothy Powell-Jackson, Mylene Lagarde

Background: Unnecessary use of antibiotics is a global problem. Not only does it represent an economic waste, it also generates negative externalities in the form of antimicrobial resistance. LMICs are particularly vulnerable to this problem, as limited regulation and oversight may increase overuse of antibiotics, and fragile health systems will struggle to cope with the effects of antibiotic resistance. In these settings, considerable attention has been focused on the role of patients' demand, while few studies have looked at the role of providers in over-prescribing of antibiotics. This is partly explained by the empirical challenge to disentangle the behaviour of providers from the effects of their environment as well as the attitudes and requests of their patients. In this study, we address some of these gaps in the context of primary healthcare in Tunisia, a country which has one of the highest rates of antibiotic use in the world. Specifically, this study aims to measure the extent to which Tunisian doctors prescribe unnecessary antibiotics for upper-respiratory tract infections and explore its determinants.

Methods: We conducted a patient audit study of 131 public and private doctors in the Grand Tunis region. Working with local experts, we developed a detailed script of a (fake) standardised patient (SP) presenting symptoms of acute viral bronchitis for which antibiotics are not required. We introduced experimental variation in the script to generate three cases: the SP explicitly asked to be prescribed an antibiotic

("request"); the SP expressed knowledge that antibiotics were not appropriate to treat them ("informed"); and the SP portrayed the case without asking for any specific treatment ("control"). Each doctor received three SP visits, with cases randomly allocated across fieldworkers and visit order to minimise confounding due to fieldworker characteristics or consultation sequencing. After each interaction, we recorded prescribing practices, other aspects of quality of care, and prices charged. This information was combined with data on doctor competence from clinical vignettes conducted several months earlier.

Results: Antibiotic prescription rates were strikingly high. Two-thirds of doctors (inappropriately) prescribed an antibiotic in the control group. More than one-fifth of doctors prescribed an antibiotic listed as a high priority for antimicrobial stewardship by WHO, with prescribing behaviour significantly worse in the private sector. Of the amount spent by SPs in the control group on drugs, 71% could be categorised as wasteful. There was limited evidence that provider behaviour was influenced by SPs requesting antibiotics or expressing knowledge of inappropriate prescribing. Subgroup analyses showed that providers with incorrect knowledge of appropriate prescribing practices were more likely to prescribe antibiotics to informed SPs, suggesting that they may have perceived the patient's attitude as an afront to their medical expertise and doubled-down on their (incorrect) beliefs.

Interpretation: We find high levels of antibiotic overprescribing in urban Tunisia. Our findings contradict the widely held notion that, in Tunisia, doctors are only prescribing unnecessary antibiotics because patients ask or expect them to. Instead, this study highlights that doctors play a crucial role in driving overuse of antibiotics in this setting.

8:30 AM –10:00 AM   TUESDAY   [Health System Performance]

Cape Town International Convention Centre | CTICC 2 – Protea
Addressing Fragmentation to Improve Efficiency Using a System-Wide Approach

MODERATOR: **Agnes Gatome-Munyua**, Results for Development

ORGANIZER: **Susan Powers Sparkes**, World Health Organization

DISCUSSANT: **Ogo Chukwujekwu**, World Health Organization; **Christabel Abewe**, World Health Organization

Death Spiral of Fragmentation: Reversing the Trends in Cameroon's Public Health Programs
PRESENTER: **Isidore Sieleunou**, Results for Development

Background: Cameroon is a lower-middle income country undergoing an epidemiological transition. Communicable, maternal, neonatal and nutritional diseases are prevalent and account for three fifths of all deaths and disabilities. At the same time, rising urbanization and increasingly unhealthy lifestyles have significantly increased the number of deaths due to non-communicable diseases between 1990 (29 percent) and 2017 (36 percent), resulting in a dual burden of disease, taxing an already fragile health system. As a lower-middle income country, Cameroon is also faced with a transition, and expected reduction of donor resources that fund critical health programs including performance-based financing (PBF), maternal voucher program and policies of free prevention and management of priority health problems.

As the government takes on more responsibilities and financing of these programmes and continue progress on their journey to universal health coverage (UHC), Cameroon will implement a cross-programmatic efficiency analysis (CPEA) in 2023. This analysis will be embedded in the countries transition and sustainability strategies at national level. The fragmentation of health financing is well recognized as the main bottleneck to progress towards UHC in Cameroon and will remain a key issue for the CPEA in Cameroon. A policy dialogue will be used to engage key stakeholders in the specific areas of fragmentation within the context of broader health financing reform and UHC.

Methods: Data collection for this analysis will include qualitative techniques such as key informant interviews and meetings with relevant stakeholders using the structured CPEA interview guide and workshops. Qualitative data collection will be supplemented with quantitative data collected for financial budget and expenditures, inputs (facilities, health workers, medicines, etc.), health services, outputs, and outcomes using nationally available data. Data will be collected at the national level. Using the CPEA approach and policy analysis frameworks, data will be analysed to identify the major cross-programmatic inefficiencies and assess through a policy dialogue, the policy options feasible to address identified cross-programmatic inefficiencies.

Findings: At this session we shall share the key findings from the study. The CPEA approach will aim to identify the cross-programmatic inefficiencies and policy options to be taken forward by stakeholders. As in other African countries – Ghana, Kenya, Nigeria, Tanzania and Uganda, defragmenting the country's health financing mechanisms is likely to emerge as a key issue for action. Among possible reforms suggested by the international literature to defragment health financing mechanisms, Cameroon has experimented with cross-subsidization and/or harmonization between health financing mechanisms -- Performance based Financing , maternal health voucher, policies of free prevention and management of priority health problems.

Conclusion: Cameroon may choose to build on these efforts to significantly reduce and/or eliminate the fragmentation of health financing mechanisms for better allocative efficiency and equity of health expenditures to progress towards UHC. This can be done by merging and integrating existing health financing mechanisms in the upcoming UHC pilot. Finally, Cameroon should move to systematic compulsory coverage of the entire population through a UHC framework that guides actions to make UHC a reality for all.

Analyzing Efficiency across Health Programmes in the National Health Service in Mozambique: Identifying Fragmentation, Misalignment and Loss of Opportunities

PRESENTER: **Georgina Bonet Arroyo**, World Health Organization

Background: Progressively, over the years, the National Health Service (NHS) in Mozambique has made significant efforts to increase coverage of essential healthcare to its population, and key services based on population health needs, have been included into the package. Meanwhile, the country has seen a rapid population increase and an increased burden of non-communicable diseases, which have been coupled with the constant health emergencies. These changes have put significant strain on the provision of health care through the NHS. There is a need to rethink how health systems are financed and organized for the provision of priority services.

Through the recommendation of the Health Coordinating Council between MoH and its partners, a cross-programmatic efficiency analysis was proposed as specific input into the Health Sector Financing Strategy in Mozambique. The overall objectives of this strategy are to increase fiscal space for health, improve efficiency gains, and improve the quality of interventions.

This health systems analysis aimed to identify and analyse critical areas of function overlap, misalignment, or loss of contact opportunities across the country's HIV, TB, Malaria, Maternal, Neonatal, and Child Health programmes.

Methods: Data collection for this analysis uses qualitative data gathered from key informant interviews and meetings with relevant stakeholders through the use of a semi-structured interview guide. Complimentary quantitative data will be collected for financial budget and expenditures, inputs (facilities, health workers, medicines, etc.), health services, outputs, and outcomes using nationally available data as well as from SHA11 National Health Accounts via the Global Health Expenditure Database. Data will be collected at the national and sub-national level wherever possible. Data collected is first organized by health system function (financing, service delivery, governance/stewardship, and generation of human and physical resources/inputs) across the selected health programmes. An across function analysis will then be conducted to identify specific areas inefficiency that constrain the achievement and sustainability of objectives.

Findings: During the session, we will share the key cross-programmatic inefficiencies identified from the study conducted, as data collection is currently underway. Based on findings from similar countries, fragmented financial flows constraining service delivery alignment might be a potential identified inefficiency through this analysis, among others.

Conclusion: The findings from this analysis will help to inform the Health Sector Financing Strategy, through a consultative and validation process once the study has concluded.

From Problems to Solutions through a Learning Process: A Framework to Address Cross-Programmatic Inefficiencies in Nigerian Health Sector

PRESENTER: **Obinna Onwujekwe**, University of Nigeria

Background: Nigeria is a country with a deep history of devolved governance. The federal, state, and local levels of government share a range of authorities and responsibilities, especially as it relates to the health system. However, this structure has made health sector responsibilities both fragmented and overlapping across the different tiers of government. This has created many issues that can contribute to inefficiencies when it comes to coordination across the different levels as it relates to health governance and service provision. These realities are compounded by the fact that largely donor funded priority health programs in the country have been set up to operate largely autonomously from one another in seeking to optimize the achievement of a specific objective.

The initial phase of cross-programmatic efficiency analysis in Nigeria identified several important findings that were shared across three states from their 2018/2019 studies. These analyses were embedded within state-level health financing strategies and related policy dialog. The related policy dialog highlighted the specific areas of fragmentation by health programme within the context of broader health financing reform. However, concrete progress has been slow to take hold. As Nigeria enters into a new phase of broader health system reform, along with renewed discussions around donor transition and funding declines, there is a need to revisit and revitalize the discussions around cross-programmatic inefficiencies.

The work programme on CPEA has shown that addressing identified inefficiencies is a protracted process that requires continual dialog and efforts to identify windows of opportunity to make progress. Following a June 2022 workshop, there is renewed demand to revisit the state-level CPEA findings and re-establish policy dialog processes in Nigeria. This effort focused on mechanisms and opportunities to address cross-programmatic inefficiencies requires on-the-ground expertise that can adapt the findings based on the current context and reform priorities.

Methods: Data collection for this analysis comes from qualitative data gathered from key informant interviews and meetings with relevant stakeholders. Complimentary quantitative data will be collected on financial budget and expenditures using nationally available data. Data will be collected at the sub-national (State) and, where possible, at the federal level. Using root cause analysis and policy analysis frameworks, data will be analysed to assess what mechanisms are feasible to address identified cross-programmatic inefficiencies.

Findings: Results from early analysis show the following identified inefficiencies for further research:

- Poor coordination (duplication/misalignment) across MoH and other agencies, such as segmented finance/planning arrangements
- Fragmented/limited financial/responsibility units with multiple supervision lines

- Misalignment between frontline needs and centralized fund management
- Multiple, misaligned/duplicative funding streams

Fragmented/parallel information and reporting systems (suboptimal monitoring and evaluation (M&E).

Synthesis of Findings from Cross-Programmatic Efficiency Analyses

PRESENTER: **Susan Powers Sparkes**, World Health Organization

Background: Many health systems rely on health programmes to target health interventions for specific diseases or populations. These programmes tend to operate largely autonomously from one another in seeking to optimize the achievement of a specific objective. This organizational approach can constrain efficiency and the evolution of the health system in its ability to adapt to changing morbidity patterns, technological advances, among other issues. Through its application in 14 countries to date, analysis and data-informed dialogue has been built across programme- and system-components around specific areas for improved integration and coordination to improve efficiency and enable outcomes.

While each country context is different, key themes and trends have emerged across the countries analysed. This undue fragmentation across health programmes in all countries constrain progress towards universal health coverage. What has also become clear is that coordination is critical both across levels of the health system as well as across programmes and other sectors.

Methods: To identify specific areas of duplication, overlap or misalignment a series of case studies were developed that uses in-depth health system functional mapping. This work uses a mixture of qualitative and quantitative methods that are anchored in the analysis of health system functions (financing, service delivery, governance/stewardship, and generation of human and physical resources/inputs) across a set of health programmes within each of 14 countries. Once the within programme system mapping is completed, a functional analysis is conducted to identify specific areas inefficiency that constrain the achievement and sustainability of objectives. Comparative analysis based on the common methodology applied in each country is then used to develop key cross-cutting findings.

Findings: Results show that four key areas of cross-cutting inefficiency have been identified:

- Uncoordinated planning and budgeting processes
- Fragmented inputs (information systems, laboratories, health workers, facilities)
- Misaligned financing mechanisms with service delivery objectives
- De-linked programmatic objectives and priorities from overall health sector reforms

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8:30 AM –10:00 AM   TUESDAY   [Health Care Financing & Expenditures]

Cape Town International Convention Centre | CTICC 2 – Orchid

Covering Chronic Illness: How to Finance Non-Communicable Disease?

MODERATOR: **Paul Revill**, University of York

The Role of Universal Health Coverage in Secondary Prevention: A Case Study of Ghana's National Health Insurance and Early-Onset Hypertension.

PRESENTER: **Samuel Owusu Achiaw**, University of Glasgow
AUTHORS: Claudia Geue, Eleanor Grieve

Background: Launched in 2003, Ghana's National Health Insurance Scheme (NHIS) was a move towards Universal Health Coverage, equitable healthcare access and outcomes. Only few studies have since investigated the effect of the scheme on health outcomes with a dearth of studies focusing on non-communicable diseases (NCDs) like hypertension. While a major cause of mortality and morbidity, most NCDs, particularly in the early stages, remain undiagnosed in Ghana. Secondary prevention comprising early detection and prompt treatment of NCDs is important in preventing severe complications and consequently reducing mortality and morbidity. In Ghana, however, patients with early signs of NCDs may often avoid seeking health care due to financial barriers. This study aimed to assess the effect of NHIS enrolment on the likelihood of having early-onset hypertension detected and further effects on treatment after diagnosis.

Methods: A cross-sectional analysis of the 2014 Ghana Demographic and Health Survey (male dataset) was conducted. The unadjusted analysis involved binary logistic regression with NHIS enrolment as the independent variable and detection of early-onset hypertension as the dependent variable. Early-onset hypertension was defined as the onset of hypertension at 55 years or younger and was diagnosed based on multiple blood pressure measurements taken during the survey. Covariates used for the adjusted regression models were age, BMI, smoking status, place of residence, wealth and education level. The association between enrolment and treatment status, as well as blood pressure control among those who had been diagnosed, was also assessed.

Results: Unadjusted and adjusted results showed that the odds of early-onset hypertension being detected in those enroled in the NHIS were respectively 2.1 times (95% CI: 1.38-3.32, p=0.001) and 1.9 times (95% CI 1.25-3.00, p=0.003) that of their unenroled counterparts. The adjusted results showed that of all covariates, educational level, particularly tertiary education was a significant predictor for the detection of

early-onset hypertension. There was however no significant association between NHIS enrolment and treatment status and blood pressure control once early-onset hypertension had been diagnosed.

Conclusion: This study suggests that NHIS enrolment may play a beneficial role in the secondary prevention of NCDs and may be worth considering as a possible secondary prevention strategy in the country. Further research is nevertheless needed to understand how enrolment, NCDs, and other contextual factors are interrelated to enable efficient employment of the scheme in secondary prevention.

Estimating the Economic Impact of Musculoskeletal Disorders in Tanzania: Results from a Community-Based Survey

PRESENTER: **Manuela Deidda**, University of Glasgow
AUTHORS: Ping-Hsuan Hsieh, Eleanor Grieve, Stefanie Krauth, Jo Halliday, Nateiya Yongolo, Sanjura Biswaro, Blandina Mmbaga, Kiula Peter Kiula, Rose Monica Ongara, Elizabeth Msoka, Emma McIntosh

Background

Musculoskeletal (MSK) disorders are a leading cause of disability globally, causing significant clinical and quality of life impacts, absence from work, reduced productivity and substantial personal medical costs. The aim of this study was to identify, measure and value the economic burden of MSK disorders in the Kilimanjaro region, Tanzania.

Methods

A community-based cross-sectional survey was undertaken between January and September 2021 using two-stage cluster sampling to select a representative sample of all Hai district residents. Clinical screening tools were used to identify and measure MSK disorders through a tiered approach. An economic questionnaire measuring healthcare costs, out-of-pocket costs, absenteeism, presenteeism and work productivity loss was administered to those with likely MSK disorders, and selected controls (individuals without MSK disorders, matched on age and gender). Resource use was valued using country-specific costs. Two-part model regressions were fitted. A descriptive analysis of catastrophic expenditure was also conducted.

Results

Annual average productivity and healthcare costs were, respectively, 3·5 and 2·5 times higher for those with likely MSK disorders than controls (productivity costs: Int$ 509 vs. Int$, 151 p-value<0.01; healthcare costs: Int$437 vs. Int $ 177, p-value<0.05). The difference in terms of out-of-pocket expenses was economically substantial in magnitude (Int$483 vs. 343), although not statistically significant.

Conclusion

The evidence will be used to inform policies addressing MSK disorders, by promoting the design of interventions, service provision, health promotion and awareness activities at local, regional and national level.

Delay in Diabetes Diagnosis Based on Glucose Control Levels: Impact on Direct Halthcare Costs

PRESENTER: **Toni Mora**, Universitat Internacional de Catalunya
AUTHOR: Beatriz Rodríguez-Sánchez

Background: The number of adults with diabetes has substantially increased, with 425 million people living with the condition worldwide and this figure projected to reach 629 million individuals by the year 2045. This substantial increase in the number of people suffering from diabetes can largely be attributed to the effects of adverse lifestyles, population growth and ageing, and the joint effects of these factors. This increase in diabetes prevalence will be accompanied by an increase in diabetes-related care costs, which is projected to reach 2.2% of global Gross Domestic Product (GDP). More than one third of diabetes-related care might be due to the management of clinical complications, mainly cardiovascular diseases. The risk for developing cardiovascular complications is, amongst other factors, associated with the degree of long-term glycaemic control, leading to the hypothesis that worse glycaemic control might be associated with increased care costs.

Aim: to estimate the difference in healthcare costs between individuals with ever diagnosed diabetes and whose blood glucose level is above or below the reference value of 6.5%, considering different time spans and subgroups.

Methods and data: Data on 285,450, during 2013-2017, coming from a large administrative dataset from The Agency for Health Quality and Assessment of Catalonia were used. Costs referred to primary care, hospitalizations, emergency care and drugs. A regression discontinuity design was applied to estimate the causal effect of having a poorly (equal or above 6.5% as the average glucose value, the treatment group) or well-controlled (below the threshold, the controls) diabetes on healthcare costs across different timespans (6, 9, 12, 15, 18, 21, and 24 months after the first laboratory test) and distances, in days, between the laboratory test and the doctor's diagnosis.

Results: When average glucose level was the only independent parameter and the time until diagnosis was 30 days or less, the difference in healthcare costs at the cut-off value (6.5%) between the treated and the control groups ranged between -3,887€ and -5,789€. Smaller differences were reported as the delay in diagnosis increased, even when additionally controlling for sociodemographic characteristics and health status.

Conclusions: The results point towards a mediation effect of diabetes-related chronic diseases might on the association between glucose control and healthcare costs, although different glucose control targets might be settled depending on individual´s characteristics. Our results point towards the importance of prompt diagnosis and might open the debate about the usefulness of the reference value in the blood glucose level.

Evaluating the Effectiveness of the National Health Insurance Fund in Providing Financial Risk Protection to Households with Hypertension and Diabetes Patients in Kenya

PRESENTER: **Robinson Oyando Omondi**, KEMRI-Wellcome Trust Research Programme

AUTHORS: Vincent Omondi Were, Hillary Kimutai Koros, Richard Mugo, Jemima Kamano, Anthony Etyang, Adrianna Murphy, Kara Hanson, Pablo Perel, Edwine Barasa

Background: The rising burden of non-communicable diseases (NCDs) presents a huge economic burden to households due to high out-of-pocket payments (OOP) that lead to catastrophic health expenditures (CHE). We assessed the effectiveness of the national health insurance fund (NHIF) national scheme to provide financial protection to households with NCD patients in Kenya.

Methods: We employed a one-year cohort study design to collect health expenditures, household expenditures and health-seeking behaviour data quarterly from 888 households, in which at least one member had hypertension and/or diabetes, in two counties in Western Kenya. Households were classified by NHIF enrolment status. Two outcome measures were assessed: 1) OOP as a share of total household expenditure and 2) the incidence of CHE. CHE was defined as annual healthcare expenditure exceeding 40% of annual household non-food expenditure. We assessed the depth of NHIF cover (i.e., the proportion of healthcare costs paid by NHIF) for outpatient and inpatient services as well as the NHIF attrition rate after one year. We used the coarsened exact matching approach to assess the difference in experiencing CHE between NHIF-enrolled households and those not enrolled. After matching we used a conditional logistic regression model to analyse the odds of CHE among enrolled and unenrolled households. Socioeconomic inequality in incurring CHE was examined using concentration curves and concentration indices.

Results: Almost half (46.3%) of households reported active NHIF enrolment at baseline but this reduced to 9.3% after one year. On average, 50.9% and 45.9% of households sought outpatient and inpatient care, respectively, from public hospitals during the study period. A higher share of households with no NHIF coverage (19.6%) incurred CHE compared to households with active NHIF coverage (14.3%) ($p = 0.283$). A similar trend was observed across the wealth quintiles, with 35.8% of the poorest households incurring CHE compared to the richest households (10%) ($p < 0.001$). The concentration curve and concentration index (CI) for CHE showed a significant pro-poor distribution (CI: -0.190, $p < 0.001$). The depth of NHIF cover among households with active NHIF coverage was more than double (31.8%) for inpatient compared to outpatient costs (13%). Also, NHIF covered 29.6% of total healthcare costs among households with active NHIF. However, the NHIF attrition rate during the one-year follow-up was 76.7%. After matching, households that were enrolled in NHIF across the four waves were less likely to incur CHE, but the difference was not statistically significant (OR = 0.67; $p = 0.47$).

Conclusion: Households with hypertension and/or diabetes patients and are enrolled in NHIF national scheme incur lower OOP compared to households without NHIF. However, the NHIF scheme's depth of cover is inadequate for outpatient and inpatient costs. Consequently, we did not find strong evidence that NHIF protects these households from CHE. NHIF should review its benefits package and provider payment rates to enhance the depth of cover and provide financial protection to households with NCDs. National and county governments should consider providing insurance subsidies for informal sector NHIF members given that the current voluntary contributions lead to high attrition.

8:30 AM –10:00 AM   TUESDAY   [Cross-Cutting Themes And Other Issues]

Cape Town International Convention Centre | CTICC 1 – Room 2.61-2.62
The Use and Importance of Qualitative Research Methods in Health Economics

MODERATOR: **Kenneth Roger Katumba**, MRC/UVRI & LSHTM Uganda Research Unit

DISCUSSANT: **Giulia Greco**, London School of Hygiene and Tropical Medicine

Understanding the Structural Factors That Influence Female Sex Work in Kampala

PRESENTER: **Kenneth Roger Katumba**, MRC/UVRI & LSHTM Uganda Research Unit

AUTHORS: Mercy Haumba, Yunia Mayanja, Mitzy Gafos, Eugene Ruzagira, Gabriela Gomez, Matthew Quaife, Janet Seeley, Dr. Giulia Greco, PhD

Background: Structural factors can present barriers for uptake of and adherence to existing HIV prevention products like oral PrEP among people at high risk of HIV infection, including female sex workers (FSWs). To fully understand the structural factors in which FSWs in Kampala operate and how they interact with interpersonal and personal factors to influence HIV transmission, it is important to understand whether these women in Kampala are homogenous or have any important heterogeneity with respect to HIV risk behaviour.

Aim: To investigate the existence of women using online platforms for sex work, and to document the full range of structural factors that FSWs in Kampala operate in.

Methods: We collected qualitative data using semi-structured interviews. Ten women were sampled randomly from a cohort of women attending a research clinic and operating in bars, lodges and on the streets. Ten others were sampled from a combination of social media and snowballing, with the initial contact being the social media contact and nine others being peer referrals. Topics included reasons for joining or leaving sex work, work locations, type of relationships with clients and peers, interaction with authorities, impact of criminalisation, and perceived or experienced stigma. Interviews were transcribed verbatim and translated into English for data in Luganda. Data in English were transcribed verbatim. Data were analysed using the framework analysis approach.

Results:

Of the 20 women included, 12 used online platforms to advertise and meet clients, 9 (75%) from the snowball sample and 3(25%) were from the cohort sample. The structural factors in which the women operate were related to the organisation of the sex workers, why and how women joined sex work, the relationships that the women had with society, the stigma that the women experienced, and the effects of regulations and laws affecting sex work. Regardless of where they got their clients, all women that sell sex in Kampala operated under high-risk environments. Women that met their clients using online platforms faced additional threats of cybersecurity attacks, blackmail from clients, and high levels of violence from clients.

Conclusion and implications for policy: Women who sell sex that advertise and meet clients using online platforms exist in Kampala. They face similar challenges and risks to women that meet clients in venues and streets, but also face specific challenges and risks by meeting their clients using online platforms. Regardless of where they meet their clients, all women selling sex in Kampala operate in high-risk environments. Interventions targeting women who sell sex should consider these differences in challenges and risks in order to reach all women selling sex in Kampala.

Understanding the Economic Burden on Households of Neglected Tropical Diseases of the Skin: Qualitative Findings from Ghana and Ethiopia

PRESENTER: **Yohannes Hailemicheal**, Armauer Hansen Research Institute

Introduction: Neglected tropical diseases of the skin (skin NTDs) including leprosy, yaws, cutaneous leishmaniasis, onchocerciasis, Buruli ulcer, and lymphatic filariasis, pose a substantial health and economic burden in many African countries. These diseases are associated with substantial physical disability, psychological distress, social exclusion, and financial hardship.

Aim: To understand the economic burden of skin NTDs on patients and their households in Ghana and Ethiopia, including the coping strategies adopted by patients and households with these diseases, in order to inform intervention development and evaluation design.

Methods: The study was conducted in Ghana and Ethiopia as part of multidisciplinary formative research to inform the development of integrated, complex interventions appropriate to the local contexts and evaluation of that strategy. In both countries, qualitative data were collected on economic burden on affected individuals and their households, stigma experiences, and disease discourses. In-depth interviews (n=98) with affected individuals, caregivers, and health workers; focus group discussions (n=27) with community members; and key informant interviews (n=21) with opinion leaders, traditional healers and policy actors were conducted. Data were coded using MAXQDA 2020 software and thematic framework analysis was used.

Results: Individuals with skin NTDs suffer substantial economic burden due to financial and opportunity costs associated with care seeking. These costs delay care seeking and when care is eventually sought, adherence to treatment is limited due to the cost of treatment. The major cost drivers across countries include transportations to the health facility, cost of medicines, and wound dressing supplies. However, in Ethiopia, the other cost drivers were costs of accommodation , food, hospital bed and investigations. These costs influenced treatment choices with some patients preferring traditional healers who were affordable, accessible and offered flexible payment options. Both patients and caregivers reported a reduction in economic and school-related activities such as opportunity cost including days lost to work, reduced working hours, lateness to school, absenteeism and withdrawal from school entirely because of their conditions.
In both countries, several coping strategies including dis-saving, asset selling, consumption reduction, contracting out land to be farmed, borrowing, family and community support, and health insurance were used by the patient and family members to mitigate the financial costs of illness and production losses.

Conclusions: These diseases affect marginalized populations and communities with inadequate availability of treatment services at peripheral health facilities. In both countries, interventions to bring care for skin NTDs closer to communities – thereby reducing both financial costs of travel and opportunity costs of care – would have the most potential to mitigate the substantial economic and physical and mental health impacts of the skin NTDs. Evaluation of relevant complex intervention strategies will need to consider affected individuals' circuitous care-seeking journeys

Using Qualitative Free-Text Data to Investigate the Lived Xxperience of the COVID-19 Pandemic for a Large Cohort of Australians with Different Multiple Sclerosis Related Disability Levels

PRESENTER: **Julie Campbell**, University of Tasmania

Background: No large-scale qualitative studies have investigated the lived experience of people living with multiple sclerosis (PwMS) during the pandemic according to their disability level. We used qualitative research methods to investigate the lived experience of a large

cohort of Australians living with differing MS-related disability levels during the COVID-19 pandemic. We also provided useful contextualisation to existing quantitative work.

Methods: A quality-of-life study was conducted within the Australian MS Longitudinal Study (AMSLS) during the pandemic. Disability severity was calculated using the Patient Determined Disease Steps. Free-text data regarding COVID-19 impacts was collected/analysed for word frequency and thematically (inductively/deductively using sophisticated grounded theory) with NVivo software.

Results: N=509 PwMS participated with n=22,530 words of COVID-19-specific data. Disability severity could be calculated for n=501 PwMS. The word 'working' was important for PwMS with no disability, and 'support' and 'isolation' for higher disability levels. For PwMS with milder disability, thematic analysis established that multitasking increased stress levels, particularly if working from home (WFH) and home-schooling children. If not multitasking, WFH was beneficial for managing fatigue. PwMS with severe disability raised increased social isolation as a concern including pre-pandemic isolation.

Conclusions: We found negative impacts of multitasking and social isolation for PwMS during the pandemic. WFH was identified as beneficial for some. We recommend targeted resourcing decisions for PwMS in future pandemics including child-care relief and interventions to reduce social isolation. As the nature of work changes post-pandemic, we also recommend a detailed investigation of WFH for PwMS including providing tailored employment assistance.

Changing Perceptions of Quality and the Role of Signalling: Malaria Treatment in the Gambia
PRESENTER: **Lesong Conteh**, London School of Hygiene & Tropical Medicine (LSHTM)

Over the last 20 years, overall, the incidence of malaria is reported to have declined in The Gambia. Reasons for this decline are likely to include the introduction of a new first line drug and the use of rapid diagnostic tests to screen for malaria. This study explores if and how any reduction has changed peoples' preferences and reported behaviours. Specifically, in an area of decreasing malaria endemicity (1) do consumer and provider notions of good quality malaria treatment change over time and change in similar ways? and (2) how do providers attempt to signal the quality of their services to consumers?

Approximately 80 in-depth interviews were conducted with health care providers and health care consumers in Farafenni, The Gambia in three rounds of data collection in 2005, 2012, 2019. While it is common to have quantitative panel data, qualitative panel data is rare. Interviews were conducted in a setting and language of the respondent's choice. Where possible we traced the previous respondents. A range of provider types were included in all rounds (ie nurses, shop/kiosk owners, pharmacists, traditional healers). Data was coded based on deductive content analysis using five main themes: perceptions, signals, quality, usage, and cost. These parent themes were then explored for additional themes and insights contained therein.

To have such in-depth analysis on the perceptions of good quality malaria treatment at 3 timepoints over 14 years provided a rich dataset. Changes in attitudes, both from a consumer and provider perspective, over time were identified. These changes were also be mapped against the changing malaria health policies, intervention coverage, epidemiological and socio-economic data. While we do not discuss issues of causality, we are able to generate detailed insights into what is perceived to be good quality treatment across a range of providers and consumers, and the extent to which these views have remained consistent over time. We also reflect on how 'signals' of good quality can and should be interpreted as efficient and inefficient proxies for technical (bio-medical) quality of care.

8:30 AM –10:00 AM   TUESDAY   [Health Care Financing & Expenditures]

Cape Town International Convention Centre | CTICC 2 – Daisy
Public Financial Management and Budget Space for Health: Framework and Applications

MODERATOR: **Sophie Witter**, Queen Margaret University Edinburgh

ORGANIZER: **Helene Barroy**, World Health Organization

DISCUSSANT: **Walaiporn Patcharanarumol**, International Health Policy Program, Ministry of Public Health, Thailand; **Claudia Pescetto**, Pan American Health Organization

Is Public Financial Management a Source of Budget Space for Health? Framing the Issue
PRESENTER: **Helene Barroy**, World Health Organization

Economist Peter Heller, writing a seminal paper published in Health, Policy and Planning in 2006, identified five opportunities for expanding fiscal space for health: raising revenue, reprioritizing expenditure, borrowing, using seigniorage and mobilizing external grants. The development of the initial framework marked a significant conceptual advancement in health financing, by situating health reforms within a broader macro-fiscal context. Fifteen years later, fiscal space for health is not viewed simply as a question of finding additional revenues but also as a matter of improving public financial management (PFM) in the health sector, specifically for publicly funded health systems. This paper advances the concept of budget space for health, which explores available resources generated through greater overall public expenditure, prioritized budget allocations, and improved PFM. The paper adds a critical component, unpacking the ways through which

PFM improvements can maximize budget space for health. This definition is the outcome of a growing understanding among academia and policy-makers that resources available in the health sector depend not only on the level of funding but also on how funds are allocated, formulated within health budgets and managed through the PFM system. The added PFM component is particularly relevant considering the growing evidence that PFM weaknesses can alter the availability of resources within the health sector, mostly due to bottlenecks in budget formulation and execution. By expanding the focus beyond revenue to include the rules and practice of budget use, health authorities can engage in a more comprehensive and effective budgetary dialogue with finance authorities to support progress towards universal health coverage and the COVID-19 response.

How Can PFM Help Transform Efficiency Gains into Budget Space for Health?

PRESENTER: **Jonathan Cylus**, London School of Economics

Efficiency gains can be translated into budget space for health, but it is not a given. To transform efficiency gains into more budget for health, three key enabling conditions must be met: there must be well-defined and targeted efficiency interventions that change the price or the mix of inputs; the interventions must generate sizable financial gains; and PFM systems must allow those gains to be kept within the health sector and repurposed towards prioritized health needs. This article proposes a framework to help policymakers assess whether conditions to facilitate the translation of efficiency gains into more budget space for health have been or could be met. The proposed approach builds on an extensive review of the existing literature on both fiscal space for health and efficiency. In addition, country reviews were conducted in five countries to shed light on the links between efficiency and financial gains and to test the analytical framework. The article includes findings from three of those five countries—Ethiopia, Lithuania and Thailand—to show how meeting certain conditions can result in efficiency gains being transformed into more budget space for health. The article also considers the experiences of the two other countries—Ghana and Gabon —to demonstrate what can happen when enabling conditions are not clearly met. Moving forward, policymakers are invited to use the approach and consider its three enabling conditions a priori to ensure that new efficiency interventions eventually transform into expanded budget space for health. Using efficiency gains as a lever to increase the budget available for health is an important opportunity that could help all countries—especially low- and middle-income countries—recover from the effects of COVID-19, prepare for the impact of future pandemics and progress towards universal health coverage.

Addressing Inefficiencies in Health Workforce Spending for Greater Budget Space and More Sustainable Health Financing

PRESENTER: **Juana Bustamante Izquierdo, PhD**, World Health Organization

Improving health workforce expenditure efficiency can increase budget space and improve sustainability of health and health workforce financing. On one hand, budget allocation for health workforce depends on macro-fiscal variables and constraints such as health spending patterns, wage bill ceilings and prioritization inside the sector. On the other hand, spending inefficiencies influence HWF budget. For example, lengthy recruitment processes affect HWF budget execution rates, and subsequently can have an influence on the availability of health budget. The paper identifies two key elements for policy makers aiming at overcoming inefficiencies in HWF spending and contributing to increase budgetary space. First, the use of analyses to better understand health workforce dynamics and mismatches can contribute to define clear health workforce policies and priorities. Using health labor market evidence to inform budget priorities is useful to establish a productive dialogue between the Ministry of Finance and Ministry of Health during the budgetary process. Second, tools for identifying and addressing inefficiencies in HWF spending can both contribute to freeing potential resources within the sector and providing a more sustainable financing to human resources for health. For example, efficiency in health workforce spending might be hampered by delays in releasing budgets, hiring processes for new health workers in the public sector, unplanned projects, and difficulties with procurement. The paper unpacks those aspects to generate more applied research in this field.

8:30 AM –10:00 AM   TUESDAY   [Health Beyond Health Care Services: Social And Related Determinants]

Cape Town International Convention Centre | CTICC 1 – Room 1.44
Health Effects of Economic Development and Climate Change

MODERATOR: **Gustavo A. Marrero**, Universidad de La Laguna

What Money Can and Cannot Buy: Life Disruption Effects of Housing Demolition

PRESENTER: **Di Yang**, Pennsylvania State University
AUTHOR: Yubraj Acharya

Background: Housing demolition is common in low- and middle-income countries (LMICs) with high economic growth, rapid urbanization, and urban redevelopment. The affected households often experience life disruptions, such breaking away from the familiar social environment, longer commuting time to work and school, and interruptions in health care utilization. Literature is scant on housing demolition and its effects on health and wellbeing. It is also not clear if monetary or in-kind compensation is sufficient to offset potential adverse effects on individuals. In the recent decade, millions of households in China have experienced housing demolition and relocation ("chaiqian") because of ongoing urbanization and urban redevelopment, which offers an opportunity to fill these gaps. While our findings are intended to offer policy lessons primarily for China, they can also inform mitigation of development-induced disruptions in other LMICs.

Methods: To generate plausibly causal estimates, we take advantage of within-individual variation in the exposure to housing demolition and the outcomes in our panel data. Using data from the China Family Panel Studies, we examine the effects of housing demolition on

individuals' medical expenditure, self-reported health, and confidence in the future.

Key Findings: Overall, we do not find a statistically significant effect on self-reported health or confidence in the future, but housing demolition can increase medical expenditure two years after demolition, conditional on incurring medical expenditure. Additional analyses on urban and rural subsamples provide further insights in the effects. Findings from the urban subsample are the same as those for the overall sample. However, in the rural subsample, housing demolition reduces self-reported health rating two years after demolition and increases confidence in the future in the year of demolition.

Policy Implications: Development-induced housing demolition can have multifaceted effects beyond the loss of property, including on health and confidence in the future. Compensation does not necessarily offset the disruptions that individuals experience in health care utilization. Complementary targeted social support programs may be needed, in additional to economic compensation.

The Impact of Heat Stress on Labor Productivity in England and Wales

PRESENTER: **Matteo Pinna Pintor**, Luxembourg Institute of Socio-Economic Research (LISER)
AUTHORS: Till Seuring, Marc Suhrcke

Climate change is expected to increase extreme weather events, including long periods of abnormally high temperatures. Exposure to high temperatures can strain the human body's ability to maintain its optimal temperature ('heat stress'), leading to morbidity and mortality – or forcing individuals to reduce work effort in order to mitigate risks. A growing literature documents important economic effects of heat stress, but its focus lies mostly on tropical climates, market outcomes and specific occupational settings. We explore if exposure to high temperatures in a historically temperate climate has affected individual work effort in the general population over the last decade. We use panel data for England and Wales from the Understanding Society (US) survey and hourly temperature data from the Copernicus project covering the years 2010 to 2019. To identify the effect of heat exposure on productivity, we link indicators based on different types of daily average temperatures at the respondents' place of residence, to a binary self-reported measure of health-related reductions in work effort ('presenteeism') during the 4 weeks before the interview. We explore a large set of indicators, based on temperature bins or thresholds – in the latter case, with and without adjustment for intensity and duration of exposure. Quasi-Poisson estimates of additional days (or degrees) spent above an increasing temperature threshold retrieve dose-response functions for selected sub-samples, suggesting up to a doubling in the incidence of presenteeism. Stratification show that the effect is concentrated on people working in occupations with a low job MET score, an indicator of the average physical demands within each occupation. These findings indicate that, even in temperate climates, heat exposure can lead to immediate health-related reductions in productivity in market and non-market activities.

Heat Waves and Inadequate Child Nutrition in Developing Countries

PRESENTER: **Gustavo A. Marrero**, Universidad de La Laguna
AUTHORS: Jesse Anttila-Hughes, Pablo Bencomo-Mesa, Amir Jina, Gordon McCord, Marcos Vera-Hernández

Background: Human capital accumulation is a dynamic process, which features non-linearities, sensitive periods, and complementarities between inputs and stages of the life cycle. Pregnancy and early childhood are recognized as a particular sensitive period, in which shocks and investments (or lack of) might have long term consequences on development (Almond and Currie 2011; Almond, Currie, and Duque 2018). The recent increase in global temperatures and extreme weather events raise the question of whether such shocks can also have implications on child health and nutrition, with possible long-lasting consequences.

Aim: We estimate the causal effect of an increasingly frequent heatwaves (HW) on child's nutritional status. We consider the severity of the heatwave (duration and threshold) as well as whether the threshold is defined in absolute or relative terms. We disaggregate the shocks by the sex, age and region of birth of the child, and by socioeconomic aspects (household wealth, mother literacy, household facilities, etc.), allowing us to study when the child is more sensitive to HW events.

Data: We leverage data from the DHS covering 57 countries (in Africa, South and East Asia, Latin America, and Eurasia) between 1985 and 2018. Inadequate nutrition is measured by the height-for-age z-scorer (HAZ) of children under-5 years of age. Daily temperature and precipitations for 0.25x0.25 grid resolution is extracted from a high-quality re-analysis dataset (ECMWF ERA-5). Variables are merged by the child cluster of residence, their year and month of birth and interview. We construct alternative measures of HW, capturing abnormally heat (above a threshold) and prolonged exposure (number of consecutive days above the threshold). The metrics are absolute (the threshold is common to all locations, i.e., 90ºF, 95ºF) or relative (the threshold is cluster- even cluster-day-specific).

Methodology: We estimate a high dimensional fixed effect (climatic cluster, year-month of birth, country-wave) model (Dell et al., 2014) with climatic variables measured during child pregnancy and first year of life. Using fixed effects at the same resolution at which we measure HW allow us to net out pre-existing differences on child nutritional status between areas with higher versus lower propensity to HW. We control for a non-linear polynomial in temperature and a pluviosity-evapotranspiration measure (SPEI). We identify causality by assuming that the number of heatwaves is randomly affecting a residential child within a common cluster.

Results: We find a negative impact on the HAZ of infant exposures during pregnancy and first year of life to heatwaves (relative metric). Their damage increases with the threshold and with the severity (especially for 6 and 9 consecutive days). Effects are highly heterogenous. Impact of HW on HAZ is especially negative for: girls, urban areas, low-wealth households and with inadequate facilities, illiteracy mothers, or living in drought areas. Results are not robust when looking at absolute HW measures.

Deforestation and Child Health in Cambodia

PRESENTER: **Gabriel Ivan Fuentes Cordoba**, Sophia University

The impact of deforestation on child and human health in poor regions of the world is a crucial topic to understand some of the implications of Climate Change on the wellbeing of the most vulnerable populations. I combine precise forest loss data with geocoded data from the Cambodian Demographic Health Surveys to investigate the impact of deforestation on child health. To do so, I regress child health outcomes on deforestation rate controlling for child-, parental-, and household-level socioeconomic characteristics; district fixed effects; district-specific time trends, and province-year fixed effects.

The main child health measure that I use is stunting. A child is considered to be stunted when their height-for-age z-score (HAZ) is of less than -2. I create a dummy variable that takes the value of one if a child has a HAZ less than -2. Otherwise, the variable takes the value of zero. In the baseline analysis, I regress stunting on deforestation. To create the deforestation variable, I use DHS data that reports the geographical location of the clusters. For confidentiality reasons, most of the location of clusters are randomly displaced up to 5 kilometers, and 1% of the rural clusters are displaced up to 10 kilometers. I create a buffer of 10 kilometers around the cluster location and calculate the share of pixels in the buffer area with forest loss in the year of the interview. This variable can be interpreted as the loss in forest between the year of time t-1 and the year t. I find that children in areas with higher deforestation rates are more likely to be stunted than those that live in areas with lower deforestation rates. My most conservative findings indicate that a 1 percent increase in deforestation leads to increase in the probability of stunting by approximately 2.6% (p-value < 5%). In terms of magnitude, the estimated coefficients are of considerable size given the rapid levels of deforestation in Cambodia. I also find heterogeneous effects by sex. Deforestation seems to be detrimental for girls, but not necessarily for boys.

There exist many potential mechanisms how deforestation could impact child stunting, but to provide an informative picture, I explore two main mechanisms that the literature argues to be important: change in diets, and increase in the probability of disease. To explore the relationship between deforestation and children diets, I create a variable that calculates whether a child consumes most of the food groups according to the World Health Organization's Minimum Dietary Diversity. According to my analysis, diets do not seem to change in areas with high deforestation rates. Then, I use four different outcome variables to measure diseases that may be associated with deforestation. These are: diarrhea, respiratory diseases, fever, and anemia. I use fever and anemia as proxies for malaria. I do not find any significant association between deforestation and the persistence of diarrhea and respiratory diseases. However, I find that deforestation is associated with an increase in the probability of fever and anemia, especially among girls.

8:30 AM –10:00 AM   TUESDAY   [Economic Evaluation Of Health And Care Interventions]

Cape Town International Convention Centre | CTICC 1 – Room 2.43

Effects of Dementia and Chronic Disease Among the Elderly [MENTAL HEALTH ECONOMICS SIG]

MODERATOR: **Julie Abimanyi-Ochom**, Deakin Health Economics, Deakin University

Chronic Diseases and Productivity Loss Among Middle-Aged and Elderly in India

PRESENTER: **Shamrin Akhtar**, International Institute for Population Sciences

Abstract

Background: Chronic diseases are growing in India and largely affecting the middle-aged and elderly population; many of them are in working age. Though a large number of studies estimated the medical cost (out-of-pocket payment and catastrophic health spending) in India, there are no nationally representative studies on productivity loss due to health problems.

Objective: This paper examined the pattern and prevalence of productivity loss, due to chronic diseases among middle-aged and elderly in India, addressing the question "Do chronic diseases reduce productivity?"

Methods: We have used a total of 72,250 respondents from the first wave of the Longitudinal Ageing Study in India (LASI), conducted in 2017-18. We have used two dependent variables, limiting paid work and ever stopped work due to ill health. We have estimated the age-sex adjusted prevalence of ever stopped working and limiting paid work across MPCE quintile and socio-demographic characteristics. Propensity Score Matching (PSM) was used to examine the effect of chronic diseases on both these variables. We performed logistic regression as a robustness analysis

Results: We estimated that among middle-aged adults in 45-64 years, 6.9% (95%CI:6.46-7.24) had ever-stopped work and 22.7% (95% CI: 21.49-23.95) had limiting paid work in India. The proportion of ever-stopped and limiting work increased significantly with age and the number of chronic diseases. Limiting paid work is higher among females (25.1%), whereas ever-stopped is lower among females (5.7%) (95% CI:5.16-6.25) than their male counterparts. Limiting paid work due to chronic diseases is significantly higher in urban areas (24%) than the rural whereas ever-stopped working due to chronic diseases is comparatively lower in urban areas (4.9%) (95% CI: 4.20-5.69).

The study also found that stroke (21.1%) and neurological or psychiatric problems (18%) were significantly associated with both ever-stopped work and limiting paid work. PSM model shows that those with chronic diseases are 4% and 11% more likely to stop and limit their

work respectively. The regression model reveals that more than one chronic disease had a consistent and significant positive impact on stopping work for over a year (increasing productivity loss) across all three models.

Conclusions: This study has demonstrated that stopping work and limiting paid work were significantly associated with chronic diseases. The chronic diseases have their greatest impact on performance domain of productivity or limiting paid work. Despite being in better position in terms of health infrastructure, availability and utilization of services, knowledge and understanding of issues, urban areas shows higher prevalence of limiting paid work due to chronic diseases. Rapid urbanization and chronic diseases are closely associated so the policy interventions focusing on productivity loss due to chronic must place urban areas in its centre then only the issue will be addressed more effectively to reduce the adverse consequences of chronic disease in India.

Keywords: Chronic diseases, ever-stopped work, limiting paid work, elderly, middle-aged, productivity loss, India.

Early Onset Dementia in Dutch Labor Force

PRESENTER: **Gaia Bagnasco**, Erasmus University Rotterdam
ABSTRACT

IMPORTANCE: Due to the lower prevalence of dementia among younger adults and its broad etiological profile, characterized by multiple neuropsychiatric presentations, the disease frequently remains undetected for a long period. Moreover, as younger individuals with dementia have not yet reached the statutory retirement age, incapacitating symptoms frequently interfere with work and cause workplace concerns ultimately leading to reduced work hours, resignation, and job loss. With delays in diagnosis and individuals already left the workforce, qualifying for the adequate public income protection schemes (e.g., disability insurance benefits) is difficult, resulting in potential financial harm for individuals.

OBJECTIVE: We aim to describe the magnitude of losses in earnings and personal income and the use of disability insurance, unemployment insurance and social security in the 11 years prior to and one year after dementia identification. We identify gaps in public safety nets and use this to contribute to improved assistance for these individuals.

DATA: We study 16.009 young adults with dementia in the period between 2016-2020. Dementia was assessed by analyzing Dutch administrative data available from Statistics Netherlands. This data was linked to tax registers for the period 2003-2021. These tax registers give information on earnings, personal income, and main sources of income.

METHODS: We perform a non-parametric event study and analyze whether early onset dementia is associated with larger earning and income losses among certain subgroups as defined by demographics and socio-economic status 11 years prior to and 1 year after the identification of dementia. We estimate dynamic treatment effects by running a regression with time-to-event dummies on the sample of individuals who develop dementia within the observation period.

RESULTS: Relative to the control group, younger adults with dementia were confronted with employment losses and substantial losses in earnings. Also, losses in personal income were found for our dementia sample over the 11-year time frame, suggesting that individuals with EOD are not fully protected by the social insurance system against earning losses. Moreover, there are indications that younger individuals with dementia are not fully accommodated by the Dutch social safety net scheme because a proportion of our dementia sample move to welfare benefits and some individuals do not enter disability insurance until after they become eligible for a nursing home - suggesting a substantial delay.

CONCLUSION: These findings highlight the important adverse work-related consequences and financial hardship of cognitive impairment. Even in the absence of successful medical interventions, younger persons may be shielded from financial deficits with prompt diagnosis. Also, more consideration should be given to dementia when evaluating work eligibility and establishing the degree of disability insurance benefits.

FDA-Approved Medications for Dementia Are Unlike Non-Pharmacological Interventions As They Are Counterproductive

PRESENTER: **Robert J Brent**, Fordham University
Background to the Research

Recently a number of non-pharmacological interventions for dementia symptoms were evaluated using Cost-Benefit Analysis (CBA), and found to be both effective and socially worthwhile. The interventions evaluated were years of education, Medicare eligibility, hearing aids, corrective lenses and not living in a nursing home. Hereafter we will refer to these dementia interventions as the "new interventions" as they have only recently been evaluated.

However, separate from the new interventions, there also exists a number of pharmaceutical medications that have been approved by the Food and Drug Administration (FDA) as having some short-term effectiveness. The main medications were donepezil, galantamine, memantine, rivastigmine and tacrine. These five medications we will hereafter call the "FDA-approved medications" and also refer to them by the abbreviation ADM (Alzheimer's Disease Medications).

Research Objectives

What is missing is a comparison of the evaluations for the new interventions with the ADM to see which interventions should be given priority in public expenditure budgets aiming to reduce dementia symptoms. This paper fills the knowledge gap by carrying out a CBA of the FDA-approved medications.

Methods Used

Given that, for each of the evaluations of the new interventions, an identification strategy was employed to ensure that causality for them was established, we can use the new interventions as controls when estimating the effectiveness of the ADM, as they have been shown to be exogenous.

For the CBA, there will be two categories of benefits involving mortality from the ADM. There will be a direct one from the ADM, and an indirect one working through their impact on dementia symptoms. Both equations were estimated using two-way fixed effects models based on a large national panel data set provided by the National Alzheimer's Coordinating Center.

The measure of dementia symptoms that was used in all the CBAs of the new interventions, and now for the ADM, is the Clinical Dementia Rating scale (CDR). This was created by the University of Washington and has been internationally validated.

Key Results

We unexpectedly found that the pharmaceutical medications were not effective in reducing dementia symptoms. In fact, the ADM were counterproductive as they actually caused the symptoms to rise. This meant that there were only negative benefits to record in the CBA together with the loss from the costs that were incurred.

The negative benefits were that the mortality rate rose directedly from the medications, and also indirectly through the increase in dementia symptoms that came from the ADM. To convert these two mortality effects into monetary terms, the value of a statistical life (VSL) given in the literature was adopted. Using a VSL of 3.27 million USD, the loss of direct benefits was 61,149 USD per person, and the loss of indirect benefits was 127,867 USD per person. With costs added, the negative net-benefits were 220,965 USD per person.

Conclusions and Policy Implications

When deciding government expenditures devoted to dementia interventions, priority should be given to the non-pharmaceutical, new interventions, as they contribute positively and not negatively to social welfare.

8:30 AM –10:00 AM   TUESDAY   [Health Care Financing & Expenditures]

Cape Town International Convention Centre | CTICC 2 – Freesia
Health Insurance Benefit Package Implementation in Ethiopia [FINANCING FOR UHC SIG]

MODERATOR: **Stephane Verguet**, Harvard University

ORGANIZER: **Solomon Tessema Memirie**, Addis Ababa University

DISCUSSANT: **Firehiwot Abebe**, Ethiopian Health Insurance Service (EHIS)

Process of Defining the Health Insurance Benefit Package in Ethiopia
PRESENTER: **Muluken Argaw**, Ethiopian Health Insurance Service (EHIS)
The EHIS initiated the process of defining the health insurance benefit package in 2021 with the aim of explicit listing of service entitlements to beneficiaries and also to hold the scheme and providers accountable. The process follows widely accepted methodologies. Terms of reference was developed and different teams were organized: two analytic teams including costing and prioritization team, technical working group to oversee the work, and advisory board to address challenges faced by the analytic teams. The analytic teams started by compiling list of interventions after making a standard definition of intervention and health services, i.e., interventions were defined as a bundle of services. The initial entry point of intervention listing was the 2019 Ethiopia's essential health service package list of interventions at a facility level. Then, we used the Burden of disease profile of Ethiopia to align diseases with interventions that helped in ensuring important interventions are not missed. First, we listed interventions that could be delivered at each level of the health care tier in Ethiopia (health center, primary hospitals, general hospitals, and tertiary hospitals). Concurrently, unit cost estimations were done for each of the interventions by level of care delivery. After finalizing the intervention and service lists, we prioritized health intervention for inclusion in the benefit package using the

following criteria: Burden of disease, cost-effectiveness, financial risk protection, equity, budget impact, political and public acceptability. Both the criteria and priority setting process has been deliberated upon by different stakeholders including healthcare leaders, patient groups, professional associations, and politicians.

Cost-Effectiveness Analysis: A Core Criterion in Defining the Health Insurance Benefit Package in Ethiopia

PRESENTER: **Amanuel Yigezu**, Ethiopian Public Health Institute

Economic evaluation is the comparative analysis of alternative courses of action in terms of both their costs and consequences. Economic evaluation evidence is being widely used to allocate resource efficiently as part of health policy and planning such as for allocation of funds and nationally for priority setting exercises (example in EHSP). It is also important in the assessment of new drugs, procedures or diagnostics. Despite its methodological challenges (largely due to transferability and generalizability issues) that arose from the use of cost-effectiveness analysis in decision making, it is believed that economic evaluation is still the best choice to aid resource allocation decisions. We, therefore, used economic evaluation to aid decision making as part of multi-criteria decision analysis in defining the health insurance benefit package. We used average cost-effectiveness ratios (ACER) from results of Generalized Cost-effectiveness analysis (GCEA). GCEA compare all interventions with the "null-intervention" and inform how to use of existing health budgets or an extra unit of money. A review of literature was conducted for a list of interventions to be implemented in Ethiopia. Studies that report their outcome measures in Life year gained (LYG), Disability Adjusted Life Years (DALY) averted, and Quality Adjusted Life Year (QALY) gained were included in the review. Priority was given to studies from Ethiopia and then to countries with comparable setting to Ethiopia. All costs were converted to 2021 US$. Average cost-effectiveness ratio of the most cost-effective intervention was used for studies that reported their findings in incremental cost-effectiveness ratio. We used a League table to sort the list of interventions according to their increasing ACERs. This value was then used with equity and financial risk protection to prioritize health interventions to be included in the benefit package and implemented.

Equity Considerations for the Implementation of Health Insurance Benefit Package in Ethiopia: Results of Expert Delphi Exercise

PRESENTER: **Solomon Tessema Memirie**, Addis Ababa University

Besides efficiency and financial risk protection, equity is an important principle for a fair distribution of health care resources and access to health care. There is large inequality in access to health care and in health outcomes along patient socioeconomic status, area of residence and demographic factors in Ethiopia. Equity as a criterion to define the health insurance benefit package (HIBP) arises from the policy commitment of the government of Ethiopia and local social values to create a fair and just health status for the different population groups in the country. We considered the following groups to be the worse off in the Ethiopian context: children less than five years of age, women in the reproductive age group, the economically poor, and those who reside in rural areas. Since data on the distribution of interventions benefits or on the disease burden disaggregated by subpopulations is not available, we used the Delphi technique by a panel of 28 experts to score diseases/conditions. The experts assigned a score to each of the disease/condition based on their expert opinion which disease conditions are more likely to be prevalent in which segment of the population (poorer or wealthier; urban or rural). The experts represented different institutes such as Universities, health facilities, medical associations, patient groups, partners, and ministry of health. Experts assigned a score 1 to 4; where 4 indicates disease/condition predominantly affecting the poor and rural residents and 1 indicating a condition more prevalent among the wealthy and urban residents. Over a period of two days, in phases, the experts scored 253 diseases/conditions. The average scores ranged from 1.07 (for menopause) to 3.79 (for obstetric fistula). We standardized the scores to be bounded between 1 and 2; 1 the lowest equity score and 2 the highest equity score. The scores for each disease/condition where then assigned to their corresponding interventions. We used these equity scores to adjust the CEA values for each of the interventions considered for the health insurance benefit package. To adjust the CEA values for equity, we multiplied the health benefits (the denominator of the cost-effectiveness value) of each intervention by the corresponding equity scores, resulting in equity adjusted CEA values. The equity adjusted CEA values were then used to rank the interventions using a league table.

Financial Risk Protection: A Key Component in the Implementation of the Health Insurance Benefit Package in Ethiopia

PRESENTER: **Mieraf Taddesse**, Addis Center for Ethics and Priority Setting

Financial risk protection (FRP) is a core component of the UHC agenda. At its root, FRP is about protecting individuals from the negative effect expenditures on healthcare could have on essential consumptions other than healthcare (e.g., food). Typically, direct medical costs (e.g., drugs) constitute the larger share of the overall financial burden; however, direct non-medical costs (e.g., transportation to and from health facilities) and indirect costs (e.g., wage loss due to sickness) could also bring substantial financial risk depending on the nature of the service sought and the context. Ensuring FRP is particularly crucial in low-income settings where health systems typically have low per-capita spending and high reliance on out-of-pocket payments to finance healthcare. Therefore, Ethiopia exhibiting both characteristics, uses FRP as one of the core criteria in determining which of the potential list of services get included in its health insurance benefits package. For each of the interventions under consideration, the number of catastrophic health expenditure (CHE) cases that could occur at an expected level of out-of-pocket spending tied to the specific service was estimated. For lack of data, we used the interventions' unit cost estimates as a proxy for out-of-pocket spending and generated an income distribution using inputs from the national living standard monitoring study. Accordingly, services with the largest expected CHE headcount were ranked higher, implying a higher priority for inclusion in the benefits package compared to those with lower CHE headcount. We found that, in general, investing on medium cost services that affect a relatively larger share of the population is likely to procure larger FRP benefit to the Ethiopian population compared to investments in the typically high-cost services affecting a relatively smaller segment of the population.

Cape Town International Convention Centre | CTICC 1 – Room 1.64

New Developments in the Economic Evaluation of Obesity Prevention Strategies in High, Middle and Low Income Settings [ECONOMICS OF OBESITY SIG]

MODERATOR: **Olufunke Alaba**, University of Cape Town

ORGANIZER: **Anagha Killedar**, University of Sydney

Assessing the Health and Economic Impact and Cost Effectiveness of Interventions for the Prevention and Control of Overweight and Obesity in Kenya: A Stakeholder Engaged Modelling Study

PRESENTER: **Mary Njeri Wanjau**, Griffith University

Background

The global increase in mean body mass index has resulted in a substantial increase of non-communicable diseases (NCDs), including in many low- and middle-income countries (LMICs) countries such as Kenya. This paper assesses four interventions for the prevention and control of overweight and obesity in Kenya to determine their potential health and economic impact and cost effectiveness.

Methods

We applied the assessing cost-effectiveness (ACE) method. The selection of modelled interventions was drawn from two broad strategies identified in a stakeholder engagement process. We reviewed the literature to define interventions, identify evidence of effect, determine the intervention costs, disease costs and total healthcare costs. We used a proportional multistate life table model to quantify the potential impacts on health conditions and healthcare costs and cost effectiveness. We targeted the entire 2019 Kenya population modelled over their remaining lifetime with risks for the related NCDs rising only from age 20 and no burden among children. Interventions were compared against a 'do nothing' scenario. Considering a health system perspective, two interventions were assessed for cost-effectiveness. Incremental cost-effectiveness ratios (ICERs) were calculated. We used the Human Capital Approach to estimate productivity gains.

Results

Over the lifetime of the 2019 population, the impact was estimated at 203,266 health-adjusted life years (HALYs) (95% uncertainty interval [UI] 163,752 - 249,621) for a 20% tax on sugar-sweetened beverages, 151,718 HALYs (95% UI 55,257 - 250,412) for mandatory kilojoule menu labelling, 3.7 million HALYs (95% UI 2,661,365 - 4,789,915) for a change in consumption levels related to supermarket food purchase patterns and 13.1 million HALYs (95% UI 11,404,317 - 15,152,341) for a change in national consumption back to the 1975 average levels of energy intake. This translates to 4, 3, 73 and 261 HALYs per 1,000 persons, respectively. Over the lifetime, the reductions in healthcare cost were approximately USD 0.14 billion (USD 3 per capita), USD 0.08 billion (USD 2 per capita), USD 1.9 billion (USD 38 per capita) and USD 6.2 billion (USD 124 per capita), respectively. Over the lifetime, the productivity gains from a reduction in obesity-related mortality and morbidity (combined) were approximately USD 1.8 billion, USD 1.2 billion, USD 28 billion and USD 92 billion, respectively. Both the 20% tax on sugar sweetened beverages and the mandatory kilojoule menu labelling were assessed for cost effectiveness and were dominant (health promoting and cost-saving).

Conclusion

All interventions evaluated yielded substantive health gains and economic benefits. The two interventions assessed for cost-effectiveness were found to be health promoting and cost saving. These interventions should be given consideration for implementation as part of Kenya's NCD control plans.

Cost-Effectiveness Analysis of Advertising Intervention for Overweight and Obesity Children in Thailand

PRESENTER: **Wansuda Ngam-A-Roon**, Mahidol University

Background:

The prevalence of overweight and obesity among children and adolescents is increasing worldwide, including in Thailand. One of the factors contributing to obesity is high consumption of fat, sugar, and salt (HFSS) including sugar-sweetened beverages, snacks, ready meals, chocolate and candy, and yoghurt and sweet yoghurt drinks. In 2008, Thailand implemented the 'Thai Public Broadcasting and Television Business Act' to limit the frequency of advertising for any food products on free television (TV). In 2013, a draft 'Notification on Criteria and Procedures for Chart List in Broadcasting' proposed restrictions on advertising on children's, youth, and family programs, but it has not yet been implemented. The cost-effectiveness of such interventions have not been investigated in Thailand.

Research aims:

To assess the cost-effectiveness of legal restrictions on advertisements for foods high in fat, sugar and salt (HFSS) during children's television programs.

Method:

This study used mathematical models to evaluate the cost-effectiveness of new legal restrictions on the airtime of TV advertisements for HFSS food during children's television programs compared to doing nothing. This study focused on children aged 6 – 12 years old (5,643,522 children), with 2014 as the base year. Both Thai and international sources were used to specify intervention parameters. Thai sources were used to specify population numbers, mean minutes per day watching TV, number of advertisements per hour, and advertisement length. An international systematic review was used to estimate the extra energy consumption per additional minute of TV advertising exposure per day, using factors for reduction in energy consumption in the real world and mealtime compensation for reduced snacking. Outcomes were average body mass index (BMI) reduction, the reduction in the number of children with overweight or obesity, cost, and incremental cost effectiveness ratio (ICER) of the intervention. Probabilistic sensitivity analysis with Monte Carlo simulation (1000 iterations) was used to quantify uncertainty.

Results:

The TV Advertising intervention could reduce BMI by an average of 0.32 kg/m^2 and could reduce the number of children with overweight and obesity by 121,000. Costs were estimated at US\$ 665,900 (\$US 1 = 35 Thai baht) which includes the cost involved in implementing the act (US\$ 45,100) and media communication (US\$ 620,700). The ICER showed that the intervention would cost US\$ 6 per case of childhood overweight and obesity prevented. This intervention is cost-effective in reducing child overweight and obesity in the Thai context.

Implications:

Legal limits on TV Advertising in Thailand are likely to be highly cost-effective. However, children's TV viewing is declining, while use of other communication channels, such as YouTube, Facebook, Twitter, is increasing. Therefore, limits on advertising for HSFF will be of greatest benefit if they cover all channels of communication that reach children.

The EQ-EPOCH Model: A Tool for Conducting Equity-Informative Economic Evaluations of Childhood Obesity Interventions

PRESENTER: **Anagha Killedar**, University of Sydney

Background

Equity-informative economic evaluation methodology has progressed in recent years. These methods, however, have rarely been used for interventions addressing childhood obesity. This might be because of the unique challenges posed by interventions addressing childhood obesity including their complex modes of action, difficulty capturing economic benefits, and the fact that important benefits tend to occur well after trial periods. Despite these challenges, applying equity-informative methods to childhood obesity interventions is critical to addressing the distinct socioeconomic inequities in the condition in many countries.

Research Aims

Our objective was to demonstrate how equity-informative economic evaluation methods could be applied to childhood obesity interventions using a purpose-built model.

Method

Using an Australian health funder perspective, we conducted a modelled distributional cost-effectiveness analysis of three obesity prevention interventions in children. The equity variable of interest was socioeconomic position (SEP), a strong predictor of child weight status in Australia. For each intervention, individual-level, SEP-specific effect sizes and intervention costs were applied to a nationally representative sample of 4989 Australian children. Using a purpose-built microsimulation model, the EQ-EPOCH model, we simulated SEP-specific BMI trajectories, healthcare costs and quality-adjusted life years (QALYs) until 17 years of age for an intervention and control cohort. We then calculated the net health benefit (in QALYs), a measure of efficiency, and the equity impact measured as the difference in the slope index of inequality (SII) in QALYs between the intervention and control. To examine uncertainty, the net health benefit and equity impact was calculated for 1000 bootstrapped samples taken from each of the simulated cohorts. For each intervention, the point estimate and estimates from boostrapped samples were plotted on an efficiency-equity plane to visualise any potential trade-offs between the two objectives. We also conducted scenario analyses to assess which parameters were the most influential for efficiency and equity impact outcomes.

Results

Two interventions generated a net health benefit and improved equity (a 'win-win'), and one caused a net health loss and worsened equity (a 'lose-lose'). An infant sleep intervention reduced the inequality in overweight and obesity by 2%, and, after accounting for opportunity costs, was found to have a 67% probability of conferring a net health benefit and improving equity. Assumptions around health system marginal productivity and the distribution of opportunity costs influenced interventions with the highest incremental costs the most. Using SEP-specific effect sizes was also highly influential on equity impact estimates.

Implications

The demonstrated method could be used to evaluate and compare childhood obesity interventions for their efficiency and equity impact using a common framework. However, further work is needed to establish the marginal productivity and distribution of opportunity costs in the Australian health system, and other health systems worldwide, and to generate reliable estimates of SEP-specific intervention effect sizes.

8:30 AM –10:00 AM   TUESDAY   [Economic Evaluation Of Health And Care Interventions]

Cape Town International Convention Centre | CTICC 1 – Room 2.63
Tackling Heart Disease, Stroke and Hypertension

MODERATOR: **Jose Leal**, Health Economics Research Centre, Nuffield Department of Population Health, University of Oxford

Impact of Standardized Stroke Care on Health Outcomes of Patients with Ischemic Stroke-an Analysis Based on Real-World Data

PRESENTER: **Bifan Zhu**, Shanghai Health Development Research Center
AUTHORS: Fen Li, Duo Chen, Chunlin Jin

Background Stroke has risen to the leading cause of mortality and years of life lost in China. To reduce the disease burden of stroke, Shanghai started to reorganize the acute stroke care system since 2016, with emphasis on the continuation of care starting from the onset of stroke signs to rehabilitation. A total of 11 municipal hospitals and 25 district hospitals are selected to form a "Stroke Clinical Treatment Center" (hereafter shortened as stroke center) which provide standardized acute stroke care. However, there is little evidence about patients' compliance to the reorganized system.

Objectives This retrospective study aims to analyze the impact of the acute stroke care system on health outcomes of patients with ischemic stroke, using real-world data retrieved from administrative databases.

Data sources The study sample consists of 4147 patients diagnosed with ischemic stroke in the J District, Shanghai, between January 2017 and December 2019. Among them, 1072 are in the treatment group (defined as receiving hospital services at stroke centers) and 3075 are in the control group (defined as receiving hospital services in other medical institutions). Patients' hospitalization information is collected from the big data platform of Shanghai Municipal Health Commission Information Center, sociodemographic information is collected from the Chronic Disease Management System, whereas patients' death information is collected from the Death Registration System. A unique identification code of each patient is used to link the information of the same person among different data platforms.

Methods To correct the sample deviation between the control group and the treatment group, a two-step method is used to construct a Treatment Effects Model:

$$D_i = 1(z_i'\sigma + u_i) \ (1)$$

D_i is the treatment variable, i.e. whether treated at a stroke center. z_i represents the factors that affect whether an individual enters the control group, including sex, marital status, education, type of insurance, underlying diseases, medical expenses 1 year before the admission, and reception (or not) of stroke screening. σ represents the coefficient of explanatory variables, u_i represents disturbance variable.

$$Y_i = x_i'\beta + \gamma D_i + \varepsilon_i \ (2)$$

Y_i represents dependent variables, including the 90-day mortality rate after discharge and the 30-day readmission rate after discharge. x_i represents independent variables that directly affect Y_i, including age, hospitalization expenses, treatment (or lack thereof) at a stroke center, and referral (or not) to a rehabilitation facility.

Results From 2017 to 2019, the 90-day mortality rate after discharge in the treatment group decline from 11.52% to 5.52%. The 90-day mortality rate after discharge of patients referred to rehabilitation institutions is 3.3% lower than that of patients who do not receive rehabilitation services (P=0.001). The 30-day readmission rate after discharge of the treatment group is 21.91% lower than that of the control group (P=0.000).

Conclusion Receiving hospital services at stroke centers have significant effects on improving the health of those under 65 years old. Treatment services in different institutions need to be further standardized, and the stroke rehabilitation system and referral mechanism should be improved.

A Ten-Year Review of Hypertension Management Under the BPHS Program in China: A Long-Term Vision

PRESENTER: **Yanchun Zhang**, China National Health Development Research Centre
AUTHORS: Kim Sweeny, Jiangmei Qin, Lifang Zhang, Chunmei Lin

Background: In 2009, the Chinese Government began to provide a package of Basic Public Health Services (BPHS) free of charge for residents. By the end of 2018, cases under standardized management of hypertension and diabetes increased by nearly six fold over 2009. However, little is known about the long-term health impact and economic benefit of such a large investment. This research estimates the effectiveness of the program in terms of controlling hypertension and assesses the long-term benefit of the program during 2009-2018, using several national representative data sets.

Methodology: A trend model was built based on data from 1991 to 2009, and used to predict hypertension control rates for 2018. The incremental effectiveness of the BPHS program during 2009-2018 was calculated by comparing the observed and predicted numbers of patients with hypertension control in 2018. Following the pathway of previous risk prediction studies on CVDs in China, a Markov model was developed to estimate the long-term health outcomes of the BPHS by comparing the two scenarios from 2019 to 2048. A standard model of economic evaluation was developed by estimating gross domestic product increases from labour force participation and productivity gained by averting morbidity and mortality. Net present value (NPV) was used to estimate healthcare expenditure saved, and the economic and social benefit of morbidity and mortality averted. The 2009 to 2018 investment from the NBPHS on hypertension control was considered to be the cost identified for this study, which was estimated to be 71.95 billion CNY (account for 14.59% of the NBPHS fund).

Results: It was estimated that **20.34 million (5.11, 35.56)** more patients had their hypertension controlled during 2009 to 2018 due to the BPHS, with an average of 20-mmHg lower SBP among the controlled. Based on this, it was estimated that **1.73 million deaths** and **1.25 million patients** would be averted from coronary heart disease and stroke over a period of 30 years, accounting for 8.5% and 6.1% of the total hypertensive patients controlled.

The cost of the BPHS program for hypertension during 2009-2018 was estimated to be 71.95 billion CNY. At a 3% discount rate, the NPV of economic and social benefit from death averted would be 759 billion CNY, of which 530 billion CNY was due to social benefit. The estimated benefit-cost ratio would be 2.5 for economic benefit and 14.1 if the social benefit is included.

Conclusions: The BPHS program has played a significant role in the management of hypertension, and improved hypertension awareness, treatment and control. It will significantly reduce the mortality and morbidity due to cardiovascular diseases in China. The investment through the BPHS for the management of hypertension has generated large economic and social benefits, in terms of averting deaths and serious disability, increasing productivity and saving costs. This study contributes to academic knowledge by providing a long-term health impact estimation and economic framework of health interventions in primary healthcare settings in China.

Financial Risk Protection Impacts of Improved Equity in Hypertension Care Cascade Performance in Low- and Middle-Income Countries

PRESENTER: **Dorit Talia Stein**, Harvard University
AUTHORS: Pascal Geldsetzer, Jen Manne-Goehler, Rifat Atun, Stéphane Verguet

Background. Unequal burden of chronic diseases among the poorest perpetuates cycles of poverty and ill-health. Disparities in access to primary prevention of cardiovascular disease through management of risk factors such as hypertension exist across socioeconomic groups. There is potential opportunity to improve equity in hypertension management, but the financial risk protection impacts of such efforts are unknown.

Research Objective. We aimed to model and estimate the distributional financial risk protection impacts of improving horizontal equity – i.e. those with equal need receiving equal care - in the hypertension care cascade across socioeconomic groups.

Methods. We developed a microsimulation model and simulated improvements in the proportion of people living with hypertension who are on treatment, up to 80% coverage across all countries and wealth quintiles. We used individual-level data from nationally-representative, cross-sectional surveys from 36 low- and middle-income countries to estimate baseline cascade performance by country and quintile and 10-year risk of a CVD event for each individual. We applied relative risk reductions for the impact of pharmacological anti-hypertensive treatment on CVD risk to baseline CVD risk estimates for untreated individuals randomly initiated on treatment in each scenario run. Next, we estimated the proportion in each wealth quintile who would experience a case of catastrophic health expenditure (CHE) by calculating whether out-of-pocket (OOP) costs for inpatient CVD care exceeded either 25% or 40% of each individual's income, conditional on seeking care after a CVD event. Income values were drawn from modeled country-level income distributions and randomly assigned to individuals within each country and quintile. OOP costs were approximated as a country-specific proportion of unit costs for inpatient acute myocardial infarction and stroke medical management. The proportion of CVD-specific expenditures paid OOP were pulled from National Health Accounts.

Results. Without improvements in hypertension treatment and assuming all individuals seek inpatient care after experiencing a CVD event, 1.8% of people living with hypertension in the lowest quintile would experience CHE at a 40% threshold and 3.7% at a 25% threshold. With improved treatment coverage (to 80%) within each quintile, 1.2% (3.3%) of individuals in the lowest quintile would experience CHE at a 40% (25%) threshold. Assuming differential probabilities of care-seeking after experiencing a CVD event by wealth quintile, only 0.65% (40% threshold) and 1.6% (25% threshold) would experience CHE among the lowest quintile.

Implications. Large numbers of CHE cases could be averted among the lowest wealth quintiles in low- and middle-income countries with more equitable coverage in hypertension treatment by averting CVD cases. However, unequal access to inpatient care for CVD may substantially undervalue the potential financial risk protection benefits of improved hypertension management among the poorest who often

are less likely to seek care. These results also highlight the importance of including contextualized and disaggregated transition probabilities in health economic modeling that is used to inform prioritization of health interventions where equity is part of the objective function.

Cost-Effectiveness of Cardiac Rehabilitation in Older Adults with Coronary Heart Disease

PRESENTER: **Donald S. Shepard**, Brandeis University
AUTHORS: Shehreen Zakir, Diann Gaalema, Philip A. Ades

Background

Coronary heart disease (CHD) is the leading cause of death in the United States. Cardiac rehabilitation (CR) is a program of monitored exercise and instruction on diet and lifestyle modification. While CR is recommended and generally reimbursed by insurers for patients with acute events from CHD) and related conditions, CR is underutilized. Only 12% of the study population received any CR in a comprehensive observational study of 601,099 eligible elderly Medicare fee-for-service beneficiaries. The limited existing literature on the cost-effectiveness suggests CR is highly cost-effective, but the studies focus on younger patients with few co-morbidities and do not generate lifetime benefits. To determine whether CR deserves greater emphasis, especially in older patients, this empirically-based modeling study used this large dataset to derive CR's cost-effectiveness.

Methods

We first assessed the impact of CR on 5-year mortality using two statistical techniques. To protect against confounding from all sources, including unobserved variables, our primary analysis used instrumental variables (IV) with geographical access and density of CR facilities as IVs. Our secondary analysis used propensity-based (PB) analysis, creating 70,040 matched pairs of CR users and non-users, assessing survival and Medicare costs. We then derived mortality ratios to relate CR users and non-users to the age-matched general population in the US life table. and estimated their lifetime survival and costs. Results of a metanalysis (Takura et al 2019) related gains in quality-adjusted life years (QALYs) to survival gains. We calculated incremental costs (in 2022 US dollars), incremental QALYs, and incremental cost-effectiveness ratios (ICERs) in terms of the cost per QALY .

Results

The two statistical techniques generated similar gains in 5-year mortality from CR. IV found a 8.0 percentage point improvement (p<0.001) versus 8.3 percentage points (p<0.0001) for PB. The corresponding lifetime QALY gains were 1.344 and 2.018, respectively. The ICERs (with 95% confidence intervals) were similar: $30,118 ($18.875-$74,484) for IV and $32,996 ($21,942-$66,494) for PB. All values were below the conservative threshold of the US per capita GDP ($75,180).

Conclusions

Economic analyses should use a lifetime perspective for chronic conditions such as CHD, which are usually permanent. We derived and applied long-term mortality ratios for CHD survivors with and without CR, beginning 1-2 years after their hospital discharge. CR was thus highly cost-effective using guidelines established by the World Health Organization and the US Department of Health and Human Services. CR's favorable clinical effectiveness and cost-effectiveness support the need to increase CR utilization. Public reporting, incentives, and automatic referrals are promising mechanisms to increase CR use.

8:30 AM –10:00 AM   TUESDAY   [Health Care Financing & Expenditures]

Cape Town International Convention Centre | CTICC 2 – Nerina
Big Data Approaches to Strengthening Health Financing

MODERATOR: **Kelly E Anderson**, University of Colorado

Machine Learning- Based Allocation Rules for Subsidised Health Insurance to Reduce Catastrophic Health Spending in Indonesia

PRESENTER: **Vishalie Shah**, University of York
AUTHORS: Taufik Hidayat, Andrew Jones, Noemi Kreif, Ivana Malenica

Background

Policy learning methods that exploit the conditional average treatment effect (CATE) function generally consist of non-parametric policies, that assign treatment according to the sign of the estimates, and parametric policies, that belong to a smaller functional class for targeting specific preference criteria, such as interpretable rules. Decision trees are a popular representation for interpretable parametric policies. In this paper, we construct an optimal policy rule that the Indonesian state government could use to efficiently allocate its two subsidised health insurance schemes, PBI-APBD (funded locally) and PBI-APBN (funded nationally) to eligible households, using an objective function where outcomes are measured in terms of catastrophic expenditure – health expenditure is

catastrophic if households' out-of-pocket payments on health exceed 10%. There is a large uninsured population, comprising mainly informal sector workers, for whom enrolment into subsidised insurance could improve financial protection.

Methods

We rely on data from the 2017 National Socioeconomic Survey (SUSENAS) and the 2018 Village Potential Statistics Census (PODES). We explore whether the effects of assigning "treatment" (APBD) over the "control" (APBN) are heterogeneous by estimating the CATE function using various model specifications. To estimate the optimal rule, we use the "super learner" that finds the optimal weighted combination of candidate estimators of the rule. The candidate library includes different regression specifications of non-parametric policies (from simple linear models to complex data-adaptive models) and parametric policies (e.g. fixed-depth decision trees). Our policy rule targets a set of pre-specified covariates based on policymakers' selection criteria for assigning subsidised insurance. PBI-APBD receives 10% of its funding from the state budget, which we model as a resource constraint. We estimate rules under unconstrained and constrained settings. We identify the types of households that should be enrolled into APBD and APBN under the learned rule, and evaluate its performance against allocation rules based on the average treatment effect (ATE).

Results

Our heterogeneity analysis suggests that potential gains from policy learning are possible. The super learner estimates of the policy rule outperform rules that either assign all households to APBD or APBN. The best-performing algorithm is a regularised linear model that targets a smaller covariate vector comprising indicators of household assets. Average characteristics are fairly similar among households assigned to treatment and control under the unconstrained rule, and cannot be meaningfully differentiated. The constrained rule, however, shows some slight regional and socioeconomic differences. Tree-based algorithms comprise the highest weightings in the super learner.

Conclusions

Our study suggests that tailored policymaking that leverages upon CATEs could provide utility gains over random allocation, especially in resource-constrained settings. We demonstrate the potential of machine learning for policy learning, in particular the value of the super learner when the underlying model is unknown. We contribute to the limited evidence base on personalised decision-making in the context of large-scale health policies.

Supplementing Risk-Equalization with High-Risk Pooling Using Administrative Data and Machine Learning Techniques for Identifying the 'High Risks'

PRESENTER: **Michel Oskam**, Erasmus University Rotterdam

Background: Regulators of social health insurance markets typically rely on premium-rate restrictions and risk-equalization to protect individual affordability and enhance efficiency and care-quality within the market. Through risk-equalization, insurers are compensated for the predictable variation in health expenditure of enrollees by a predefined set of risk adjusters (e.g., age, gender and health status). Despite the sophisticated nature of equalization models currently used, high-risk individuals – e.g., those with a chronic illness – remain inadequately compensated. The resulting risk selection incentives insurers face towards these vulnerable individuals threaten the functioning of health systems.

Objective: This paper examines *to what extent remaining selection incentives in the Dutch health insurance market can be reduced by supplementing risk-equalization with a targeted form of risk sharing called 'high-risk pooling' (HRP)*. HRP means that insurers receive cost-based compensations (in addition to the equalization payments) for high-risk people expected to be undercompensated by the risk-equalization model. A key feature of HRP is that high-risk people are assigned to the compensation-pool ex-ante (i.e., before the start of the payment year).

Methods: Our analysis consists of two steps. First, through historical data on health expenditure and risk adjuster information, we identify individuals predicted to be severely undercompensated by the Dutch equalization model. We apply and compare three different methods for identifying these people: 1) a simple indicator based on prior-year spending, 2) an OLS model that includes a broad spectrum of risk factors and 3) a sophisticated random forest algorithm that includes the same risk factors as the OLS model. As a second step, we simulate the effects of HRP for the group identified in step 1, both in terms of selection incentives and incentives for cost-control.

Key results: We find that the random forest algorithm identifies the most selective group of high-risk individuals in terms of 'undercompensation by the risk-equalization model'. The advantage over the other two methods, however, is relatively minor. Implementation of our HRP for this group substantially reduces selection incentives. For example, the undercompensation of individuals with congenital anomalies to the respiratory system decreases from €1,829 to €118. Moreover, by funding the compensation of the high-risk pool through contributions from the 'low-risk individuals' excluded from the pool, overcompensations of healthy individuals are reduced as well. For example, the overcompensation of individuals without a chronic illness decreases from €100 to €51. Although risk-sharing reduces incentives for cost-control, redistributing under 2.5% of the total budget towards HRP results in a worthwhile 34% decrease of risk selection incentives.

Conclusions and implications:

HRP has the potential to considerably reduce the undercompensations that remain for chronically ill individuals. Although the random forest accurately identifies the high-risk individuals through historical data, transparency concerns of such algorithms may prove to be problematic for direct implementation. As an alternative, using OLS or simply using past expenditure may still be worthwhile options for an HRP design. Despite the potential for HRP to alleviate problems of imperfect risk-equalization, it is – to the best of our knowledge – not used in health insurance systems.

Upcoding By Medicare Advantage Plans: The Role of Health Risk Assessments and Chart Reviews

PRESENTER: **Jeah Jung**, George Mason University

AUTHORS: Roger Feldman, Caroline Carlin

Medicare is the federal insurance program for older adults and some disabled people in the United States. Medicare has been traditionally a public insurer, but it also allows beneficiaries to choose a private insurer to receive benefits—known as the Medicare Advantage (MA) program. MA has grown substantially in recent years, it currently covers almost half of the Medicare population. Medicare pays MA plans risk-adjusted capitated rates for enrolling beneficiaries. Risk-adjustment payments help prevent MA plans from selecting healthy enrollees. However, a concern has been growing that MA plans code as many diagnoses as possible to make their enrollees with the same expected spending as TM beneficiaries look sicker, leading to larger payments to MA plans. Health risk assessments (HRAs) and chart reviews are two sources where MA plans establish additional diagnoses. However, some of the additional diagnoses from these sources may have been associated with treatments or increased resource use. Our study decomposes enrollees' incremental risk scores from diagnoses in HRAs and chart reviews (CRs) into portions that explain resource use and that do not. By analyzing the MA program in the US, our study will help us understand whether providers engage in undesirable upcoding activities under a risk-adjusted system.

We used MA encounter data from a random 50% sample of enrollees from MA contracts that submitted highly complete encounter data between 2016 and 2019. We applied standardized prices to services provided to enrollees to construct a measure of "resource use" (price-standardized utilization) per beneficiary per month (PBPM). We used traditional Medicare payments as the standardized prices. We obtained resource use for inpatient facility, outpatient facility, professional services, and hospice care. We measured patient health risks by the Hierarchical Condition Category (HCC) score, which Medicare uses to adjust MA payments. We created three risk scores and estimated the contribution of each score to resource use: 1) HCC_base: the base risk score constructed from excluding diagnoses from HRAs and chart reviews; 2) iHCC_CR: the *incremental* risk score added to the base score from diagnoses in HRAs; and 3) : the *incremental* risk score added to the sum of the base risk score and iHCC_HRA, from diagnoses in chart reviews.

We found that a one-unit increase in the base risk score increased resource use by $754 PBPM. However, the effect of the incremental risk scores on resource use was much smaller: $403 for iHCC_HRA and $486 for iHCC_CR. This suggests that 36.5%-45.5% of the incremental risk scores were due to coding not associated with resource use. We also found considerable variation in the role of HRAs and chart reviews in such coding across contracts: the contribution of the incremental risk scores to resource use is smaller among contracts with larger incremental risk scores.

Our decomposition analysis shows that HRAs and chart reviews helped to achieve more complete coding of patients' diagnoses, but they were also sources of coding intensity not explaining resource use. We discuss several policy considerations to reduce payments associated with coding not accompanied by resource use.

8:30 AM –10:00 AM   TUESDAY   [Health, Its Distribution And Its Valuation]

Cape Town International Convention Centre | CTICC 1 – Room 1.43

The Economic Burden of Long COVID: Evidence and Policy Responses Globally

MODERATOR: **Paula Lorgelly**, University of Auckland | Waipapa Taumata Rau

DISCUSSANT: **Manuel Gomes**, University College London

Estimating the Health and Economic Burden of Long COVID in Australia: Progress and Challenges

PRESENTER: **Martin Hensher**, Deakin University

AUTHOR: Mary Rose Angeles

Due to its stringent and successful control measures, Australia suffered few COVID-19 infections during most of 2020 and 2021; as a result, the scale of Long COVID and post-acute sequelae in Australia was correspondingly limited. This changed rapidly following the shift in policy settings under the National Reopening Plan in late 2021. By December 2022, more than 10.75 million confirmed cases of COVID-19 had been recorded across Australia, more than 95% occurring since 1 January 2022; seroprevalence studies suggest that over two-thirds of Australians had been infected by August 2022 alone. The emergence of Long COVID at scale in Australia has therefore been different from that seen in many peer countries, as a phenomenon appearing largely over the last year involving Omicron variants, in a population with high vaccination rates.

Unlike many other peer countries, Australia has not yet implemented any systematic population surveillance surveys or systems to estimate the prevalence and impact of Long COVID, and very limited primary data is available. Yet public and media concern over the reported

experiences of a rising number of people living with Long COVID has grown, as has concern over limited access to care and services during a period of generalized pressure and crisis in healthcare access. This presentation will summarise the results of modelling work by the authors examining the likely scale and impact of Long COVID and post-acute COVID-19 sequelae. It will report on estimates of prevalence, burden of disease and likely economic impacts across Australia.

The presentation will then consider some of the particular challenges which have impeded the development of effective policy responses to Long COVID in Australia, despite the country's initial timing advantage. These include the lack of effective surveillance data; political, business and media pressures to "move on" from COVID; lack of evidence on effective therapeutic options for Long COVID; and the difficult intersection of Long COVID with a wider crisis in Australian healthcare that – while exacerbated by the pandemic – pre-dates COVID-19. More proportionate health and economic policy responses will then be proposed and discussed.

The Economic Costs of Long COVID in the United States

PRESENTER: **David Cutler**, Harvard University

Over 6 million people have died of COVID-19 worldwide, including nearly 1 million in the US. But mortality is not the only adverse consequence of COVID-19. Many survivors of infection suffer long-term impairment, officially termed Post-Acute Sequelae of SARS-CoV-2 infection (PASC) and commonly often referred to as "long COVID". Fatigue is the most common symptom of long COVID, but long COVID has been documented to affect nearly every organ system, from respiratory illness to mental health.

In this paper, I estimate the economic costs of long COVID in the United States. I focus on cases to date; there will surely be additional cases in the future, but it is hard to know how many there will be. There are three economic costs to long COVID: reductions in the length and quality of life; lost productivity from workers who are less productive at work or absent from work entirely; and increased medical spending to treat long COVID. There are other transfers that occur, for example from non-disabled to disabled individuals, but these are not social costs.

Data to estimate the costs of long COVID come from several sources. Prevalence information comes from national surveys. Data on labor force participation come from labor force surveys. Medical spending information comes from comparing long COVID to other conditions.

Preliminary results suggest very high costs of long COVID, totaling roughly $3.5 trillion in the United States. Future work, to be presented at the conference, will refine these estimates.

The Impact of Long COVID on Healthcare Resource Use and Work Participation in the Netherlands

PRESENTER: **Stella Heemskerk**, Erasmus MC

AUTHORS: Iris Brus, Inge Spronk, Peter Tieleman, Sara Biere-Rafi, Juanita Haagsma, Suzanne Polinder

To date, over 8 million acute COVID-19 infections have been registered in the Netherlands. A substantial proportion of these cases suffer from persistent COVID-19 symptoms, also described as long COVID. In addition to long-term health consequences, there is an economic burden of long COVID for the patients and for society. The majority of long COVID patients visited at least one healthcare provider. Moreover, due to the problems with daily functioning, patients are unable to return (completely) back to work and/or be declared incapacitated for work after two years of sick leave.

As part of a longitudinal cohort study, data was collected through a digital questionnaire among patients with self-reported long COVID, meeting the WHO clinical case definition and who registered in the Dutch long COVID registry of C-Support. This study was conducted in collaboration with C-Support: a Dutch organization, commissioned by the Ministry of Health, that informs, advises and supports patients who experience long-term complaints after COVID-19. This study aimed to determine long-term consequences of long COVID and impact on health-related quality of life and work participation, and to describe healthcare resource use. Approval was obtained from the Medical Ethics Review Board of the Erasmus Medical Center (MEC-2021-0751).

From February 2022 onwards, long COVID patients were invited to complete a digital questionnaire. To date, over 10,500 patients completed the questionnaire and analyses amongst the first 8,630 respondents were performed. The majority (77%) of the respondents was female, with a mean age of 47 years and on average 14.5 months since acute COVID-19 infection. Health-related quality of life - measured with EQ-5D-5L - was severely impaired *(mean utility index score 0.56 (SD 0.26) compared with 0.94 (SD 0.11) prior to acute COVID-19 infection)*. On average, respondents visited six *(range 0 to 21)* healthcare providers *(Top 3: 95.1% GP, 88.5% physiotherapist, 73.0%, occupational physician)*. Respondents had the most appointments with the physiotherapist *(mean 39.8 (SD 31.3))*, followed by the occupational physician *(mean 7.2 (SD 5.5))* and the GP *(mean 6.7 (SD 6.8))*. Prior to acute COVID-19 infection, 93.6% of the respondents had paid work *(mean 33.1 (SD 9.6) hours per week)*, of which, at the time of the questionnaire, 45.3% worked fewer hours *(mean 15.8 (SD 9.4) hours per week)* and 33.7% was not capable of working.

From February 2023 onwards, all respondents will receive a second questionnaire that will include the same (standardized) modules as the first questionnaire, as well as additional modules on financial situation (e.g. changes in income and impact of financial situation on healthcare resource use), work productivity, modified work, factors influencing work participation and long COVID treatments.

First year and early second year results will be presented, with a particular focus on the long-term healthcare resource use, financial situation, work productivity and work reintegration of long COVID patients. The presentation will also provide an estimate of the productivity costs of an average long COVID patient in the Netherlands.

Long COVID in Aotearoa New Zealand: Early Results from a Disease Registry on Economic Burden
PRESENTER: **Paula Lorgelly**, University of Auckland
AUTHORS: Andrew McCullough, Jenene Crossan

The New Zealand Ministry of Health has funded a long COVID registry to generate evidence with respect to how long COVID is manifesting in Aotearoa New Zealand. At the start of 2022 the population in Aotearoa New Zealand had little natural immunity to COVID-19 (due to closed international borders and lockdowns when needed) but high vaccination rates (due to vaccine mandates). Aotearoa New Zealand like many countries opened it's borders and relaxed it's rules in early 2022. As of December 2022, there have been 1.95m infections (in a population of 5 million) and 99% of these infections are the omicron variant. Therefore understanding the impact of long COVID in a New Zealand context is important, particularly given the omicron variant is considered to have milder symptom expression on average. Conservative estimates suggest that 10% of COVID infections may result in long COVID which could mean 190,000 New Zealanders experiencing the longterm impacts.

The registry is designed to answer research question such as the prevalence of long COVID symptoms, the impact on quality of life, health care utilisation and the impact on individuals' ability to work and undertake caring responsibilities. Individuals – mostly directed from a long COVID support website – complete a questionnaire on entry into the registry and then at regular follow-up points to allow for assessments of change. Individuals who self-report as having long COVID (in part due to a lack of diagnoses and referral clinics) are asked about their initial or repeat infection, asked to report their symptoms and quality of life, asked whether they have sought care and support for their long COVID, asked about any effects of long COVID on their employment and education and also asked about any impacts on whānau | family.

The process of establishing the registry will be presented, with a particular focus on the partnership with Māori, tāngata whenua and also the requirements around data governance. It is well evidenced that COVID-19 and the economic response exacerbated inequalities, disadvantaged populations disproportionately carried the burden. A key deliverable of the registry is evidence exploring if the disparities experienced by Māori and Pasifika with respect to the initial acute infection continue to persist for long COVID.

The presentation will also reflect on the how the health system and other government agencies might utilise the evidence produced on the economic burden of long COVID. Aotearoa New Zealand is undertaking a once in a generation health system reform; new agencies and entities are tasked with improving the health system to address inequalities in health. Given health care only accounts for 20-25% of the variation in health outcomes, the evidence of broader burden could be instrumental in addressing the social determinants of health in terms of workplace policies, disability and chronic disease characterisation and social welfare benefits.

10:00 AM –10:30 AM TUESDAY [Social Events]

Cape Town International Convention Centre | CTICC 1 – Clivia, Jasminum & Strelitzia conservatories
Refreshment Break and Poster Viewing

10:00 AM –10:30 AM TUESDAY [Supply And Regulation Of Health Care Services And Products]

Cape Town International Convention Centre | CTICC 1 – Clivia conservatory
POSTERS: Field 5. Supply and Regulation of Health Care Services and Products

5.1 Exploring Doctors' Trade-Offs between Management, Research, and Clinical Training in the Medical Curriculum: A Discrete Choice Experiment in Southern Africa
PRESENTER: **Astrid Turner**, University of Pretoria
AUTHORS: Jacqueline Wolvaardt, Mandy Ryan

Background - Medical curricula should prepare medical doctors for roles that extend beyond that of a clinician. But the medical curriculum is often informed by historical content where clinical training surpasses any other topic. A qualitative research study demonstrated consensus that management and research training need to be incorporated in medical training in southern Africa. To inform curricula design it is important to understand what the profession would be willing to give up in terms of clinical training time for these topics.

Aim - To establish how much clinical activity training time doctors in southern Africa would give up for time spent on research and management training, as well as changes in the way the medical curriculum is delivered.

Methods - A discrete choice experiment (DCE) was used. The DCE was informed by literature reviews, qualitative research, expert contributions and piloting phases. Five attributes were included: i) management content; ii) research content; iii) teaching method iv) placement in the curriculum; and v) clinical training hours in a week. Respondents were presented with 10 choice tasks (2 were repeats) generated from a D-efficient design. A contingent valuation question was included to inform levels for the clinical time activity in the main survey. Respondents' preference for tradition or change was assessed using the Resistance to Change-Beliefs scale. Demographic information was collected to assess observed preference heterogeneity.

Data quality was assessed (repeat choices and speedsters). Analysis of the DCE data was based on the Random Utility Maximisation framework using variants of the multinomial logit model. Willingness to Give Up Time (WTGUT) was estimated for all attributes i.e., how many hours respondents would be willing to give up from the current 40 hours clinical training to be used for management and/or research training instead.

The online pilot DCE survey was sent to 50 medical doctors in September 2022.

Pilot results - No "low quality data" was identified. Parameter estimates suggested face validity in terms of direction of preference. For example, relative to no management training, respondents preferred all other levels, with an upward trend as training increased. Relative to no research training, there was a preference for "using research". Regarding teaching method, relative to a face-to-face level, respondents preferred hybrid method slightly more. There was a stronger preference for teaching of the content throughout the years. However, WTGUT estimates lacked face validity with suggested hours beyond the 40-hour maximum for some curricula. Further data analysis revealed only 3% of choices were for the opt-out. Modelling the clinical training attribute as non-linear demonstrated that respondents did not distinguish between clinical time levels and the contingent valuation indicated respondents were willing to give up time beyond the upper level in the DCE.

Conclusion - Whilst respondents engaged with DCE task, the clinical training levels did not push individuals to their maximum. Levels were revised for the main study in January 2023. Data will be available for presentation.

Implications for practice/policy - Findings from the study will inform the redesign of the medical curriculum in southern Africa.

5.2 Availability and Affordability of Medicines in Côte d'Ivoire

PRESENTER: **Akissi Régine Attia Konan**, University Félix Houphouët Boigny
AUTHORS: Agbaya Stephane Serge Oga, Jérôme Kouamé, Sonan Florentin N'depo

Introduction

Access to good quality medicines is one of the pillars of the health care system. Indeed, medicines allow the treatment of diseases and thus save lives. However, millions of people do not have access to them, mainly in Africa, for financial reasons. In a context of insufficient financial protection system, we conducted a study to determine availability and affordability of medicines in private and public sector facilities in Côte d'Ivoire.

Material and methods

The standardised methodology designed by the World Health Organization and Health Action International was used to survey 4 infectious disease and 2 chronic disease medicines. Data were collected in five regional sanitary area in 10 public health facilities and 10 private retail pharmacies. Originator brand (OB) and lowest-priced generic (LPG) equivalent medicines were monitored and their prices compared with the international reference prices. Availability was measured from drug discountinuation in the last 6 month. Affordability was calculated in terms of the daily wage of the lowest-paid of the least qualified public sector employee.

Results

The availability of products was lower in the public sector (19% of drug shortages over the last 6 months compared to 10% in the private sector, p<0.001). Public sector LPGs were 4.97 times higher than IRPs and private sector OB medicines were priced 22.75 times higher, whilst LPGs were 13.43 times higher. OBs cost more than LPGs. Treatment with generic drugs was more affordable and on average 4 times less expensive than with OBs. Standard treatment with OB cost more than a day's wage. In the private sector, standard treatment cost more than a day's wage (on average 9 days with OBs and 5 days with LPGs). In the public sector, 57% of treatments with LPGs cost less than one day's wage.

Conclusion

Developing a pricing policy by implementing price controls, focusing on the drug substitution mechanism and deploying local production of generic medicines could improve availability and affordability, whilst at the same time extending insurance mechanisms for the low income population.

5.3 Achieving Universal Health Coverage and Sustainable Development Goals By 2030: Investment Estimates to Increase Production of Health Professionals in India.

PRESENTER: **Anup Karan**, Public Health Foundation of India (PHFI)
AUTHORS: Himanshu Negandhi, Mehnaz Kabeer, Diip Mairembam, Tomas Zapata, Hilde De Graeve, James Buchan, Sanjay Zodpey

Title: Achieving Universal Health Coverage and Sustainable Development Goals by 2030: Investment estimates to increase production of health professionals in India.

Background: COVID-19 has reinforced the importance of having a sufficient, well-distributed and competent health workforce. In addition to improving health outcomes, increased investment in health has the potential to generate employment, increase labour productivity and

foster economic growth. Shortages and skewed distribution of health workforce in India is well documented. However, little evidence is available on the required size of investment for increasing the production of health workforce to meet SDGs and the potential economic benefits of such investment in India. We estimated the required investment for increasing the production of the health workforce in India for achieving the UHC/SDGs and its potential economic benefits in terms of contribution to gross domestic product.

Methods: We used data from National Health Workforce Account 2018, Periodic Labour Force Survey 2018-19, population projection of Census of India, Gross Value Added (GVA) per worker from Central Statistical Organisation and government documents and reports. We distinguish between total stock of health professionals and active health workforce. We estimated current shortages in the health workforce using the WHO and ILO recommended health worker: population ratio thresholds and extrapolated the supply and shortages of health workforce till 2030, using a range of scenarios of production of doctors and nurses/midwives. Using mean unit costs of opening a new medical college/nursing institute and increasing intake capacity of institutions, we estimated the required levels of capital investment to bridge the potential gap in the health workforce. We also estimated the projected return to investment for the year 2030 by using employment data of health workforce including doctors, nurses/midwives, associate health professionals and support staff, and GVA per worker in the health sector.

Results: To meet the WHO developed threshold of 34.5 skilled health workers per 10,000 population, there will be a shortfall of 0.16 million doctors and 0.65 million nurses/midwives in the total stock and 0.57 million doctors and 1.98 million nurses/midwives in active health workforce by the year 2030. The shortages are higher when compared with a higher threshold of 44.5 health workers per 10,000 population. The estimated investment for the required increase in the production of health workforce ranges from INR 523 billion to 2,580 billion for doctors and INR 1,096 billion for nurses/midwives. Such investment during 2021-25 has the potential of an additional employment generation within the health sector to the tune of 5.4 million and contributes to national income to the extent of INR 3,429 billion annually.

Conclusion: India needs to significantly increase the production of doctors and nurses/midwives through investing in opening up new medical colleges. Nursing sector should be prioritized to encourage talents to join nursing profession and provide quality education. India needs to set up a benchmark for skill-mix ratio and provide attractive employment opportunities in the health sector to increase the demand and absorb the new graduates in the health system.

5.4 Reimbursement Reductions and the Use of Balance Billed Medical Devices: The Case of Drug-Eluting Coronary Stents

PRESENTER: **Wei-Lun Chang**, Taipei Veterans General Hospital
AUTHORS: Ming-Neng Shiu, Hao-Min Cheng, Yi-Wen Tsai

Background: Evidence shows that medical care providers may switch from providing low-priced products to high-priced alternatives in response to financial pressure resulting from reimbursement reductions. This is called the substitution effect. The substitution effect has been rarely studied on balance billing under a single-payer system.

Objective: This study aimed to examine the impact on patient use of high-priced drug-eluting stents (DES) that allowed for balance billing as a consequence of price cuts of bare-metal stents (BMS) by the Taiwan National Health Insurance Administration in 2009.

Methods: Our quasi-experimental study used population-based data from the Taiwan Health and Welfare Data Science Center database and identified two study populations: (1) 41,409 patients who were implanted with coronary stents (BMS or DES) and (2) 15,422 patients who were implanted with DES in 2008–2009. The study period began from January 2008 until December 2009, covering a 12-month pre-policy period and a 12-month post-policy period. Based on the brand and generation of DES products, we classified them into low-priced or high-priced DES. We examined the use of DES in patients implanted with coronary stents, and the use of high-priced DES in patients implanted with DES. We applied segmented logistic regression models with mixed effects to assess the effects of the BMS price reductions on the use of DES by the patients. By applying the models, we estimated the changes in the levels of DES and high-priced DES using immediately after the price reductions (immediate effects), together with the changes in the trend post-policy (gradual effects). We first conducted analyses for all hospitals. Thereafter, we conducted the analyses after stratification by hospital stent volume, ownership, and accreditation level.

Results: After adjusting for potential confounders, we observed that the odds of using DES and high-priced DES by patients immediately decreased by 20% (odds ratio 0.80 [95% CI 0.67 to 0.96]) and 56% (odds ratio 0.44 [95% CI 0.33 to 0.59]), respectively, following the BMS price reductions. During the post-policy period, the odds of using both DES and high-priced DES had a relative increase of 1% for each additional month compared with the pre-policy period. However, the changes were not statistically significant (DES: odds ratio 1.01 [95% CI 0.99 to 1.02]; high-priced DES: odds ratio 1.01 [95% CI 0.99 to 1.04]). After the stratification, there were significant immediate policy effects on DES use in hospitals with a high stent volume, public hospitals, and medical centers. We observed significant immediate policy effects on high-priced DES use in private hospitals. Significant gradual policy effects on DES use were observed in public hospitals and medical centers. In terms of gradual policy effects on high-priced DES use, a relative increase was observed in private hospitals, whereas a relative decrease was observed in public hospitals.

Conclusion: The BMS reimbursement reductions substantially decreased the use of DES and high-priced DES by the patients. The reduction in DES use probably resulted from increases in the amount of balance billing paid by the patients.

5.5 Old Age and Rarity: A Systematic Review of Equity Issues Among Older Adults with Rare Diseases

PRESENTER: **Jean Pierre Uwitonze**, University of Bern
AUTHORS: Lize Duminy, Carl Blankart

Introduction

Older adults with rare diseases face unique barriers to treatment since issues related to "older adult populations" and "rare disease populations" are exacerbated by specificities inherent to the two populations. As a result, older adults with rare diseases experience two compounding barriers to access: barriers related to advanced age as well as barriers related to rare diseases. By conducting a systematic review of rare disease literature, our main objective is to investigate whether there is evidence of implicit or explicit discrimination levied by health systems against older adults with rare diseases.

Methods

We systematically searched for evidence related to equity and rare diseases following the PRISMA guidelines. We extracted evidence from PubMed via Medline, Cochrane and Embase databases. Two reviewers independently screened the 1705 results and applied a predefined set of inclusion and exclusion criteria for both title and abstract screening and full text screening. Ultimately, 50 articles were deemed eligible for inclusion in the final study. The inter-reviewer Kappa coefficient between the reviewers was 0.95 with disagreement being resolved through discussion. During analysis, we hand-sorted eligible evidence and categorized comparison groups to either older adults with rare diseases vs. younger persons with rare diseases (6 articles), rare disease population vs. non-rare disease population (23 articles) and orphan drugs vs. non-orphan drugs (21 articles).

Results

We clustered our results into four major categories: ethical discussions (11 articles), regulatory frameworks (22 articles), societal preferences (11 articles) and rare disease patients' experience (6 articles). In the rare disease patients' experience cluster, our systematic review reveals that older rare disease patients face disproportionately bigger hurdles—especially at primary care level. Equity principles form the core of ethical discussions cluster. While some of these ethical discussions seem to justify the different forms of discrimination towards rare disease patients or older adults, hardly any consensus exists. On the other hand, evidence gauging societal preferences tries to justify discriminatory actions using societies' little consideration for disease rarity in comparison to disease severity. Furthermore, the heterogeneous standards that characterize most regulatory frameworks reveal methodological biases against (older) persons with rare diseases.

Discussion and Conclusion

Older adults with rare diseases face unique problems with less willingness from society and payers to address their specific unmet needs. To address equity-related challenges of older adults with rare diseases, regulatory and reimbursement frameworks need to be designed to be more responsive to these population groups. From a systems perspective, policymakers and regulatory authorities must better understand these equity issues and address them integrally in reimbursement decisions and appraisals. Nonetheless, we were not able to identify much evidence that specifically concerns older adults suffering from rare diseases—thus an area future research may focus on.

5.6 Nurse Staffing and Exclusive Breast Milk Feeding during the Childbirth Hospitalization

PRESENTER: **Joanne Spetz**, University of California
AUTHORS: Audrey Lynson, Kathleen Rice Simpson, Jie Zhong, Caryl Gay, Jason Fletcher

Background: Nursing care is an important component of the overall quality of healthcare experienced by patients and families, especially during the perinatal period. Evidence for nursing care quality in maternity settings is limited, and nurse-sensitive maternity indicators need to be established. Prior research with mothers, nurses, and physicians suggests that one such potential indicator is initiation of human milk feeding during the childbirth hospitalization. Nurses play a significant role in supporting the initiation of lactation during the childbirth hospitalization, and structural factors – such as nurse staffing - that affect the process of nursing care may limit the overall 'dose' of breastfeeding related nursing care patients receive.

Research Aim: The purpose of this study was to determine the relationship between nurse-reported staffing, missed nursing care, and exclusive breast milk feeding during the childbirth hospitalization while also accounting for other structural factors, including hospital size, teaching intensity, level of obstetric and neonatal services, volume of births, and location. A secondary aim was to examine associations between adherences to national staffing guidelines and hospital characteristics.

Methods: We used unique data from a survey of 2,691 United States labor nurses who worked in a sample of 184 hospitals for which breastfeeding rates and control variables were available. The outcome variable was the 2018 Joint Commission PC-05 Exclusive Breast Milk Feeding rate. Nurse reported staffing was measured as the perceived labor & delivery unit compliance with Association of Women's Health, Obstetric and Neonatal Nurses staffing guidelines. Data from the nurse survey were aggregated to the hospital level. Bivariate linear regression was used to determine associations between nurse and hospital characteristics and exclusive breast milk feeding rates. Generalized structural equation modeling was used to model relationships between nurse reported staffing, nurse-reported missed care, and exclusive breast milk feeding at the hospital level.

Principal Findings: Bivariate analyses demonstrated a positive association between nurse-reported staffing and exclusive breast milk feeding, and a negative association between missed nursing care and exclusive breast milk feeding. In structural equation models controlling for covariates, missed skin-to-skin mother-baby care and missed breastfeeding within one hour of birth partially mediated the relationship between nurse-reported staffing and exclusive breast milk feeding rates. We also found that higher birth volume, having a neonatal intensive care unit, teaching status, and higher percentage of births paid by Medicaid were all associated with lower mean guideline adherence scores.

Conclusions: This study provides evidence that hospitals' nurse-reported compliance with national staffing guidelines is predictive of hospital exclusive breast milk feeding rates, and that exclusive breast milk feeding rates are a nurse-sensitive outcome. Important gaps in staffing were reported more frequently at hospitals serving patients more likely to have medical or obstetric complications, leaving the most vulnerable patients at risk. Hospitals should facilitate practices that promote successful breast milk feeding, including providing adequate staffing and organizational structures to support nurses' provision of high-quality care inclusive of routine skin-to-skin care at birth and assistance with initiating feeding within the first hour of birth.

5.7 Executive Contracts for Sustainable Innovation: Incentivising Gains in Wealth and Health

PRESENTER: **Slavek Roller**, University of Groningen

I propose a framework of contracting for sustainable innovation. The magnitude of innovation (minor vs. major) reflects competitiveness, measured as appropriated net social surplus (profit) from the new market share gained due to innovation. In contrast, the magnitude of sustainable innovation reflects value creation, measured as net social surplus gained in the economy - without limiting said surplus to material prosperity gains. I consider how sustainable finance regulations and practices can influence sustainable innovation via the design of executive contracts. I apply this framework of contracting for sustainable innovation to explain the patterns of social value creation in the pharmaceutical industry. To this end I create a novel dataset in which the therapeutic improvement of each novel medicine proxies net social surplus.

I classify innovation metrics based on the beneficiary of the value that the innovation ought to create: shareholders (incentives linked to appropriated social surplus) or society (incentives linked to generated social surplus). The former either explicitly tie innovation to economic success of new products ("sales for new products launched"; "product pipeline with the long-term growth of the company in mind"; "new molecular entities with favourable potential impact on long-term revenue growth rate") or in their quantity ("number of reimbursable product approvals"; "registrational volume"; "deliver two new molecular entity (NME) launches per year"). The latter tie innovation to patient benefit ("delivering more years of life and quality of life for people around the world"; "patient value") or therapeutic advance ("obtain breakthrough designation from the FDA"; "highly statistically significant treatment effect", "number and level of innovation of the products").

I find that companies using executive compensation incentives linked to social surplus creation (with performance metrics measuring sustainable innovation) have a higher rate of subsequent medical advances - medicines with significant or breakthrough therapeutic improvement - than companies using incentives linked to social surplus appropriation. This finding points to a possibility for an optimal innovation policy that instead of directly targeting innovating firms (patent laws, taxes, government-funded innovation prizes, etc.) targets the decision-making agents in those firms via, for example, sustainable finance regulations and corporate governance provisions therein.

Apart from its relevance for the rich theoretical literature on contracts, it is also a topical regulatory issue: in both the EU and the US executive pay laws are under reform. In June 2020 the three Chairs of the European Supervisory Authorities wrote a letter to the European Commission highlighting the need "to improve clarity around the link between a company's non-financial performance and the variable remuneration afforded to directors". Under the U.S. Securities and Exchange Commission (SEC) Pay Versus Performance Disclosure Rules adopted in August 2022 a company's disclosure of its performance to investors may "include non-financial performance measures". There's therefore a political momentum to use sustainable finance laws (including those concerning the executive pay) to incentivise value-for-society-creating means through which the companies achieve their financial gains.

5.8 Viability of *Chlamydia Trachomatis* Among Patients Diagnosed By Nucleic Acid Amplification Testing: A Meta-Analysis and Implications for Routine Testing

PRESENTER: **David C Boettiger**, The University of New South Wales
AUTHORS: Arthur Wong, Nicole Lima, Caroline Watts

Background

Chlamydia trachomatis (CT) is one of the most common sexually transmissible infections worldwide. In Australia, there were 90,516 CT notifications in 2020 with 71% among people aged 15 to 29 years and 55% among females. Nucleic acid amplification tests (NAATs) are the current gold standard for diagnosing CT infection. However, NAATs do not distinguish between viable and non-viable bacteria as nucleic acids can persist after cell death. Recent advances in testing technology have shown that a sizeable portion of CT diagnoses are due to non-viable organisms. We aimed to quantify how much antibiotic use could have been avoided in 2020 in Australia, and the associated cost savings, had antibiotic treatment been withheld for people with non-viable CT infection.

Methods

A systematic review was conducted by searching electronic databases (PubMed, Embase, Scopus, Dimensions, Google Scholar) for studies published to November 2022 using the following terms: ("Chlamydia" OR "Chlamydia trachomatis") AND ("viability" OR "bacterial load").

Studies were included if they analysed clinical samples using both a NAAT and a modern viability technique (viability PCR, mRNA testing, extensive culture). Fixed-effects meta-analyses calculated pooled estimates stratified by anatomical site of infection. Pooled estimates were compared against published estimates of national CT incidence, treatment rates, and treatment costs. Based on earlier studies, 67.1% of treatments in women were for urogenital infection only, 5.2% for rectal infection only, and 27.7% for urogenital and rectal infection. All treated infections in males were assumed to be rectal. We assumed patients with non-viable infection would not experience any long-term complications with or without treatment.

Results

Ten studies were eligible for inclusion in our meta-analysis. Of these, 7 studies contributed to our analysis of vaginal CT and 5 studies contributed to our analysis of rectal CT. Estimates for vaginal CT non-viability ranged from 4-24%, with a pooled estimate of 15% (95% CI 13-17%, I^2=86.98%). Estimates for rectal CT non-viability ranged from 7-48%, with a pooled estimate of 45% (95% CI 41-49%, I^2=87.97%). Assuming all treated CT infections in 2020 used doxycycline, withholding treatment among those with non-viable infection would have reduced antibiotic consumption by 338,214 defined daily doses (DDD) and saved \$AU 716,500. If we assumed all treated CT infections used azithromycin instead, withholding treatment among those with non-viable infection would have reduced antibiotic consumption by 80,527 DDD and saved \$AU 399,300. Given systemic antibiotic consumption in Australia is approximately 215.4 million DDD per year, the above described DDD reductions represent 0.16% (doxycycline) and 0.04% (azithromycin) declines in total systemic antibiotic use.

Conclusions

Routine CT viability testing could substantially reduce unnecessary antibiotic consumption, contributing to antimicrobial stewardship efforts and reducing healthcare system costs.

5.9 A Network of Causes: Framing the Multidimensional Nature of Medicine Shortages

PRESENTER: **Jan Panhuysen**, Hertie School Berlin
AUTHORS: Eva Goetjes, Katharina Blankart, Mujaheed Shaikh

Objectives

Medicine shortages reflect the (temporary) lack of sufficient access to (essential) medicines, where at least temporarily supply cannot meet demand at a national level. Targeted interventions to mitigate such shortages necessitate knowledge on the multidimensional nature of the causes of medicine shortages and understanding the strength and complexity of relationships between them. In this paper, we systematically assess the mechanisms underlying medicine shortages and derive a framework that captures the role of individual causes.

Methods

We performed a scoping review, as per PRISMA guidelines, of articles published from 2000 to 2021 on the causes of human medicine shortages. Consolidated into eight categories as established by EU Single Point of Contact (SPOC) framework, we apply 'Evidence Synthesis for Constructing Directed Acyclic Graphs (ESC-DAGs)' to build a DAG representing a network of causes and relationships between them. We examine the importance of causes and the strength of dependencies between them using centrality measures used in Network Analysis and provide guidance to empirical researchers interested in using the network.

Results

We retrieved 112 articles and identified 73 distinct causes of medicine shortages. Manufacturing related causes of shortages are reported most frequently followed by commercial and demand driven causes. Within manufacturing, access to raw materials, constrained capacities and high supply-side concentration are major causes leading to shortages in North America and EU, while in the rest of the world distribution issues are more prevalent. Within commercial issues, low profitability and low prices remain the primary reason for shortages. Our DAG shows a network among 57 of these causes with 143 distinct relationships. Network centrality measures identify market-based issues such as high concentration of manufacturers, supply of raw materials, and limited scalability as most central to the network. However, many mechanisms underlying medicine shortages are in fact channelled through questions of economic viability, which offers largest potential for interventions. The causal framework is provided as an online tool for self-exploration and use-case specific application for empirical researchers and policy makers.

Conclusion

Understanding the causes of medicine shortages is a complex endeavour: Effective policy interventions require a comprehensive approach, which considers the unique characteristics and interconnections of these causes. The framework developed allows localising scope for policy intervention and informs scholars in refining empirical strategies attempting causal analyses in the field.

5.11 Impacts of National Reimbursement Drug Price Negotiation on Drug Accessibility, Utilization, and Cost in China: A Systematic Review

PRESENTER: **Zheng Zhu**, Peking University

AUTHORS: Quan Wang, Zhihu Xu, Jiawei Zhang, Peien Han, Li Yang

Objective

Since 2016, the Chinese government has regularly implemented six rounds of the National Reimbursement Drug Price Negotiation (NRDPN) to improve the accessibility of innovative drugs. This systematic review aimed to determine the effects of NRDPN on drug price, availability, affordability, utilization, cost, and health outcomes in China in the years 2016–2022.

Methods

We searched the electronic databases PubMed (which includes MEDLINE), Web of Science, China National Knowledge Infrastructure (CNKI), Wanfang, and VIP for all associated studies published in English or Chinese between 2016 and 2022. One of the following outcomes had to be reported: drug price, availability, affordability, utilization, cost, or health outcomes. The study design had to be a randomized or non-randomized trial, an interrupted time series (ITS) analysis, a repeated measures study, or a controlled before−after (CBA) study. Two reviewers independently extracted data and assessed the studies according to Cochrane Effective Practice, Organization of Care (EPOC) guidelines.

Results

From a total of 2628 studies, we identified 15 studies that met the inclusion criteria (14 interrupted time−series studies and 1 controlled before−after study). The published studies indicated the implementation of the NRDPN policy decreased drug prices and improved drug availability and affordability. It has been suggested that the NRDPN was conducive to narrowing disparities in availability and affordability across regions, hospital levels, and types of health insurance. In addition, it was associated with the increased use of successful-negotiated drugs and decreased out-of-pocket expenditures (OOP). However, health outcome changes attributed to NRDPN policy were not found in the published studies.

Conclusion

Evidence to date generally suggests the NRDPN policy is an effective way to improve the accessibility of innovative medicines and protects vulnerable populations from inequity in access to medicines. It is also associated with a price reduction and patient financial burden alleviation. However, there are still challenges to benefiting patients sufficiently and equally. Policymakers should develop a more collaborative policy combination to coordinate with the NRDPN policy, as well as improve financial protection and equal opportunities in access to medicine.

5.12 Pharmacy Adoption and Supply Constraints in Generic Pharmaceuticals: Evidence from Japan

PRESENTER: **Haruo Kakehi**, Keio University

AUTHOR: Ryo Nakajima

Background:

Authorized generic (hereafter, AG) produced by a brand company is entirely bioequivalent for a brand-name drug. Literature shows patients prefer AG by its brand premia, which implies that AG's diffusion can promote generic substitution and reduce healthcare costs. However, healthcare providers often limit patients' access to some pharmaceuticals, and not all patients use AG.

Purpose:

To understand how the supply side constrains the patient's choice, we studied pharmacies' prescription behavior, using an example of antibiotics AG. We chose simple Japanese prescription practices for three reasons. First, in Japan, insurers and Pharmacy Benefit Management (PBM) have little influence in limiting patients' prescription drugs, the coverage of health care is universal, and patients have free access to the same treatment at the same price across the country; however, AG's adoption rate varies among pharmacies. Second, patients and physicians do not choose either AG or non-AG, and only pharmacies, in principle, adopt and prescribe either of them. Third, no alternative antibiotics AG exist in the same ATC4, and pharmacies cannot substitute prescriptions with similar generics. This is ideal for evaluating the pharmacy's behavior limiting the patient's choice.

Method:

We investigated the pharmacies' adoption decision using the medical claim data from December 2014 to December 2021 provided by Japan System Techniques Co., Ltd., which collects approximately 7.7 million individual data from multiple corporate health insurance programs. The empirical problem is that the pharmacy's adoption decision is potentially endogenous. We employed a correlated random coefficient model to deal with this problem. Using the model, we examined (1) how much the AG adoption can promote generic substitution and reduce cost, (2) why the adoption varies across pharmacies, and (3) what pharmacy factors are related to the adoption.

Result:

First, we confirm that adopting AG promotes the generic substitution in antibiotics by 2.38%. In addition, AG adoption reduces healthcare costs by 1.7-6.3% in antibiotics, which varies among prefectures. Second, we find evidence that the return from AG adoption differs among pharmacies. This return is more prominent for pharmacies that achieve minor generic substitution if they prescribe non-AG. Third, we show that the return derives from the government's subsidy and pharmacies' management style. Due to the government's generic subsidy, each pharmacy can earn profits by increasing its generic share. On the other hand, the adoption cost of AG, including wholesale price and supply

chain, varies among pharmacies. Each pharmacy's return from adopting AG depends on these costs and benefits. The results show that while the subsidy promotes AG adoption, large chain pharmacies are especially reluctant to adopt AG. Considering this return, the adoption decision of AG is entirely rational, and the return explains the different AG adoption rates.

Conclusion:

These results reveal that while AG can promote generic substitution, the pharmacy's adoption decision constrains the patient's choice. Our findings have implications for the costs and benefits of AG's diffusion and supply side constraints. Additionally, the results inform policymakers on the effect of pharmacy's management style on healthcare costs without insurer and PBM influence.

5.13 The Pan-Canadian Pharmaceutical Alliance and the Volume-Based Procurement Scheme in China: A Comparative Study Using Donabedian's Structure-Process-Outcome Framework

PRESENTER: **Quan Wang**, University of Toronto
AUTHORS: Siqi Liu, Zhijie Nie, Zheng Zhu, Xia Wei, Jiawei Zhang, Jingyu Zhao, Li Yang

Background:
High price directly impacts the affordability and accessibility to medicines. Consolidating bulk purchasing power from multiple payers into an alliance to negotiate drug prices with manufacturers is a strategy that might effectively work to motivate firms to provide a price concession. The pan- Canadian Pharmaceutical Alliance (pCPA) in Canada and the Volume-Based Procurement Scheme (VBP) in China are two initiatives for achieving well-coordinated drug provision via pricing, procurement and payment policies by capitalizing on the combined governments' buying power.

Methods:
Donabedian's structure-process-outcome framework was applied for understanding 2 initiatives systematically. Data was collected through literature review, including academic article, gray literature, and outcome reports. We also compared the prices of overlapped drugs as one of the outcome indicators.

Results:
For structure part, the pCPA is an upstream initiative led by province/territory (P/T), aimed to increase access to clinically relevant and cost-effective treatments. By contrary, VBP is a downstream national initiative prioritized for drug price reduce. Unlike pCPA, VBP transfers purchasing power from the separative medical institute to a centralized organization, which consequently provides stable expectations for pharmaceutical bidders. Therefore, in the process arrangement, pCPA negotiation is open to all drug manufacturers, whereas Generics Consistency Evaluation is prerequisite for VBP bidding process. The legal disjunction between negotiation procurement of pCPA negotiation adds more uncertainty on manufacturers who have to provide clear price discount under unclear market size. For VBP, as the main purchasing entities, the public medical institutions in the program area are explicitly required by the governments to commit to the entire volume they submitted after completing the price negotiation. The former undermines market stability and the latter deprives prescription right from medical institutes partially. The pCPA and VBP reduced generic prices of drugs, by 60% and 53%, averagely. The prices of overlapped generic drugs in VBP are about 33.46% and 51.50% of pCPA, by exchange rate and purchase power parity. With clear time line, the VBP bidding process can be finalized in 3 months, whereas the pCPA usually needs 12 months. In both initiatives, regions with larger market size get more benefits.

Conclusion:
Access to pharmaceuticals is a multidimensional challenge that requires integrated policies and strategies with the engagement of all related parties. Experience in the two countries has shown that coordinated alliances might involve lots of piecemeal interactive problems, a sophisticated system with a robust long-range plan may address these better.

5.14 Does Hospital Management Matter? Evidence on the Relationship between Hospital Management Practices and the Quality of Newborn Care in Malawi

PRESENTER: **Victor Mwapasa**, Kamuzu University of Health Sciences
AUTHORS: Charlotte Ward, Andrew Kumitawa, Linda Nyondo-Mipando, Catherine Goodman, Wanangwa Chimwaza, Vincent Samuel Phiri, Christian Bottomley, Timothy Powell-Jackson

Background

The need to improve the quality of care in health systems in low- and middle-income countries is widely recognised. However, insufficient attention has been given to the role of organizational factors, and particularly, hospital management. Recent evidence indicates that hospital management practices may be a driver of better quality of care. However, few studies have been conducted in low- and middle-income settings, especially ones linking management with mortality outcomes. We examined the association between the adoption of management practices and the quality of clinical care, linking data from a national survey of hospitals to the electronic medical records of more than 20,000 small and sick newborn patients in Malawi.

Methods

Drawing on a systematic review of management survey tools, in-depth interviews of hospital managers, and participatory workshops, we developed a hospital management survey tool tailored to the Malawian context. The tool covered 28 management practices at hospital and neonatal unit level, in the following domains of management: clinical delivery of care; human resource management; target setting and performance monitoring; financial management; and leadership and governance. In April 2022, we implemented the survey in 36 central level, district and faith-based hospitals with more than 3,000 births per year, interviewing up to five clinical and administrative managers of different seniority in each hospital. Our exposure variable was an index of management, calculated as the average of the management practice z-scores across. We linked the management data to a prospective neonatal inpatient dataset that captured information on the universe of newborns admitted to the neonatal unit of the study hospitals. Outcomes included all cause in-hospital neonatal mortality and condition-specific quality of care indicators. We examined associations between the management index and outcomes, using mixed effects logistic regressions, controlling for case-mix and hospital characteristics. In further analyses, we examined the relative importance of different management domains and sub-group differences with respect to hospital sector and level.

Results

The mean management score across the 28 management practices was 3.35 (on scale of 1 to 5), indicating that the average hospital has clear room to improve. Central hospitals were worse managed than lower level hospitals, with a gap in the management score of 0.24, equivalent to a difference of more than one standard deviation. Across the five domains of management, the lowest scores were in target setting and monitoring of performance, and human resource management. The regression results will show robust associations between hospital management practices and the quality of clinical care, and what domains of management drive this relationship.

Conclusion

Development and implementation of a new tool to quantitatively measure management practices in hospitals in a low-income setting is feasible. Our findings will provide novel observational evidence on whether the adoption of management practices matters for the quality of newborn care and will be used to inform the design of an intervention to strengthen hospital management in Malawi.

5.15 Impact of Teleconsultation on Healthcare Pathway of Children with Pimd

PRESENTER: **Naomie Mahmoudi**, Conservatoire National des Arts et Métiers (CNAM)
AUTHORS: Laurence Anne Hartmann, Mathieu Narcy

Persons with disabilities face widespread barriers to accessing health and related services. As a result, they have poorer health outcomes than people without disabilities (WHO and World Bank, 2011; United Nations, 2019). This lack of access to care is particularly more important for children with PIMD, especially for access to specialized consultations such as neuropediatric follow-ups (Hully et al., 2017). Telemedicine could help overcome these barriers. Indeed, some telemedicine experiments for children with disabilities in the United States show positive effects on the satisfaction of patients, families and health professionals (Karp et al., 2000; Robinson, Seale, Tiernan, & Berg, 2003).

This study aims to assess the effect of teleconsultations for children with PIMD (profound intellectual and multiple disabilities) on their healthcare pathway (consumption structure, e.g. emergency room visits, hospital visits, outpatient care, medication, other medical goods such as assistive technology and transportation), but also on healthcare costs (for children and their parents).

The methodology relies on the quasi-experimental character resulting from the ongoing implementation of this medical practice into several medical social facilities in the Paris region. This quasi-experiment makes it possible to evaluate the impact of telemedicine on the healthcare pathway of children with PIMD according to whether or not they have benefited from teleconsultations. We implement a difference-in-differences method with multiple time periods (Chaisemartin and D'Hautefeuille, 2020; Callaway and Sant'Anna, 2021). Indeed, in our experimental setting, units receive treatment at different times. We control medical heterogeneity between the experimental and control groups by matching methods. Moreover, two robustness analyses are conducted. The first is to better account the individual heterogeneity by restricting the analysis to two categories of children identified by two diagnoses (children with epilepsy and children with respiratory distress). The second is to better neutralize the effects of heterogeneity between medical social facilities by comparing the impact of telemedicine within the same facility (since in a facility that has adopted telemedicine, not all children with PIMD benefit from it).

We use health administrative data from the French national health insurance scheme linked to the national hospital discharge database (SNDS-PMSI). The period covered is from 2012 to 2021. The study sample corresponds to children with PIMD aged 2 to 18 years old who had at least one visit (consultation and/or hospitalization) during this period in one of the five Parisian hospitals providing neuropediatric follow-up.

This new medical practice should improve access to care for children with PIMD, their quality of life (care and follow-up in their place of residence) and their follow-up (reduction of waiting times for appointments, prevention of hospitalizations/re-hospitalizations and of recourse to emergency rooms). In addition, it could also have a positive effect on the health of family caregivers.

This study could justify the dissemination of telemedicine to provide medical care to children with PIMD (or even other beneficiaries with disabilities) in France. It could also characterize more precisely the healthcare pathway of this specific population, which is still relatively unknown.

5.16 Fertility Impact of Donor-Supported Contraceptives in Sub-Saharan Africa

PRESENTER: **Mingxin Chen**, Johns Hopkins University

AUTHORS: Carolina Cardona, Ian Salas

A substantial amount of aid for family planning goes to the purchase of contraceptives. To what extent does it help countries manage their fertility? We investigate this in the context of Sub-Saharan Africa (SSA), a region with the highest total fertility rate and relatively slow contraceptive uptake. We collected data for 34 SSA countries over 17-years from 2003-2020. Fertility behavior was captured with the General Fertility Rate (GFR) for women aged 15-44 using information from 89 Demographic and Health Surveys. Contraceptive supply coverage was estimated with shipment volumes of donated contraceptives using data collected by the Reproductive Health Supplies Coalition. To measure the effect of subsidized contraception on fertility, quarterly GFR was regressed on quarterly CYP coverage and a full set of quarter-year and country fixed effects. Preliminary results suggest that birth rates are significantly lower after a country receives donated contraceptives. On average, a 5 percentage-point increase in contraceptive supply coverage is associated with a 3.3 percentage-point drop in GFR in the SSA countries. Stratified results suggest that aid for family planning supplies may go further in countries with greater family planning need, but also in countries with more-developed health-systems.

5.17 Implementing Mobile Phone Surveys As a Tool to Improve Surveillance and Priority Setting for the COVID-19 Response in Colombia

PRESENTER: **Andres Vecino-Ortiz**, Johns Hopkins University

Background

The current COVID-19 pandemic tested the capacity of health systems to adapt and respond rapidly to new challenges. These challenges have been most evident in low- and middle-income countries where resources are scarce. One of those challenges has been on surveillance capacity and priority setting

In this work we developed a mobile phone syndromic surveillance system for COVID-19 in Colombia to ensure quick syndromic surveillance and priority setting can be carried out for the next pandemic.

Methods

This work was performed in two waves. In the first wave, a nationally representative mobile phone-based survey was deployed with a target sample of 345 individuals. In the second wave, which was representative at the region level (there are five main regions in Colombia), the survey had a target sample of 435 individuals. Sample sizes were estimated under the assumptions of a 95% confidence (Z=1.96), margin of error = 0.05, and baseline prevalence of 0.34 for the first wave and 0.06 for the second wave (which was informed by the prevalence obtained during the first wave). Phone numbers were selected through random digit dialing. All the participants were adults who lived in Colombia and speak Spanish. The surveys were delivered through Interactive Voice Response (IVR). The survey asks participants about current respiratory symptoms, general health status, COVID-19 vaccination, COVID-19 perceptions, known past infections, and key sociodemographic information such as age, place of residence and sex.

Results

A total of 367 individuals responded to the first wave and 451 individuals responded to the second wave. Results of the surveillance system found that respondents shared sociodemographic characteristics with the current distribution of the Colombian population, suggesting that IVR surveys might have an important potential to be deployed in emergency situations to prioritize individuals at risk as well as identifying vulnerable population groups. Prevalence of respiratory symptoms and its distribution by age, sex, vaccination status and severity of disease was obtained, as well as cost per respiratory case detected.

Discussion

We found that it is feasible to conduct syndromic surveillance activities in order to improve surveillance systems and inform priority setting strategies in the midst of a pandemic. We identified supply and demand factors affecting syndromic surveillance using IVR, and provide guidelines to focus the surveillance on specific populations.

This study highlights the potential of using mobile phone technology for priority setting. IVR is a relatively inexpensive tool with a wide potential coverage. This tool might improve the resiliency and responsiveness of health systems to future pandemics particularly at a time in which financial and human resources are limited.

5.18 Local Manufacture of Antiretroviral Drugs and Commodities in Nigeria: Challenges and a Way Forward

PRESENTER: **Frances Ilika**, Palladium

AUTHOR: Ure Ihekanandu

Introduction: In Nigeria, the argument for indigenous production of antiretroviral (ARV) medications and test kits is ongoing. About 1.9 million people live with HIV in Nigeria, with 1.2 million on antiretroviral therapy. In 2020, US$195 million was invested in HIV commodity expenditure, with more than 81% of these funds from donors, while public and private funds accounted for 18% and 1%, respectively. While these efforts from donors have yielded an increase in the accessibility of antiretrovirals (ARVs) to millions of people living with HIV,

financial support from donors for the HIV response in Nigeria has decreased. Local manufacture of ARV drugs and test kits is a sustainable strategy that can increase private sector participation in HIV financing and ensure significant gains in the country's HIV program. This study determines the feasibility of local manufacture of ARV drugs and commodities in Nigeria, identifies challenges and recommends steps to overcome barriers to in-country manufacture of ARV drugs and commodities.

Methods: The study was done to assess the feasibility of advancing the local manufacture of HIV drugs and test kits. This was a cross-sectional study, with data collected through a mixed method, including literature reviews, questionnaires, preliminary market analysis and key informant interviews (KII). KII participants were purposively selected based on their role in their organizations which is mainly related to overseeing pharmaceutical manufacturing activities or leading external engagement on pharmaceutical production of ARV drugs, while respondents for the questionnaire survey were randomly selected.

Results: 81% of pharmaceutical manufacturers reported that local production of ARVs was feasible in Nigeria. More than half of the pharmaceutical manufacturers expressed a high level of interest in fast-tracking local manufacturing of ARVs. Over 80% of pharmaceutical manufacturers reported that their organizations had discussed the idea of local manufacturing of ARVs, and more than half (56%) reported the willingness to manufacture ARVs locally. The preliminary market analysis showed that the local manufacturer would generate over US$2.16 billion over the course of 10 years and would serve almost 9 million adults on ARVs. While the Nigerian market will dominate for the first 7 years, by 2034, the West African market will eventually overtake the Nigerian market. Current challenges facing the local pharmaceutical manufacturing industry include lack of a clear policy environment, insufficient government commitment, high cost of production, interest rates and custom duty, delay in evaluating dossiers for new products by the regulatory agency, competition from imported products, security, high taxes and poor power supply.

Conclusion: This study shows a considerably favorable market and incentive for local pharmaceutical companies to produce locally. Ultimately, political will, including advanced market guarantees, will be needed to justify the investment. The absence of an enabling environment and policy thrusts by government, guaranteed markets, technical capacity and rigorous WHO approval processes, pose challenges to ARV production. However, ensuring deliberate policy backing, sustained coordination of key stakeholders, including manufacturers, and facilitated joint ventures with donors, international pharmaceutical companies, among others, can ensure that the process for local manufacturing is set on the right trajectory.

10:00 AM –10:30 AM   TUESDAY   [Health Care Financing & Expenditures]

Cape Town International Convention Centre | CTICC 1 – Clivia conservatory
POSTERS: Field 6. Health Care Financing and Expenditures

6.1 Health Insurance and Financial Protection Against Catastrophic Maternal and Child Health Care Expenditure in Zambia

PRESENTER: **Kabaso Mulenga**, University of Witwatersrand
AUTHOR: Frederik Booysen

Abstract

Background: The cost of maternal and child health care can be a barrier that may lead to financial distress and worse health outcomes. This paper investigates the extent to which health insurance provides financial protection against catastrophic maternal and child health care expenditures.

Methods: Analyses were conducted using the 2014 Zambia Household Health Expenditure and Utilization Survey. The paper adopts methods for analysing catastrophic expenditures against the capacity to pay, using Wagstaff and Van Doorslaer's approach, and the Ataguba method. The main research question was investigated using the *eteffects* endogenous treatment effects model.

Results: This paper provides evidence of potential financial distress due to maternal and child expenditures in Zambia. The results showed that antenatal care records the highest incidences of catastrophic expenditures than delivery and postnatal care. On the other hand, the intensity of catastrophe is highest for delivery care expenditures than it is for antenatal or postnatal care expenditures. In addition, the findings from this paper indicate that health insurance is more likely to provide financial protection from catastrophic aggregate, antenatal, delivery and postnatal care expenditures.

Conclusion: The paper provides empirical evidence of catastrophic maternal and child care expenditures in Zambia. In addition, the paper highlights that health insurance reduces the likelihood of women incurring catastrophic antenatal, delivery and postnatal care expenses. Therefore, an increase in universal health insurance coverage, such as through the newly introduced National Social Health insurance Scheme, can lead to better financial protection outcomes, especially for mothers seeking maternal and child health care services.

6.2 Harmonizing Budget and Expenditure Tracking Methods for Strategic Aid Coordination and Operational Efficiencies in Malawi

PRESENTER: **Lalit Sharma**, Clinton Health Access Initiative, Malawi

AUTHORS: Ian Yoon, Pakwanja Desiree Twea, Nikhil Mandalia, Stephanie Heung, Sakshi Mohan, Mark Malema, Atamandike Chingwanda, Mwiza Thindwa, Dominic Nkhoma, Mihereteab Teshome, Briony Pasipanodya, Eoghan Brady, Solome Nampewo, Emily Chirwa, Gerald Manthalu, Andrews Gunda

Background: In Malawi's primarily donor-funded health sector, fragmentation limits the Government's ability to coordinate scarce resources and drive efficiency, with 54.5% of total health expenditure and 80% of HIV funding coming from donors. Multiple resource tracking exercises were therefore developed to increase transparency of funding flows, including Resource Mapping (RM) for forward-looking budgets; National Health Accounts (NHA) for expenditures; and the National AIDS Spending Assessment (NASA) for HIV/AIDS expenditures. However, these parallel exercises increased the time and financial burden on the MoH, impeding institutionalisation. It also increased the reporting burden on organizations to submit similar data for different exercises, contributing to lower response rates and reduced data quality. To address these challenges, the MoH harmonised the RM, NHA and NASA. This abstract describes the process followed and assesses the efficiency gains by streamlining fragmented resource tracking exercises.

Methods: A case study approach was conducted to document the harmonization process and assess its success in reducing fragmentation of resource tracking processes. This was assessed in collaboration with experts leading the Government's aid coordination efforts and developing resource tracking tools. We drew on expert experiences and reviews of grey literature, including relevant policy documents, data collection tools, and databases of Government/partner funding commitments.

Results: To drive efficiencies, the MoH and NAC identified complementary components of the three exercises and conducted detailed cross-walking and mapping of data elements between RM, NHA and NASA. A harmonized data collection tool was developed and used by more than 200 organisations to enter budget and expenditure data. Data was automatically consolidated into a harmonized dataset of more than 38,000 funded activities to prepare analyses and reports. Harmonization reduced duplicative processes and administration costs of parallel resource tracking studies. Prior to harmonization, RM, NHA, and NASA separately and in parallel conducted planning for the exercise (~1-2 months), hired and trained data enumerators (~1-2 months), trained submitting organizations (~1 month), conducted data collection (~3-4 months), and cleaned and consolidated data (~3-4 months). These three parallel processes were since streamlined into a single process across RM, NHA, and NASA, thereby significantly reducing the time and resource burden on both MoH and submitting organizations. Simultaneously, it increased demand for resource tracking data, improved data quality, and contributed towards institutionalization of resource tracking. As one limitation, different use cases for each exercise lead to trade-offs between data quality, detail, and effort.

Conclusion and Policy Implications: The process followed in Malawi is a methodological innovation as Malawi is the first country to harmonize these three exercises. Harmonization of RM, NHA, and NASA is a key opportunity to strengthen resource tracking institutionalization, data quality, and response rates. Furthermore, the streamlined resource tracking exercise has been used to inform key policy decisions, including a fiscal space analysis and prioritization of the Health Sector Strategic Plan III for 2022-2030. The crosswalk of data elements and the harmonized tools can be adapted across country contexts. These findings are therefore relevant to Ministries of Health, NACs, donors, and technical partners interested in driving efficiencies and coordinating aid.

6.3 The Role of Risk Preferences on Voluntary Health Insurance in Tanzania

PRESENTER: **Alphoncina Philipo Kagaigai**, University of Oslo

Introduction: Lower and middle-income countries (LMICs) have a common goal to achieve universal health coverage (UHC). This is important so as to improve access to healthcare services and ensure financial protection for all by reducing out-of-pocket expenditure which seems to be high in these countries.

Objective: The objective of this study was to examine the role of risk preferences on enrolment status (currently insured, previously insured, and never insured) into a Tanzanian voluntary health insurance scheme targeted at the informal sector.

Methods: Data were collected from households in a random sample of 722 respondents. The risk preference measure was based on a hypothetical lottery game which applies the BJKS instrument to elicit risk preferences. This instrument measures income risk and where the respondents are to choose between a certain income and a lottery. Both multinomial and simple logistic regression models have been used to analyse the relationship between risk aversion and enrolment status.

Results: On average, the respondents have a high degree of risk aversion, and the insured are more risk averse than the non-insured (previously insured and never insured). There is a weak tendency for the wealthiest, measured by household income or total household expenditure, to be somewhat more risk-averse than the less wealthy. Logistic and multinomial logistic regressions show that risk aversion is strongly associated with enrolment status. A higher degree of risk aversion significantly increases the probability of being insured, relative to being previously insured, and relatively to being never insured.

Conclusion: Risk aversion matters in the decision to enroll in the iCHF scheme. Strengthening the benefit package for the scheme, will increase the enrolment rate and hence improve access to healthcare services to the people in the rural areas and those employed in the informal sector.

6.4 Estimating the Out-of-Pocket Expenditure to Manage and Care for Type 2 Diabetes Mellitus in Nepal: Evidence from the Patient Perspective

PRESENTER: **Padam Kanta Dahal**, CQUniversity Sydney Campus

AUTHORS: Rashidul Alam Mahumud, Zanfina Ademi, Lal Rawal, Biraj Karmacharya, Haruka Sakamoto, Tomohiko Sugishita, Corneel Vandelanotte

Background: The economic burden of type 2 diabetes mellitus is rapidly increasing worldwide and creating a major challenge for low- and middle-income countries like Nepal. However, the healthcare cost for managing type 2 diabetes mellitus in community setting of Nepal is unknown. This study aimed to estimate the out-of-pocket expenditure for managing type 2 diabetes and to identify whether and to what extend socioeconomic, demographic, and behavioral factors had an impact on out-of-pocket healthcare expenditure in the community setting of Nepal.

Methods: This cross-sectional study was conducted between September 2021 to February 2022 among patients with type 2 diabetes (n=481) in the Kavrepalanchock and Nuwakot districts of Nepal. Bottom-up and micro-costing approaches were used for the estimation of the direct and indirect medical costs from the patient's perspective. The average cost per patient for managing type 2 diabetes within a six-month period was estimated as total cost and stratified according to residential status (i.e., Urban vs Rural) and the existence of co-morbid condition (n = 238). A generalised linear model with a log-link and gamma distribution was applied for modelling the continuous right-skewed total costs per patient and 95% confidence intervals were obtained from 10000 bootstrapping resampling techniques.

Results: For six months, the mean healthcare resource cost to manage type 2 diabetes mellitus was US $22.87 (NRs 2701.86) per patient, 61% was the direct medical cost [US $14.01 (NRs 1655.00)]; 15% was direct non-medical cost [US $3.43 (NRs 405.19)] and 24% of total cost was associated with patient productivity losses [US $5.44 (NRs 642.63)]. The mean healthcare resource cost for a patient living in urban community [US $24.65 (Rs 2911. 66)] was about US $4.95 (NRs 585.08) higher (mean difference = US $4.95 (NRs 585.08), 95% CI: US -$8.04 to US -$1.86; p<0.05) than patients living in the rural community [US $19.69 (NRs 2326.43)] (i.e., around 8.5% of the average monthly family income of patients). The healthcare costs of patients with co-morbid conditions were US $22.93 (NRs 2709.27) and without co-morbidity were US $22.81 (NRs 2694.60) per patient. Patients living in rural areas were 18% (beta b = -0.18, CIs = -0.30 to -0.05, p = 0.005) lower out-of-pocket payments compared to urban counterpart. Similarly, uninsured patients were 26% (beta b = -0.26, CI = -0.38 to -0.14, p <0.001) lower out-of-pocket payments to manage and care for type 2 diabetes mellitus.

Conclusion: Type 2 diabetes mellitus imposes a substantial financial burden on both the healthcare system and the individuals. This warrant needs for establishing innovative treatment strategies to cover the diabetes cost in order to reduce the high out-of-pocket expenses. Additionally, results of this study add comprehensive information and highlight the gaps on T2DM management and provide useful insights for policymakers and healthcare providers to anticipate the future resource use and costs to manage T2DM.

Key words: Cost estimation; direct and indirect medical cost; healthcare cost; out-of-pocket payment; type 2 diabetes

6.5 Implementing Innovative Payment Models in Primary Health Care to Achieve Universal Health Coverage

PRESENTER: **Daniel Erku**, Griffith University

Background: Provider payment mechanisms create incentives that influence the behaviour of health care providers. In this narrative review, we examined key design features and implementation arrangements of population-based (i.e., capitation) /or blended payment models and assessed their implications for PHC performance regarding access and quality of care.

Methods: PubMed, CINAHL, Web of Science, Cochrane Library, EMBASE, and Google Scholar were searched from each database until May 2022 for studies that described the context, mechanism, and outcomes of population-based and/or blended payment models implemented in PHC settings. We included qualitative and quantitative studies, process evaluations and systematic or scoping reviews. Data were extracted using a predefined extraction sheet, and analysed using a narrative synthesis.

Results: A strategic purchasing and provider payment policy that is underpinned by the country's PHC objectives and service delivery models has shown to be more effective, by creating the right incentives to ensure well-managed access across levels of care. Successful design and implementation of population-based and/or blended payment models require ensuring that provider payment is directly linked to and informed by population health needs, information on provider performance, and expected technical, institutional, and political challenges. Contextual factors affecting the impact of capitation on PHC performance include i) the alignment of payment models to other financing and payment systems, ii) the structure of PHC delivery, iii) the design features of payment model, and iv) implementation arrangements.

Conclusions: Adopting a well-aligned and carefully designed mix of provider payment methods – with some form of capitation at its core – can directly influence patients' access to essential health services. There is a need to move beyond piloting population-based payment schemes to planning for scale-up and adoption while considering the country's unique health financing policies, market structure, and supply and demand.

6.6 The Healthcare Cost Burden of Long-Term Medical Condition or Disability: A Longitudinal Population-Based Study of Australian Children

PRESENTER: **Kabir Ahmad**, University of Southern Queensland

AUTHORS: Rasheda Khanam, Byron Keating, Syed Afroz Keramat, Rubayyat Hashmi, Enamul Kabir, Hendrik Juerges

Background: Long-term medical condition or disability is one of the leading causes of disease burden among children. There are a few studies evaluating the healthcare costs from Medicare data on obesity, ADHD, mental health, and sleep problems in children in Australia. However, based on the extant literature, study on the healthcare costs of medical conditions or disabilities, especially among children or adolescents in Australia, are very limited.

Objective: This study sought to evaluate the additional direct healthcare costs for children associated with any medical condition or disability that lasted six months or more. This study aimed to investigate the relationship between any medical condition or disability and healthcare costs from a longitudinal sample of children from aged 0 to 16 years. Further, it also assessed the population level excess healthcare costs associated with any medical conditions or disability of Australian children and by types of disabilities.

Data sources and study setting: Study participants are 9224 children of Birth (B) and Kindergarten (K) cohorts from the nationally representative Longitudinal Study of Australian Children for whom the linked Medicare costs data are available. The children were followed in consecutive eight and seven waves for the B and the K cohort, respectively, and the pooled number of observations was 54285.

Study design: The influence of medical conditions or disabilities on healthcare costs over 14 years for the B cohort and 12 years for the K cohort were estimated using generalized linear modelling with the combination of log link and gamma distribution. We also modelled the population level costs of Australian disabled children including types of disabilities using the prevalence rates and marginal mean estimates per child from the GLM model.

Key findings: From the participants of the B and K cohort, the prevalence of the medical condition or disability varies, ranging from 5% to 16%, across different age groups. However, this prevalence is 9.2% among the pooled observations of all the waves of this study for children aged 0-1-to-16–17-year. In both cohorts, the duration of medical conditions and treatment had a strong influence on increasing the excess healthcare costs. The total access healthcare costs across 0-1-to-16–17-year age duration per child would be on average A$3780 per year. At the population level, the estimated total excess Medicare costs associated with any medical condition or disability among 0–16-year-old children are, on average, A$205.6 million/year. By types of disabilities or medical conditions, the predicted total excess Medicare costs for Australian children of this age group are: A$11.6 million/year for sensory, A$9.85 million/year for physical, A$17.7 million/year for psychological, A$65.4 million/year for long-term conditions and A$109.6 million/year for multiple disabilities or conditions.

Conclusions: Long-term medical conditions or disability incurs an additional financial burden on the public healthcare system. In Australia, at the population level, these high excess healthcare costs are evident for all ages of childhood. The estimated excess healthcare costs provide a further economic justification for promoting preventive efforts to reduce the incidence of any medical condition or disability at early ages.

6.7 A Performance-Based Contracting Model for Migrant Health Care

PRESENTER: **Michelle Alejandra Barliza**, ABT ASSOCIATES

AUTHORS: Camila Franco, Jonathan Cali, Miguel Pulido, Ana Ragonesi, David Gomez, Sandra Manrique

Background

Colombia has the third highest number of migrants and returned population in the world and hosts the largest Venezuelan migrant population – approximately 2.5 million residing in the country and 5 million in transit. Around 30% of migrants do not have regular status, so they cannot enroll in the health insurance system and can only access emergency services. Their irregular status prevents many migrant women from accessing prenatal care, with a negative impact on maternal and newborn health. In Barranquilla, one of the cities with the largest migrant population, the extreme maternal morbidity ratio is 72.8 cases per 1,000 live births for Venezuelan women compared to 43.5 for Colombian women. Additional resources are needed to formally and effectively integrate these migrants into the Colombian health system.

Intervention model:

The USAID-funded Local Health System Sustainability Project (LHSS) supported the Colombian Ministry of Health and Social Protection (MoH) in designing a Performance-Based Contract in Barranquilla. LHSS and its partners are piloting the contract, which will pay a provider for a maternal health package that includes prenatal care and postpartum contraception for 500 pregnant irregular migrants in Barranquilla. The pilot will take three months to set up, 12 months for implementation, and 6 for evaluation. The total cost is approximately 120,000 USD.

Design methodology:

To inform the design, the team conducted a qualitative assessment using focus groups, interviews, and strategic meetings with *MiRed*, the public network of hospitals and health centers in Barranquilla that provides 70% of the health services offered to migrants. Negotiations with *MiRed* led to agreement on four payment metrics tied to results: prenatal assessments during pregnancy, early detection of prioritized diseases, proper management of obstetric risk, and protection against pregnancy-associated diseases. An intermediary/verifier has as a main responsibility to manage the contract and monitor the progress and results to certify the achievement of defined targets for an Outcome payer

(Fundación Santo Domingo), which will base 20% of its payments to *MiRed* on results and the remaining linked to activities defined in the package.

Results

Pilot implementation will begin January 2023 and expects to increase by i) 22.1 percentage points (p.p.) the proportion of migrant women with more than four prenatal controls; ii) 21.9 p.p. the proportion of women screened early for Syphilis and HIV, up to week 16; iii) 40 p.p. the number of women provided micronutrients (folic acid, ferrous sulfate, calcium) for the duration of the pregnancy at the first prenatal control and iv) 31.9 p.p. the proportion of pregnant women and their partners with adequate syphilis treatment. Results will be evaluated in January 2024.

Scale up

This model will be scaled up in different cities through corporate social responsibility and foundations. LHSS is also negotiating with the MoH and subnational authorities to use performance-based contracting to attract additional private-sector financing for migrants' health care. This performance-based model can be applied more broadly to the public purchasing health services and paying for other health services and populations. Ultimately the model can improve the efficiency of health spending.

6.8 An Evaluation of the Priority-Setting Process Conducted By the Health Benefits Package Advisory Panel in Kenya.

PRESENTER: **Rahab Mbau**, London School of Hygiene and Tropical Medicine

Introduction

Globally, there is a growing demand for countries to demonstrate how well their healthcare priority-setting processes are conducted given resource scarcity and continued wastage in the health sector. This study describes and evaluates the priority-setting process conducted by the Health Benefits Package Advisory Panel (HBPAP) in Kenya against key elements of an ideal priority-setting process.

Methods

We conducted a qualitative case study using in-depth interviews with national level respondents (n=20), fieldnotes and document reviews. We described and evaluated the extent to which the HBPAP's priority-setting process for health benefits package development fulfilled the normative procedural (acceptable way of doing things) and outcome (acceptable consequences) conditions of an ideal healthcare priority-setting process as outlined in the study's conceptual framework. We analysed the data using a thematic approach.

Findings

HBPAP's priority-setting process for health benefits package development partially fulfilled the procedural and outcome conditions of the study's evaluative framework. Concerning the procedural conditions, transparency and publicity were partially met, and were limited by the lack of publication of HBPAP's report. While HBPAP used explicit and evidence-based priority-setting criteria, challenges included the lack of primary data and local cost-effectiveness threshold, weak health information systems, short timelines, and political interference. While a wide range of stakeholders were engaged, this was limited by short timelines and inadequate financial resources. Empowerment of non-HBPAP members was limited by their inadequate technical knowledge and experience in priority-setting. Lastly, appeals and revisions were limited by short timelines and lack of implementation of the proposed benefits package. Concerning the outcome conditions, stakeholder understanding was limited by the technical nature of the process and short timelines while stakeholder acceptance and satisfaction were limited by lack of transparency. HBPAP's benefits package was not implemented due to stakeholder interests and opposition.

Conclusion

To our knowledge, this is the first study to examine macro-level priority-setting process for health benefits package development in Kenya. This study shows that priority-setting processes for benefits package development in Kenya could be improved by publicizing the outcome of the process, allocating adequate time and financial resources, strengthening health information systems, generating local evidence, and enhancing stakeholder awareness and engagement to increase their empowerment, understanding and acceptance of the process. Managing politics and stakeholder interests is key in enhancing the success of priority-setting processes.

6.9 Analysing Health System Spending across OECD Member Countries to Generate Non-Communicable Disease Expenditure By Disease Phase, Sex, and Age Group

PRESENTER: **Emily Bourke**, University of Melbourne
AUTHORS: Samantha Grimshaw, Tony Blakely

Background: Non-communicable diseases (NCDs) are the leading cause of death and disability worldwide. Across Organisation for Economic Co-operation and Development (OECD) member countries, they accounted for just under 90% of all deaths, and over half of all disability-adjusted life years lost. Efforts to quantify the financial and health system impacts of NCDs have been limited by data availability, comparability, and scope, with disease expenditure studies having only been undertaken comprehensively by a handful of countries. This

information is vital to understanding where to allocate health system spending, improving efficiency, and conducting health economic evaluations of public health programs in the face of growing NCD burden and aging populations.

Aim: This study aims to address this critical information gap in global health metrics, by using innovative and multidisciplinary epidemiological and health economic methods to estimate the health system cost of 80 major NCDs, by disease phase, sex, and age group, in all OECD countries in 2019.

Methods: This analysis used data on incidence, prevalence and mortality from the Global Burden of Disease for each OECD member country, total expenditure for each disease by sex and age group from the Australian Institute of Health and Welfare, relative costing estimates by disease phase from a Statistics NZ IDI analysis by Blakely et al., and the OECD national health accounts. To estimate average spending per person with a disease in each disease phase (incident year, prevalent, and last year of life if dying of the disease), the average NCD expenditure by disease, disease phase, sex, and age group for Australia was calculated, and multiplied by epidemiological case numbers across each disease phase. This was then applied to the case numbers in each OECD country to estimate aggregate spending with an Australian cost base. Estimates were then scaled to each country's total health system expenditure (net of health system administration, public health costs, and estimated non-NCD expenditure) to estimate total spending on disease by phase in each OECD country. Estimates are reported as 2019 purchasing power parity-adjusted United States dollars (US$). Health expenditure on diseases for Norway, Switzerland, and the USA were compared against existing expenditure data from the most recently published study undertaken in each of those countries.

Preliminary results: Average relative health spending on NCDs across member countries was US$208 million per 100,000 population, with the United States of America (USA) having the highest relative spending at US$603 million. Musculoskeletal disorders had the highest proportion of total health expenditure across member countries. Females accounted for higher expenditure on musculoskeletal disorders, mental and substance use disorders, and neurological conditions, while males had higher expenditure on kidney and urinary diseases, and cancer. The first year of diagnosis represented on average 16.78% of total NCD spending, while the last year of life accounted for 2.08%.

Implications: These preliminary NCD expenditure estimates represent a starting point for governments to understand the health system burden of NCDs and quantify impacts on health system expenditure for different policies and interventions, to ultimately accelerate progress towards meeting international health targets.

6.10 Estimating the Resource Envelope for Early Childhood Development: A Framework and Experience from Kenya

PRESENTER: **Kenneth Munge Kabubei**, World Bank
AUTHORS: Anmol Kamra, Stacey Orangi, Robinson Oyando Omondi, Laura Di Giorgio
Estimating the resource envelope for Early Childhood Development: A framework and experience from Kenya

Introduction: Adequate and optimally utilized financing is key to improving access to and quality of early childhood development (ECD) service. Estimating the ECD resource envelope is challenging due to the multisectoral nature of ECD service provision, the lack of a standardized list of services, and inability of most financial management systems to track them, especially in devolved settings such as Kenya. Our assessment sought to determine for the first time the overall resource envelope for ECD in Kenya.

Methods: We defined a package of 27 essential ECD services targeted at ages 0-8 years across sectors including health, education, social protection, WASH, agriculture, interior and gender based on the World Bank's Early Years Framework. We collected budgets and expenditures made by the public sector and non-state actors over fiscal years (FY) 2017/18, 2018/19, 2019/20, and 2020/21 and tagged them to the 27 interventions to estimate Kenya's financing for ECD. Data sources included budget and expenditure data from financial management information systems, financial reports, and workplans from national and county governments and non-state actors. Data were collected using an adapted resource mapping and expenditure tracking approach between May 2021 and July 2022. Budgets and expenditures were apportioned to the 27 interventions using allocation factors validated with study participants and relevant stakeholders. All values were reported in Kenya Shillings (KES) FY2020/21 terms.

Results: Total expenditure over the period was KES 611,976 million (US$4,998 million) with 96% of this from the government, and average expenditure per child was KES18,445 (US$150). The largest share of ECD investments were in the education, health and nutrition and social protection sectors: average 45%, 27% and 9% respectively. The national level accounted for 75% of total government expenditure, though counties spent 67% of health and nutrition sector expenditure. Non-state actor spending was greatest in health and nutrition (65%) and social protection (27%) mainly complementing gaps in government spending. Government expenditure's top 3 interventions were continuity through primary education (36%), adequate, nutritious and safe diets (8%) and social assistance transfer programs (8%). Non-state expenditures' top 3 interventions were adequate, nutritious and safe diet (24%), child protection services (23%) and access to healthcare (13%). 36% of government expenditure was in continuity through primary education while 25% of non-state expenditure was on adequate, nutritious, and safe diet in interventions that ensures children's continuity through primary education/school.

Discussion: Government expenditures align with devolution functional and expenditure assignments. Non-state actors are complementary but small in line with the relative low cost but high effectiveness of selected interventions. The results show high expenditures on education of age 6-8 years by the Kenyan government crowding out other potential interventions.

Conclusion: Tracking spending on ECD is paramount to assess its adequacy, complementarity and impact. This assessment provides an opportunity for Kenyan policy makers to reassess public resource allocations to ECD services with a view to accelerating human capital advancement.

6.11 Did Financial Risk Protection Systems Withstand the COVID-19 Pandemic? Assessing Changes in Catastrophic Health Expenditure and Its Drivers in Five Countries

PRESENTER: **Annie Haakenstad**, Institute for Health Metrics and Evaluation, University of Washington

AUTHORS: Corinne Bintz, Megan Knight, Horacio Chacon-Torrico, Walter H Curioso, Joseph Dieleman, Simon Hay, Nathaniel Henry, Judith Mendez, Hector Juan Villarreal Paez, Rafael Lozano

The COVID-19 pandemic was a shock to health systems worldwide, stressing financial risk protection systems. There are reasons to expect both increases and decreases in catastrophic health expenditure (CHE), or when out-of-pocket (OOP) healthcare costs exceed 10% or 25% of consumption expenditure. First, worldwide declines in capacity-to-pay – the CHE denominator – would result in increases in CHE if OOP expenditure held steady in 2020. However, OOP expenditure also likely changed. For instance, in countries where COVID-19 care was not heavily subsidized, the additional costs of COVID-19 care could have resulted in increased OOP expenditure. Alternatively, some patients may have foregone healthcare to avoid exposure to COVID-19, spending less OOP overall. Finally, patients may have shifted to the private sector, avoiding COVID-19 cases in public facilities, but increasing OOP costs per visit.

This study focuses on whether CHE increased or decreased in 2020 and the underlying causes of these changes. We focused on the only five countries with publicly-available household expenditure data: Belarus, Mexico, Peru, Russia and Vietnam. Drivers included: insurance coverage, OOP expenditure, consumption expenditure, healthcare use, and sector (private versus public). An ensemble model predicted 2020 CHE and drivers if past trends had continued in the absence of the pandemic, which we compared to the observed values. An interrupted time series analysis tested whether healthcare use and sector changed significantly when stay-at-home orders were implemented in March 2020.

In Mexico, CHE (10%) increased to 5.6% (95% uncertainty interval: 5.1-6.2), significantly higher than expected (3.2%, 2.5-4.0). CHE (10%) in Belarus was 13.5% (11.8-15.2) in 2020, also significantly higher than the predicted 9.7% (8.1-11.3). In Russia, Peru and Vietnam, CHE rates were not different than expected. In Mexico, OOP health spending was significantly higher and insurance coverage was significantly lower, but no change in consumption expenditure was detected. In Peru, significant declines were observed in consumption expenditure and OOP spending but not insurance coverage. In April 2020, healthcare visits dropped in Mexico (p=0.009) and Peru (p<.001), and the private share of healthcare visits increased more than 10 percentage points in Mexico (p<.001) and 20 percentage points in Peru (p<.001).

In three of the five countries studied, health systems either did not protect people from the financial risks of healthcare or did not maintain healthcare access in 2020. In Russia, secondary sources indicate healthcare use dropped in 2020. Both increases in CHE and reductions in healthcare use are an indication of health systems failing to maintain basic functions during the pandemic, although in Mexico, the discontinuation of *Seguro Popular* in 2020 confounds the impact of the pandemic. In Mexico and Peru, the private sector was better able to sustain basic functions – as measured by services provided – than the public sector in 2020. This is in part because the public sector served most COVID-19 cases, which likely kept other patients away. If the 2020 response to the pandemic accelerated shifts to private healthcare use, CHE is likely to worsen without targeted policies to address these changes.

6.12 Magnitude of Health Expenditure Induced Removable Poverty in India: Some Reflections on Ayushman Bharat

PRESENTER: **Ramna Thakur**, School of Humanities and Social Sciences, Indian Institute of Technology Mandi

Background: Health expenditure is one of the primary causes of household debt and poverty in India's low and middle-income groups. More than 70% of the expenditure on health is out of pocket (OOP) of the individuals, which pulls households into poverty and suffering.

Aim: This study aims to measure the health expenditure-induced removable poverty in India by using nationally representative consumer expenditure surveys of three quinquennial rounds conducted by the National Sample Survey Organization (NSSO). This study has also focused on the reflections of the National Health Protection Scheme [Ayushman Bharat - Pradhan Mantri Jan Arogya Yojana (AB-PMJAY)], which is the world's largest Government funded health assurance scheme, on these poverty rates in the country.

Data and methods: The number of households surveyed during the employed three NSSO rounds is 120,309 households consisting of 71,385 rural and 48,924 urban in 1999-2000, 124,644 consisting of 79,298 rural and 45,346 urban in 2004-05, 101,662 consisting of 59,695 rural and 41,967 urban households in 2011-12 respectively. This study has analyzed the magnitude and dimensions of health expenditure-induced removable poverty in rural, urban, different social (Scheduled Castes, Scheduled Tribes, Other Backward Class and General), household types (self-employed, salaried, casual labour and others) and religious groups (Hindu, Muslims, and others) in India after applying the respective weights. 'Mixed reference period' has been used in all three rounds in this study. In the 'Mixed Reference Period' last 365 days of data for commodities like; clothing, bedding, footwear, education, medical (institutional), and durable goods and the last 30 days for the rest of the items have been used. In this study, the official poverty line suggested by the Planning Commission, Government of India, has been used as a yardstick to measure poverty headcount after adjusting to Consumer Price Index (CPI) for 1999-2000, 2004-05 and 2011-12. The study uses headcount, payment gap, and concentration index to measure OOP health expenditure's economic burden and impoverishment impact.

Results: The analysis shows that the incidence and depth of poverty are substantially understated because of overlooking out-of-pocket (OOP) health expenditure in the country's standard measure of poverty. Outpatient care contributes most to the health expenditure impoverishment of households in India. However, outpatient care is not included in the AB-PMJAY, the world's largest Government-funded health assurance scheme. Muslims, among all religious groups, Scheduled Castes among social groups, and casual labourers are more vulnerable to OOP health expenditure-induced removable poverty in India. Poverty, in general, has dropped significantly, but the share of health expenditure-induced poverty in general poverty has increased substantially. It has increased, especially in rural areas and among India's most vulnerable sections of society in the past 20 years.

Conclusions: Health insurance coverage can significantly change the country's poverty level, but focusing on only inpatient care and some particular groups of the population may not solve this problem. As is clear from this study that health expenditure-induced poverty is not only inpatient care or any group specific.

6.13 Impact of Pharmaceutical Pricing for Child Formulations of Treatment for Drug-Resistant Tuberculosis in Three High Burden Settings

PRESENTER: **Tommy Wilkinson**, University of Cape Town

AUTHORS: Anthony Garcia-Prats, Tina Sachs, Mandar Paradkar, Aarti Kinikar, Melchor Frias IV, Anneke Hesseling, Edina Sinanovic, Megan Palmer

Tuberculosis (TB) in children is a complex clinical and social public health concern with 1.1 million cases annually and 230,000 deaths. The global community is unlikely to reach the ambitious sustainable development goal to eliminate the incidence of TB by 2035 without sustained action and innovation at critical points in the TB pathway and in key populations. Children with multidrug-resistant TB (MDR-TB) are a particularly important and neglected group facing unique challenges for prevention and treatment, where providing appropriate and child-friendly treatment is essential for accurate and acceptable dosing during the long complex treatment period.

CATALYST is a phase I/II trial of the pharmacokinetics, safety, tolerability, acceptability and pharmacoeconomics of novel formulations of TB standard medications (moxifloxacin and clofazimine) for the treatment of MDR-TB in children in India, South Africa and the Philippines. Trial data will inform international normative guidance on the dosing and management of MDR-TB globally. A common barrier to implementation and access to new medicine formulations at the country level is localized pharmacoeconomic information for national TB programs and for global procurement mechanisms such as the Global Drug Facility. The significant variation and limited data on costs of provision of childhood MDR-TB treatment makes the "price at which" specific formulations of medicines represent allocatively efficient use of limited health care resources highly uncertain. The common analytical approach of applying a single, income-adjusted global price for the treatment of childhood MDR-TB across contexts may lead to estimates that are insufficient for local country investment decisions.

The analysis addressed the research question: What is the cost variation in provision of standardized childhood MDR-TB pharmaceutical treatment across South Africa, Philippines and India, adjusted for purchasing power parity, formulation type, treatment regimen, and child age/weight.

MDR-TB treatment costs were estimated for South Africa, The Philippines and India based on localized treatment regimen and national or global procurement mechanisms. Costs by treatment regimen, drug formulation and country presented showed substantial variation across the three countries, particularly costs presented as a factor of domestic general government health expenditure per capita. Child-friendly formulation pricing was shown to be less expensive than using adult formulations in children <5 years old in longer regimen using newer medicines.

Child-friendly drug formulations are an important component of the fight against childhood MDR-TB. However, costs are dynamic with pricing differentials between formulations and across treatment regimen, procurement approaches and country contexts. Localized decision making and evidence is required to determine appropriate use of limited healthcare resources for the care of MDR-TB in children.

6.14 Variations in Out-of-Pocket Spending By Chronic Conditions By Sociodemographic and Economic Factors Among Patients Suffering from Selected Chronic Conditions in Four Districts in Sri Lanka

PRESENTER: **Anuji Gamage**, KDU

AUTHORS: Nuwan Darshana, Therani Gunasekere, Deepika Attygalle, Sridharan Sathasivam

Background

Considering the current economic crisis and challenges in healthcare finances in Sri Lanka decreasing out-of-pocket-expenditures(OOPE) and increasing equity in access to health services is essential in achieving Universal-Health-Coverage. We aimed to assess the variations of OOPE among patients with chronic condition/s in four districts in Sri Lanka.

Methods

Cross-sectional survey among 2344 adults, diagnosed with selected chronic-condition/s was conducted in 4 districts in Sri Lanka to represent urban, rural, semi-urban, and estate dwellers, selected using a multi-stage-stratified cluster sampling technique. Data was collected using a validated interviewer-administered questionnaire, and analyzed using SPSS version 23 and Excel. OOPE consisted of direct and indirect expenditures incurred during hospital admission and a total expenditure was calculated and reported in Sri-Lankan-Rupees(SLR). Mann

Whitney U test was used to compare the median OOPE between the government sector and private sector admissions. Catastrophic-Health-Expenditure(CHE) is the ratio between OOPE(numerator) and the household's ability to pay for health care/total income(Denominator). Binary logistic regression identified the predictors of CHE and categorization was done considering 15% as the threshold. The level of significance was considered 0.05.

Results

Most participants were between 51 and 60(N=596, 25.40%). Fifty-three percent of the participants were female(N=1238). 41.2%(N=966) of the participants engaged in economic activity; most were private sector workers(N=375, 37%). Most participants(N=254, 26%) reportedly earn a monthly salary higher than Rs.50 000. Majority had hypertension(N=683, 29.1%), followed by diabetes(N=632, 27.0%), hyperlipidaemia(N=230, 9.8%) and asthma(N=192, 8.2%) and13% reported having complications associated with the disease. Fifty-six percent(N=1304) were on regular clinic follow, and more than 70% of individuals with chronic diseases/es from the estate and rural sector reported regular follow-ups—most utilized western-medical government hospitals(N=916,70.2%) for regular follow-up.

The majority of the estate dwellers opted to use Western medical government institutions for their condition. Whereas Western medical private hospitals and centers were utilized by rural and urban dwellers, respectively. Diabetes and hypertension were the most prominent NCDs in the urban and rural sectors, whereas asthma and stroke were prominent in the estate sector.

Two hundred fifty-two patients were admitted for chronic-disease management. Among them, 51.6% were females. Nearly 86% were admitted to government sector hospitals. Regarding hospital admissions, the majority(N=212, 84.1%) incurred indirect OOPE, while 15.9% (n=40) had both direct and indirect OOPE. Median(IQR) direct OOPE was SLR 4750.0(5188.0), while median (IQR) indirect OOPE was SRL 2800(3692.5). Median(IQR) for total OOPE was SRL 3350.0(5100.0). The majority(63.2%) of patients had total OOPE(direct+ indirect) of less than 5000 rupees per admission. Considering hospital admission, CHE was less than 15% for the majority of patients(N=167, 66.3%), followed by 12.7%(N=32) in 15%-25%, 7.5(N=19) in 25%-40% and 13.5%(N=34) in more than 40% respectively. District-wise variations were observed.

Conclusions

Proportion of NCDs and complications was high among participants of all four sectors.Patients with NCDs incur high OOPE for hospital-admission and routine follow-up, and there were sectoral variations. Services rendered to patients with chronic conditions warrant a more integrative approach to reduce the OOPE. The essential services need to be delivered uninterruptedly. There were sector-wise variations in OOPE. These sectoral determinants should be studied.

6.15 Technical Efficiency and Heterogeneous Effects of Results-Based Financing across Health Facilities in Zambia.

PRESENTER: **Chitalu Chama-Chiliba**, University of Zambia
AUTHORS: Peter Binyaruka, Collins Chansa, Josephine Borghi

Background: Improving health system performance in the context of limited resources and increasing health needs is critical for many low and middle-income countries. A results-based financing (RBF) pilot project was implemented in Zambia between April 2012 and October 2014 to strengthen the health system and increase access to quality maternal and child health services. RBF was supposed to facilitate this by incentivising maternal and child health outputs and improving processes for monitoring and evaluation, data verification and use, and technical supervision. As an output-oriented financing strategy, RBF is expected to enhance efficiency in service delivery. We examine the technical efficiency of health facilities in Zambia before and after implementing the pilot RBF project based on a three-arm cluster-randomised design. Specifically, we compare technical efficiency scores in the health facilities implementing RBF, the input/direct financing arm and the pure control arm. Health facilities in the input/direct financing arm were designed to receive the same level of funding as those in the RBF arm.

Methods: We use data from the RBF impact evaluation on four healthcare inputs (staff, drugs, medical supplies and equipment) and four outputs (outpatient consultations, institutional deliveries, antenatal care and child immunisation). The data used in the study covers 102 health facilities with information on key inputs and outputs: 37 in the RBF intervention arm, 33 in the input/direct financing arm and 32 in the pure control arm. We also use data on contextual factors such as the number of outreach days, external supervision, facility type and ownership that may influence efficiency based on a literature review. We measured technical efficiency using data envelopment analysis and obtained efficiency scores before and after the implementation of RBF. We also examined factors influencing technical efficiency by regressing the efficiency scores over the contextual factors. The impact of RBF on efficiency and potential heterogeneous effects were determined using a difference-in-difference regression approach.

Results and conclusion: Preliminary results show that the average technical efficiency score was 0.22 when deliveries were considered as the only output and 0.48 when all four outputs were considered, suggesting resource use inefficiency. Only 7%, 10% and 14% of the health facilities in the pure control, input/direct financing and RBF arms, respectively, were efficient when all the outputs were considered at endline. Overall, the regression results show no significant impact of RBF on efficiency. Notably, health facilities in the input/direct financing arm were significantly more efficient than RBF facilities when one output is considered, but the effect was insignificant when all outputs were considered. Furthermore, heterogeneous effects exist across the health facilities, with input/direct financing significantly improving efficiency in health centres than in health posts. The evidence shows that most health facilities were not operating at full capacity, suggesting

a potential to improve resource use. Due consideration should also be given to contextual factors to complement health-sector-based reforms aimed at improving efficiency.

6.16 Evidence from the National Health Accounts on the Current Investments in Primary Healthcare in Eswatini

PRESENTER: **Babatunde Akomolafe**, Clinton Health Access Initiative (CHAI)
AUTHORS: Sifiso Ndlovu, Zanele Nxumalo, Nomfundo Mncina, Awwal Abdullahi, Nhlakanipho Khumalo

Background

Eswatini's efforts toward achieving Universal Health Coverage (UHC) have centred around mobilising adequate resources and improving resource management by strengthening public financial systems. The Government of the Kingdom of Eswatini funds its health sector through three main sources: Government (50%), households (10%), and development assistance from abroad (25%). The country needs to increase domestic resource mobilisation and maintain spending levels to achieve UHC long term. This study aims to estimate the total health expenditure (THE) from 2018/2019 and 2019/2020 National Health Accounts, highlighting the policy implications of improving spending and allocation to primary health care.

Methods

This analysis was based on the Eswatini National Health Account (NHA) for the years 2018/2019 and 2019/2020 using the system of health accounts (SHA) 2011 framework. Primary data were collected from Government sources, Donors, Non-Governmental Organisations, Insurances, Employers, and Out of Pocket Expenditures (OOPE). The analysis follows the methodology of SHA 2011, covering revenue sources, financing schemes, financing agents, healthcare providers, and healthcare functions. Trends in spending were compared across time and spending categories, including preventive care. The data collection, data validation and analysis was led by the planning unit of the Eswatini's Ministry of Health (MoH) with technical assistance from the Clinton Health Access Initiative and the World Health Organisation.

Results

The analysis showed that the Government of Eswatini contributed the largest share of the current health expenditure (CHE), and there was a steady increase in the CHE from 46.4% in 2018 to 52.5% in 2020. The per capita health expenditure increased from USD 330 in 2018 to USD 342 in 2019. While public spending increases, there has been a decline in development assistance from abroad from 27.7% in 2018 to 23.5% in 2020. On disease spending, HIV/AIDs consumed the largest share of CHE at 32.8% and 32.9% in 2018 and 2020 respectively, followed by Non-communicable diseases (NCD) that utilised 17.6% and 18% in the study period. While a large part of THE was spent on curative care and health administration, about 30% of THE was spent on preventive care. The OOPE was reduced from 10% in 2018 to 9.2% in 2020.

Conclusion and Policy Implication

The NHA findings show that despite increased healthcare investment, funding was prioritised for infectious and NCDs without a reprioritisation to PHC spending for preventive services. For Eswatini to achieve significant progress towards UHC, it will have to invest more in PHC by channelling more investment to preventative services, including health promotion and education to reduce the potentially significant future investment in curative care. In addition, the MoH should invest in Public Financial Management (PFM) systems that will ensure better financial performance, more efficient and cost-effective service delivery, and stronger governance and accountability.

6.17 Enhancing Domestic Resource Mobilization for Neglected Tropical Diseases (NTD) within Integrated Health Planning and Budgeting Processes in Tanzania

PRESENTER: **Jose Luis Gonzalez**, Results for Development (R4D)
AUTHORS: Wemaeli Mweteni, George Mugambage Ruhago, Alemu Chekole, Kennedy Panja, Chihiyo Mlay, Oscar Kaitaba, Isaac Njau, Julius Charles Masanika, Douglas Ndeki, Lalji Shabbir, Geoffrey Mackenzie, Edwin Mathew, Kilwanila Hussein Kiiza, George Kabona, James Kengia, Wangeci Thuo

In many countries, neglected tropical diseases (NTDs) have been chronically underfunded and are highly dependent on external donor funding, yet investing in efforts to combat NTDs is considered one of the "best buys" in public health. These investments are cost-effective and have the potential to return significant long-term health and economic benefits, thus breaking the cycle of poverty and disease for those affected by NTDs. To date, health services and interventions for NTDs have been left out of many national and subnational policy, planning, governance, and finance processes.

To increase domestic resource mobilization for NTDs and foster local ownership of NTD programming, the Tanzania NTD control program (NTDCP), with technical support from the Act | East program, applied a capacity building approach for health budgeting and planning processes in 15 selected councils. Enhancing domestic resource mobilization for NTDs is a priority for Tanzania as it shifts to low-middle income status and external donor funding declines. Capacity building activities included a series of advocacy meetings with high-level stakeholders and technical workshops with 15 councils on how to use NTD epidemiological and financial data to advocate for greater prioritization of NTDs during the preparation of integrated health plans and influence budget allocation for NTD programming into the regular Comprehensive Council Health Plan (CCHP) cycle. Councils also received technical assistance to negotiate fund allocation at

budgeting meetings and build their capacity to use the President's Officer for Regional and Local Government (PO-RALG) PlanRep tool to track funds approval, allocation, and disbursement.

Council selection was based on the disease burden (high burden and nearly eliminating NTDs). Act | East and the NTDCP trained National CCHP cascade trainers who capacitated key council planners (District Medical Officer (DMO), Health secretaries, District Planning Officers (DPLO), Council NTD coordinators) during the CCHP pre-planning stage. Planning and budgeting were done through the PlanRep system using DHIS2 data and off-system data like the number of trachoma eye surgeries. Funds from different sources were pooled and allocated across various levels of facilities, and DMOs and DPLOs signed their plans as a commitment to advance the integration of NTDS into the CCHP from 2022 onwards.

Following capacity building activities, all 15 councils increased funding allocation for NTDs from previous years. Pre-CCHP assessment showed that the total amount allocated to NTD programming was 159,594USD - an average of 10,640 USD per council. Allocation per cost center included: Council Health Management Teams (44,865USD), Council Hospitals (12,872USD), Health Centers (27,105USD), and Dispensaries (32,290USD). CCHP interventions included case detection and management, diagnosis, health prevention, medical equipment, medical and diagnostic supplies, preventive chemotherapy, and vector control.

Tanzania's experience demonstrates that NTDs could be more sustainably financed by strengthening domestic resource mobilization efforts when (1) NTDs are prioritized in health plans and strategies at all levels of the government, (2) NTDs are integrated into health sector planning and budgeting processes, (3) the MOH implements evidence-based advocacy plans and sustained technical support to subnational governments, and (4) local governments are held accountable to meet their commitments to NTD targets.

6.18 Barriers to Strategic Purchasing for Healthcare in Imo State, South East Nigeria: Critical Review of Evidence

PRESENTER: **Charles C Ezenduka**, University of Nigeria

Background/Objective: Health systems committed to achieving Universal Health Coverage (UHC) are making progress towards strategic health purchasing (SHP) for enhanced system performance. Effective implementation of SHP requires putting in place structures and mechanisms that support the process for enhanced health system performance. However, evidence show increasing challenges to implementing SHP in low and middle income countries (LMICs), due to lack of appropriate institutional and functional arrangements that provide critical enablers for achieving desired objectives. The study examined the purchasing arrangements in the Imo state healthcare system south east Nigeria, to identify challenges that limit implementation of strategic purchasing and make recommendations to facilitate process.

Methods: Based on a qualitative case study approach, relevant documents (reports, policy and regulatory) were critically reviewed including in-depth interviews of key stakeholders in the State Ministry of Health (SMOH), to analyze the healthcare purchasing practices and arrangements in the state. Information on external factors and governance, purchasing practices, other capacities in the healthcare system were collected to understand the healthcare purchasing arrangements. Analysis was guided by the Resilient and Responsive Health Systems (RESYST) framework which compares the purchasing practices of a scheme with ideal strategic purchasing actions (SPAs), to identify the gaps/challenges and influencing factors that undermine strategic purchasing objectives in the state

Findings: Purchasing practices of the state ministry of health (SMOH) is mostly passive with very limited strategic purchasing functions. Government lacks commitment towards its stewardship, regulatory and accountability roles with the ministry. Chronic inadequate funding for healthcare, poor delivery infrastructure, dearth of manpower, lack of purchaser-provider split and poor provider performance monitoring are major barriers to achieving SHP objectives. Input-based provider payment through monthly salary and line-item budget are not linked to performance, and therefore do not promote quality and efficiency of service delivery. Health management information system lacks robust features that support strategic purchasing objectives for enhanced efficiency of service delivery. The state government recently established a social health insurance system (IMSHIA) as part of commitment towards UHC, which is in the early stages of operation.

Conclusion: Healthcare purchasing in the state remains largely passive given the operation of the public integrated system whose fundamental features undermine SHP principles and objectives. The system lacks basic institutional and technical capacities for SHP functions. Consequently, adequate and sustainable funding, accountability of governance remain critical to addressing identified challenges to achieving strategic purchasing objectives. The system requires urgent reform to boost implementation of strategic purchasing. Expansion and strengthening of the Imo state insurance agency (IMSHIA), government greater commitment towards its stewardship and accountability roles among others, will boost strategic health purchasing in the state for progress towards universal health coverage

Universal health coverage, Health financing, Purchasing functions, Strategic purchasing, Purchaser–provider split, Provider performance

6.19 Prices of Medications Sold through Online Pharmacies

PRESENTER: **Sachiko Ozawa**, University of North Carolina at Chapel Hill

AUTHORS: Colleen R Higgins, Yi-Fang Ashley Lee

Background: The COVID-19 pandemic has made it more common for people to purchase goods online including medications. Online pharmacies commonly advertise medication discounts and cost savings compared to brick-and-mortar pharmacies to attract consumers. Yet there has not been systematic analysis comparing prices of medications sold online with those at local pharmacies.

Methods: A cross-sectional study was conducted to assess the prices of six medications online: Adderall, dexamethasone, hydroxychloroquine, insulin, imatinib, and lopinavir-ritonavir. We searched the phrases "buy (medication) online" using commonly used internet search engines such as Google, Bing, Yahoo!, and DuckDuckGo. Web pages displayed in the first 10 pages were screened and included if they sold targeted medicines, were published in English, were free to access, and shipped to the US. Websites were classified using LegitScript's classification as legitimate or illegitimate. We compared websites' medication prices and shipping costs with prices offered through GoodRx, which are representative of out-of-pocket prices that uninsured US patients might pay at brick-and-mortar stores.

Results: Costs of Humalog and NovoLog insulin from illegitimate internet pharmacies were approximately 2 to 5 times cheaper than that offered by legitimate internet pharmacies or GoodRx. The median price for 30 tablets of generic imatinib at traditional brick-and-mortar pharmacies was USD $787 (range, $136–$9,054), which was more expensive compared with $296 (range, $165–$427) at legitimate online pharmacies, and ranged from $28–$1,343 at illegitimate online pharmacies. Illegitimate pharmacies were more likely to offer bulk discounts and claim price discounts, yet dexamethasone and hydroxychloroquine were more expensive online. An inexpensive generic version of lopinavir-ritonavir that is not authorized for use in the US was available online offering US shipping. For Adderall, illegitimate online pharmacy prices including shipping costs were nearly 5-fold more expensive compared with prices listed on GoodRx.

Conclusions: Legitimate online pharmacies were often more expensive than brick-and-mortar pharmacies after accounting for shipping costs. The price of medications sold through illegitimate online pharmacies vis-à-vis brick-and-mortar stores differed depending on the product. Patients looking for medication cost savings online are likely to reach illegitimate online pharmacies which endanger patient safety.

10:30 AM –12:00 PM   TUESDAY   [Supply And Regulation Of Health Care Services And Products]

Cape Town International Convention Centre | CTICC 1 – Room 1.44

Health Insurance, Information and Patient Choice

MODERATOR: **Troels Kristensen**, University of Southern Denmark

Instrumental Variable Tests for Adverse Selection

PRESENTER: **Anthony LoSasso**, DePaul University

Empirical research on adverse selection in insurance markets is based on two broad empirical strategies: positive correlation tests (Chaippori and Salini 2000), and cost curve tests (Einav, Finkelstein, and Cullen 2010). In this paper, we show that the cost curve test for adverse selection can be re-cast as a non-parametric instrumental variables estimator in which an. insurance plan attribute serve as the instrumental variable. The test can be implemented using two stage least squares and all of the standard tools associated with that method thus apply. In addition, the instrumental variables framework relaxes the parametric assumptions in the linear cost curve test and it suggests other research designs for studying adverse selection, such as variation in the menu of plans people face when making enrollment choices. We apply the method to the analysis of the small group health insurance market in the United States. We examine a collection of 36 focal insurance plans that are each offered by at least 25 different employers as part of a menu of exactly 2 plans. Some firms offer the focal plan as the cheap option and others offer it as the expensive option on the menu. We find that 19 of the 36 plans suffer from significant adverse selection, raising premiums pushes healthier people out of the plan and leaving higher costs enrolled population. The remaining 17 plans exhibit favorably selection: raising prices pulls in healthier people, lowering average costs.

The Effect of Medicare Advantage on Mortality and Utilization

PRESENTER: **Danny Hughes**, Georgia Institute of Technology
AUTHOR: Moiz Bhai

Since its inception, the effectiveness of the Medicare Advantage program or private Medicare, a privately administered but publicly funded social insurance program has been a source of controversy and considerable public debate. Much of this debate has focused on the advantageous or positive selection into Medicare Advantage using data dropouts from Medicare Advantage into public or traditional Medicare. Unfortunately, claims data from Medicare Advantage have been a black box for researchers since they are not publicly reported. We use a novel source of linked administrative claims data between 2007 and 2017 from a large commercial and Medicare Advantage insurer in the United States to explore how Medicare Advantage influences health and mortality. To do this, we employ a natural experiment arising from the Initial Enrollment Period for Medicare eligibility in the United States at age 65 to measure the effects of Medicare Advantage on healthcare utilization (inpatient and outpatient care using granular claims data) and mortality. We match and track individuals in commercial (employer supplied health insurance) as they transition to Medicare Advantage at the sharp cutoff of age 65 for Medicare Eligibility to credibly estimate how Medicare Advantage influences health behavior and mortality during the transition from commercial insurance to the Medicare pgoram.

For our analysis, we develop a novel identification strategy that uses baseline characteristics at age 64 in commercial insurance on a rich set of personal and plan characteristics (out of pocket costs, previous health history, group plan characteristics, previous healthcare utilization, demographics) to predict enrollment into Medicare Advantage. We also observe a similar set of personal and plan characteristics for individuals that continue into Medicare Advantage at age 65. In our preferred empirical approach, we combine forecasts from value-added models with our exogenous variation from the Initial Enrollment Period to compare enrollees in Medicare Advantage with enrollees in Traditional Medicare. For robustness, we re-estimate our forecasts using a reverse experiment that similarly exploits the Initial Enrollment

Period for beneficiaries that enter Medicare Advantage from other commercial insurers by comparing these new enrollees at age 65 to comparable enrollees in Traditional Medicare.

Our preliminary results suggest Medicare Advantage has a positive effect on health outcomes and utilization. Consistent with previous we show that Medicare Advantage reduces utilization, but more importantly we credibly identify and demonstrate that Medicare Advantage reduces mortality for individuals at the cutoff by approximately 10% (.003 percentage point difference from baseline mortality of 0.032%) compared to enrollees that transition into public Medicare. The policy implications of our study suggest that despite the numerous criticisms on the effectiveness of the Medicare Advantage program, our results imply that some of the inefficiencies from the disproportionate payments to Medicare Advantage program are offset by (likely) higher plan quality which results in increases in life expectancy and longevity.

Can Beneficiary Information Improve Hospital Accountability? Experimental Evidence from a Public Health Insurance Scheme in India.

PRESENTER: **Radhika Jain**
AUTHOR: Pascaline Dupas

Motivation

Although public health insurance programs have been rapidly scaled up in India and other LMICs, evidence suggests they have had limited effects on household health spending. One explanation for the persistence of out-of-pocket payments (OOPP) may be low awareness of insurance benefits among patients, which may allow hospitals to contravene program rules and charge patients for services that should be free. We study hospital compliance with a public health insurance program that entitles low-income households to free hospital care in Rajasthan, state.

Methods

Using insurance claims data, we identify the universe of patients receiving hemodialysis treatment under insurance and conduct phone surveys with them to collect descriptive statistics on awareness and OOPP. We also conduct a randomized experiment, where we provide simple phone-based information to patients about their entitlement to free care under insurance, the amount the hospital is paid by the government for their care, and the names of up to 3 nearby hospitals also providing insured dialysis services.

Results

We first document substantial non-compliance by both public and private hospitals: 66% of patients report paying for dialysis care in the last month at their insurance-covered hospital or for tests and medicines purchased outside, and total payments over the last 4 weeks average INR 3,024 ($43). Payments directly at public hospitals are lower but substantial compared to those at private hospitals, and total payments are similar across sectors due to the higher likelihood of purchasing of tests and medicines outside the hospital due to stockouts in public. Awareness of insurance benefits is also low.

The information intervention generated large and significant increases in patients' awareness of their insurance entitlements (+0.17SD on awareness index). Patients exercised both voice (bargaining with their hospital to reduce their payment) and exit (switching to a different hospital) in response to the information. However, these strategies were only effective for patients visiting public hospitals, who experienced a 35% reduction in OOPP (INR 800, $12), while those visiting private hospitals saw no change in spending.

Conclusion

While bottom-up accountability has received substantial attention in the context of public primary care, we study it in the context of tertiary hospital care. We demonstrate the feasibility and effectiveness of using low-cost, scaleable phone-based information provision to improve awareness of health insurance benefits. We show this can strengthen patient-driven accountability but may not be sufficient to change the behavior of private agents, whose incentives are different, particularly in the context of higher-level, life-saving care, where hospitals may hold substantial power over patients. Top-down monitoring and the careful design of hospital incentives are also needed.

Hospital Choice and Patient Outcomes: Evidence from Regional Choice Reform

PRESENTER: **Konsta Lavaste**, University of Jyväskylä
AUTHORS: Mika Kortelainen, Liisa Laine, Tanja Saxell, Luigi Siciliani

We study the allocative effects of improving patient choice among heterogenous hospitals in a public health care system. Designing public policies to improve allocation and use of resources in society is particularly relevant but challenging in health care, which is known to have inefficiencies and frictions in choice, together with variations across producers in their available resources and performance. While quality and efficiency are important domains of health care performance, delayed access to care and long waiting times despite of pre-specified policy targets have become a significant policy issue in many countries.

We use a difference-in-differences (DiD) approach based on a regional reform in Finland that gave elective surgical patients a right to choose any public hospital within and outside their own health care district in the reform area, leaving patients and hospitals in the rest of the country unaffected. The reform acts as a shock to the competitive environment by improving publicly insured patients' possibility to choose and substitute to alternative hospitals. From a theoretical perspective, such reforms should allocate patients towards larger hospitals with better

resources or performance, increasing concentration in their markets and providing all hospitals stronger incentives to improve performance. Using comprehensive administrative data on hospital discharges, we estimate whether the reform affected patients' hospital choices and allocation, potentially changing the market structure and improving the performance of all hospitals operating in the market.

Using the DiD approach, we first document that the reform had substantial effects on hospital choices across several commonly performed elective surgeries: hip replacements, knee replacements, and all musculoskeletal surgeries. We find that the reform increased the distance traveled by patients up to 16 percent and the probability of patient being treated outside their own health care (hospital) district up to 83 percent compared to the corresponding pre-reform mean.

We also find that large teaching hospitals attracted more patients and concentration in their markets increased after the reform. Thus, choice reform can increase the market dominance of large hospitals by expanding their markets and improving substitutability across hospitals. Interestingly, waiting times also reduced and public hospitals treated more patients, but with little impact on clinical quality.

Taken all together, our results suggest that the reform promoting choice improved hospital performance and allocation with more efficient use of resources. Our results suggest that promoting choice improves public hospital performance and allocation towards better-resourced, large producers without raising average costs. Our findings on the positive links between substitutability and concentration are consistent with the theoretical predictions for allocations of activity across heterogeneous producers. If improved substitutability implies increased competition, the findings, however, contrast with the traditional presumption that increased competition is associated with weaker concentration.

10:30 AM –12:00 PM   TUESDAY   [Health Care Financing & Expenditures]

Cape Town International Convention Centre | CTICC 1 – Room 1.42

How Can We Make Health Financing More Equitable? Lessons from Ghana, Indonesia, Sierra Leone, and Tanzania [FINANCING FOR UHC SIG]

MODERATOR: **Mark Blecher**, South Africa Government

Socioeconomic Inequality in Health Insurance Subscription Renewal: A Case of Ghana's National Health Insurance Scheme

PRESENTER: **Jacob Novignon**, Kwame Nkrumah University of Science and Technology
AUTHOR: Yaw Boateng Atakorah

Ghana's national health insurance scheme (NHIS) covers about 50% of the population and is considered an important step towards achieving Universal Health Coverage (UHC) in the country. However, over the years the scheme has faced challenges that threaten its sustenance including the non-renewal of subscription. This would be more worrying if the poor are disproportionately affected. This study attempts to understand the socioeconomic inequalities in NHIS subscription renewal and identify factors that contribute to the observed inequality.

We used data from the seventh round of the Ghana Living Standard Survey (GLSS). A sample of 40,170 individuals were included in the analysis comprising 18,066 males and 22,104 females. The analysis was conducted in three stages; first we construct concentration curves (CCs), based on these, concentration indices (CIs) were computed to measure the magnitude of inequality. We used linear regression techniques to decompose the inequality indices to identify relevant contributing factors. Gender and rural-urban location gaps in NHIS renewal were also assessed.

The CCs show that NHIS renewal is pro-rich and this is confirmed by the positive and statistically significant CIs [CI=0.126; P<0.01]. The observed socioeconomic inequality is higher for females [CI=0.136; p<0.01] and rural dwellers [CI=0.073; p<0.01]. The findings also show that inequalities in premium payment [56.9%], education [7.9%] and wealth [8.2%] were the major contributors to the observed inequality in NHIS renewal. The contributions of sex (females), location (urban), access to TV, and household size equally widened the gap with minimal percentage contributions. Education attainment and wealth levels were the most important contributors to the observed gender and rural-urban location gap in NHIS renewal.

The findings highlight important equity-related nuances in the renewal of NHIS subscription in Ghana. It also serves lessons about policy targeting to improve enrolment and renewal. Therefore, policies that encourage rural education and economic empowerment are essential steps in the right direction.

Increasing the Sustainability and Fairness of the National Health Insurance in Indonesia

PRESENTER: **Ruli Endepe Al Faizin**, ThinkWell Global
AUTHORS: Iko Safika, Wahyu Ramadhan, Kristiana Yunitaningtyas, Hasbullah Thabrany

Background: Indonesia aims to achieve universal health coverage (UHC) by expanding national health insurance coverage to 98% of its 276.4 million inhabitants by 2024. The national health insurance (NHI) program was introduced in 2014 and currently covers 90.3% of 2022. Since its inception, NHI has experienced a continued funding deficit up until 2019. About 60% of NHI members are subsidized by the government. The remaining 40% of the members are employed in the formal sector and contribute 5% of their income as membership

premiums. The total monthly premium in 2022 was only Int$430 million. A key weakness of NHI is the absence of cross-subsidy and membership fees pegged equitably to income levels. This regressive model leads to lower contribution rates as a percentage of income from higher versus lower-income populations. Furthermore, the current premium is insufficient to cover comprehensive and high-quality benefits for the population. Additional revenue is needed to ensure financial risk protection and access to quality essential health services.

Method: The study used quantitative analyses of household expenditure data from SUSENAS (National Socio-Economic Survey) 2018-2022 and income analysis from SAKERNAS (National Labour Survey) to measure the ability of households to contribute to JKN proportional to their spending. Income brackets were refined to establish upper and lower limits that consider adjustments for insurance benefits outlined in Government Regulation 44/2015.

Results: Approximately one-third of the households in Indonesia spend Int$180-314 per month. Our financial model assumes a collectability rate of 100% of the monthly premiums. We then propose changing the current salary cap of Int$800 as the maximum base value for NHI contributions calculations to Int$1,380, which is on par with the work accident and death insurance regulations. This would allow for JKN contributions to grow to Int$14.2 billion annually. The government would require Int$5.7-9 billion annually to cover the contribution of the 89-125 million people currently subsidized by NHI. By increasing the earning cap from Int$800 to Int$1,380 monthly, the NHI could collect Int$10.3-12.1 billion annually, ensuring sufficient financing for quality healthcare and protecting the poor and vulnerable populations.

Conclusion: The results of this study demonstrate that there is potential for higher-income households to contribute more to NHI, increasing its financial sustainability and fairness. These findings also suggest that the government has potential options to subsidize the poor and vulnerable population to ensure social protection. NHI is significantly dependent on member contributions for its sustainability as a social protection mechanism and increasing salary caps is almost unavoidable. However, the impact of such a change being negatively received by NHI members needs to be managed including the negative impact on membership retention and premium collection.

The Redistributive Effect of the Public Health System: The Case of Sierra Leone

PRESENTER: **Jacopo Gabani**, University of York
AUTHORS: Sumit Mazumdar, Michael M. Amara, Sylvester B. Hadji

INTRODUCTION: Universal health coverage (UHC), equity and reduction of income inequalities are key objectives for the Sierra Leone government. While there is evidence that investing in health systems may drive economic growth, it is less clear whether investing in health systems reduces income inequality. Therefore, a crucial issue is to what extent the Sierra Leone public healthcare system reduces income inequality, and finances and provides healthcare services equitably.

METHODS: We use data from the Sierra Leone Integrated Household Survey 2018 to complete a financing and benefit incidence analysis of the Sierra Leone public healthcare system. We extend these analyses by assessing the redistributive effect of the public healthcare system (i.e., fiscal incidence analysis). We compute the redistributive effect as the change in Gini index induced by the payments for, and provision of, public healthcare services.

RESULTS: the financing incidence of the Sierra Leone public healthcare system is proportional to households' living standards (i.e., Kakwani index is 0.004, not statistically different from zero). With regards to public healthcare benefits, while PHC benefits are pro-poor, secondary/tertiary benefits are pro-rich. The result is that overall public healthcare benefits are equally distributed (concentration index (CI) is 0.008 not statistically different from zero). However, needs are concentrated among the poor, so benefits are pro-rich when needs are considered. We find that the public healthcare system redistributes resources from better-off quintiles to worse-off quintiles (Gini coefficient change induced by public healthcare system: -0.5%). PHC receives less financing than secondary/tertiary care but delivers a larger improvement in income inequality.

DISCUSSION: The Sierra Leone public healthcare system redistributes resources and reduces income inequality. However, the redistributive effect occurs largely thanks to PHC services being markedly pro-poor, and the Sierra Leone public health system could be more equitable. Policymakers interested in improving Sierra Leone public health system equity and reducing income inequalities should prioritise PHC investments.

Explaining the Socioeconomic-Related Inequality in Health Insurance Coverage in Tanzania: A Decomposition Analysis

PRESENTER: **Faith Amos Rodgers**, Muhimbili University of Health and Allied Sciences
AUTHORS: Alphoncina Philipo Kagaigai, Peter Binyaruka

Background: Achieving universal health coverage (UHC) is an important goal globally, and countries are implementing health system reforms to improve population coverage, service coverage and ensure financial risk protection. Health insurance as a pre-payment mechanism is a promising tool to improve access to healthcare and protect individuals from catastrophic health spending. However, its coverage remains suboptimal and pro-rich especially in low- and middle-income countries (LMICs). Despite a typical pro-rich health insurance coverage in LMICs, there is little understanding which factors influencing that pro-rich inequality. This study aims to expand the understanding by using national data from Tanzania, a country aspiring to establish a mandatory national health insurance system.

Methods: Data from the nationally representative household budget survey of 2017/18 was used. The survey covered 45929 individuals from 9463 households. We used household consumption expenditure to measure individuals' living standard. A concentration index was computed

to measure the degree of inequality in health insurance coverage, measured as ownership of any type of health insurance. A decomposition analysis was conducted to identify the determinants of inequality in health insurance coverage.

Results: Only 14% of Tanzanians were covered by health insurance, mainly through the National Health Insurance Fund (NHIF) (8%), Community Health Fund (CHF) (5%) and private insurance (1%). The overall concentration index of health insurance coverage was 0.219 (P<0.001). In terms of rural-urban, the concentration index was 0.134 (P<0.001) in rural and 0.339 (P<0.001) in urban areas. This shows that health insurance coverage was concentrated more among rich population (pro-rich) than in poorest population. Decomposition of the concentration index revealed that primary education was the largest contributor (30%) to socioeconomic-related inequality in health insurance coverage; while, being married (25%), and the richest quintile (19%) were also important contributors to the inequality.

Conclusion: There is a strong pro-rich inequality in health insurance coverage in Tanzania. Policy makers need to focus not only on reducing the gap between poor and rich for improved health outcomes, but also on factors explaining the inequality gap like wealth, education level, and the like. Our findings also highlight the need for a multi-sectoral approach for factors that cut across other sectors, as well as the health sector. These findings are important in Tanzania given the ongoing health insurance system reforms for universal coverage.

Keywords: Health insurance, socioeconomic inequality, concentration index, decomposition, Tanzania

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10:30 AM –12:00 PM   TUESDAY   [Economic Evaluation Of Health And Care Interventions]

Cape Town International Convention Centre | CTICC 1 – Room 2.64-2.65
Exploring Heterogeneity Vaccine Cost-Effectiveness [IMMUNIZATION ECONOMICS SIG]

MODERATOR: **Margherita Neri**, Office of Health Economics

National, Regional and Provincial Cost-Effectiveness of Introducing Childhood 13-Valent Pneumococcal Conjugate Vaccination in China: A Modelling Analysis

PRESENTER: **Xiaozhen Lai**, Peking University

Background: Although 13-valent pneumococcal conjugate vaccine (PCV13) is available in China's private market, it has yet to be introduced into the National Immunization Program (NIP) and is therefore not available to large parts of the population. This study aimed to estimate the cost-effectiveness of including PCV13 in China's NIP at national and provincial levels.

Methods: We adopted a decision-tree Markov model to estimate the cost-effectiveness of adding 3-dose PCV13 in the NIP compared to the *status quo* in the private market from a societal perspective. The model hypothesized a birth cohort for five years after vaccine introduction. Treatment costs and vaccine program costs were calculated from Chinese Center for Disease Control and Prevention (CDC) and national insurance databases. Disease burden data, incidence rate ratios, and other parameters were derived from published and grey literature. Cases and deaths averted, quality-adjusted life years (QALYs) gained, and incremental cost-effectiveness ratios (ICERs) were estimated at the provincial, regional, and national levels. One-way, scenario and probabilistic sensitivity analyses were conducted to explore model uncertainty.

Results: At the national level, introducing PCV13 in the NIP was predicted to prevent approximately 4 807 pneumococcal deaths (66% reduction) and 1 057 650 pneumococcal cases (17% reduction) in the first five years of the 2019 birth cohort. Under the assumed base case price of US$ 25 per dose in the NIP, PCV13 in the NIP was cost-effective nationally with ICER of US$ 5 222 per QALY gained, and was cost-effective in 17 and cost-saving in 4 of the 31 provinces compared to the *status quo*. One-way and scenario sensitivity analyses indicated robust results when varying all model parameters, and probabilistic sensitivity analysis showed a 98% probability of cost-effectiveness nationally.

Conclusion: Our findings highlight the cost-effectiveness of introducing PCV13 in China's NIP. Provincial results supported subnational introduction of PCV13, and priority should be given to less socioeconomically developed provinces. Since vaccination cost is the most influential model parameter, efforts to improve PCV affordability after pooled procurement will benefit public health in a cost-effective manner.

Exploring the SARS-CoV-2 Burden of Disease and Age-Specific QALY Gains of Vaccination Strategies While Accounting for Emerging Variants of Concern

PRESENTER: **Lander Willem**, University of antwerp

AUTHORS: Nicolas Franco, Christel Faes, Steven Abrams, Niel Hens, Philippe Beutels

The SARS-CoV-2 pandemic has been disruptive for the economy and healthcare system but was counteracted by immunisation efforts in 2021-2022 at unprecedented speed and scale. In spite of the endeavours, control of the pandemic was impeded by waning immunity and the emergence of variants of concern (VOCs) for which vaccination provided less protection. In this work, we focus on counter factual age-specific burden of disease associated with increased booster dose uptake in adults and a childhood-vaccination program in 2021 through model-based scenario analyses.

We extended a published stochastic compartmental model grafted on longitudinal social contact data alongside daily incidence data on hospitalizations and deaths to account for the emergence of VOCs and COVID-19 vaccination. Belgium is used as a case study to perform retrospective scenario analyses. Quality Adjusted Life Year (QALY) losses due to COVID-19 morbidity and mortality were estimated from the model-based projected incidence of mild, hospitalised and ICU cases and deaths, in combination with literature-based QALY losses per case, life expectancy data and the Belgian EQ-5D-5L population norm. We focus on two uptake programs in which (1) all adults who received primary vaccination would have received a booster dose by June 2021, and (2) 80% of the 5-11-year-old children would have completed a 2-dose vaccine schedule by the end of August 2021, which is in line with the reported uptake for 12-17-year old children.

We estimated the SARS-CoV-2 related burden of disease in Belgium until February 2022 around 300k QALYs mainly due to premature mortality, whereas QALY loss due to mild cases (>4M in a population of 11M) accounted for >10%. The QALY gains from increasing vaccine uptake in 5-11-year-old children was driven by the prevention of premature mortality, especially in the 60-79-year old population. The adult booster campaign would have prevented proportionately more mild infections and associated QALYs, with most health benefits accruing to the 20-39-year population. The estimated total QALY gain was lower with increased booster uptake for adults compared to the childhood vaccination program. In addition, the latter also showed lower Intensive Care Unit (ICU) occupancy, which has been a key indicator for the implementation of non-pharmaceutical interventions. Note that we did not assume vaccine effectiveness against transmission, though the model specified, as in reality, that uninfected people cannot transmit SARS-CoV-2.

Our model findings highlight differences in age-specific QALY gains when introducing SARS-CoV-2 vaccination. Compared to what happened in Belgium and to higher booster coverage in adults, more expansive and timely childhood vaccination would have produced more QALYs overall, would have accrued mainly to older adults through the prevention of premature mortality, and would have relieved more pressure on ICU occupancy. Higher coverage with adult boosters on the other hand would have produced more QALYs in younger adults through the prevention of predominantly mild disease. Furthermore, both scenarios under study would have enabled more physical contacts, which in turn would have led to improvements in mental wellbeing and economic activity, along with ethical aspects related to the redistribution effects of such strategies.

Microssimulation of Nirmatrelvir/Ritonavir for Covid-19 Vaccinated Individuals

PRESENTER: **Marisa Santos**, National Institute of Cardiology (INC)
AUTHORS: Ricardo Ribeiro Alves Fernandes, Bruno Barros

cONTEXT

In November 2022, nirmatrelvir/ritonavir (NMV-r) was made available without cost to high-risk patients under the Brazilian Public Health System (SUS). Although a significant portion of the Brazilian population has received vaccinations, there is debate over whether expanding its usage beyond the high-risk group would be cost-effective enough to meet Brazilian cost-effectiveness threshold.

Objective

Determine the NMV-r cost-effectiveness ratio -ICER in Brazil's vaccinated population in comparison to standard care.

Methods

In the TreeAge software, A microsimulation model of individual data was created. SRAG, a national database of severe respiratory diseases was utilized to map patients and create 48 profiles that took age group, immunosuppression, and vaccine dose amounts into account. The simulation begins with each person in the "ill" condition, from which they can go to the "ward," "ICU," "release from the ICU," (from which they would return to the ward), and finally the "recovered" state.

The time horizon was one year with daily cycles. The public health system's perspective was adopted. To evaluate costs and utility losses, complications including kidney failure and long-term covid were taken into account. According to the literature, the drug's effectiveness was estimated to reduce hospitalization by 50%. On the advice of experts, the parameters for image and laboratory testing were selected.

The quality-adjusted life years (QALYs) were used to assess the model's effectiveness . The effects of Covid-19 on various conditions and their applications in the Brazilian population have not yet been published. Utility values observed in the SARS-CoV-2-infected American population were included in the model, separated into groups based on symptoms. The average utility of asymptomatic patients was adjusted to be equivalent to that of the general Brazilian population (0.88), gradually declining in patients with mild symptoms (0.833), those who were hospitalized in the ward (0.5), those who were in the ICU (0.05), and those who were dead (0).

Results

Simulation of 100,000 patients (First order Monte Carlo simulation) produced mean cost-effectiveness estimates for cohorts with and without NMV-r. The drug's use resulted in an average incremental cost per patient of BRL 1,114.51 (US$213), which translated into an incremental effectiveness of 0.008412 QALY over a year. The estimated ICER was was BRL 132,479.92. which is above the Official Brazilian Threshold of BR 120,000.00/QALY (US$22,935/QALY) for severe diseases,

Only 24% of the simulations fell below the suggested threshold, as shown by the scatterplot, yet 100% of the simulations were the most expensive and effective.

Conclusion

For the treatment of the vaccinated Brazilian population, nirmatrelvir/ritonavir is not considered as cost-effective.

Value Pricing of COVID-19 Vaccine in China Based on the Evidence of Cost-Effectiveness Analysis

PRESENTER: **Yaqun FU**, Peking University

AUTHORS: Jingyu Zhao, Peien Han, Li Yang, Tao Ren, Siyan Zhan, Liming Li

Background: Free COVID-19 vaccination has been implemented in China to cover all its population for free since January 2021, and the medical insurance procurement price of vaccine per does has declined dramatically. This study aims to use real-world data to provide evidence for pricing by analyzing the cost-effectiveness of four different types of COVID-19 vaccines that are widely used internationally, namely, inactivated, adenovirus, recombinant protein, and mRNA vaccines.

Methods: Firstly, a cost-effectiveness analysis of a whole inoculation of four kinds of COVID-19 vaccines (inactivated, adenovirus, recombinant protein, and mRNA vaccines), was conducted. The efficacy and effectiveness data were collected from either multi-center random clinical trials (RCT) or meta-analyses, and the cost data was collected from real-world and WHO reference prices. Secondly, the incremental cost-effectiveness ratio (ICER) of a whole inoculation in avoiding COVID-19 related infections, hospitalization, ICU admission, and death were calculated and compared, and the most cost-effective vaccine was set as the comparator. Finally, the prices of the other vaccines were adjusted to reach an equal ICER with the comparator vaccine.

Results: When the medical insurance purchasing price of inactivated vaccine per dose was at $3.10 ($1=￥6.449 in year 2021), the cost of a whole inoculation should be capped at $9.67, including vaccine cost, transportation cost, storage cost and injection fee; therefore, the net price per dose of inactivated, adenovirus, recombinant protein, and mRNA vaccines were $2.92, $7.46, $1.40 and $2.72, respectively. The ICER of four kinds of vaccines in preventing infections, hospitalization, ICU admission, and death was below zero, which means vaccination was cost-saving. Among them, mRNA vaccine was the most cost-saving strategy. Under the comprehensive consideration of the effects in avoiding COVID-19 related infection, hospitalization, ICU admission, and death, the prices of a whole inoculation of four kinds of vaccines should be reduced to $8.19, $7.59, $8.27, and $9.67, and the price per dose should be at $2.22, $5.50, $0.96 and $2.72, respectively.

Conclusions: Regardless of the type, COVID-19 vaccines are cost-saving in preventing COVID-19 related infection, hospitalization, ICU admission, and avoiding death from a societal perspective. The medical insurance reimbursement price can be calculated by considering the financial capacity of medical insurance; meanwhile, can further adjusted based on economic evaluation using RCT and real-world evidence. In the future, when setting the price of a new vaccine, effectiveness data should be used as evidence, and the price of similar type of vaccines can also be used as a reference.

10:30 AM –12:00 PM   TUESDAY   [Health Care Financing & Expenditures]

Cape Town International Convention Centre | CTICC 1 – Room 1.43

Hybrid Health Systems: The Empirics of Government Behaviour, Offsets to Public Hospital Costs, and Risk Adjusted Subsidies

MODERATOR: **Francesco Paolucci**, University of Newcastle

ORGANIZER: **Josefa Henriquez**, University of Newcastle

DISCUSSANT: **Rudy Douven**, CPB Netherlands Bureau for Economic Policy Analysis

Integrating Ex-Ante Risk Adjustment with Ex-Post Risk Sharing in Health Plan Payment Systems: The Case for Hybrid Risk Equalisation in Australia

PRESENTER: **Richard Van Kleef**, Erasmus University Rotterdam

AUTHORS: Francesco Paolucci, Josefa Henriquez, Andrew Matthews, Thomas McGuire

Health plan payment systems with community-rated premiums typically include risk adjustment, risk sharing or both to compensate insurers for predictable profits (on young and healthy people) and predictable losses (on the elderly and chronically ill). This paper shows how a payment scheme based on risk sharing alone can be improved by including elements of risk adjustment. Moreover, in a community rated market with high product differentiation, it shows how changes in the payment system affects the redistribution of claims cost across product tiers. Using Australia's private health insurance market as a case study, we compare and assess the current risk sharing system against alternative models that include risk adjustment and risk sharing. More specifically, we compare systems in terms of incentives for risk selection and incentives for cost control. Our results reveal that a simple payment system with risk adjustment on the basis of demographic variables supplemented with outlier-risk sharing outperforms the current system. Our work illustrates how policy development can be thought of as a process by which risk equalization builds on existing payment system models as more and better data become available and reliance on risk sharing can be reduced.

Government Subsidies for Private Health Insurance in Australia: The Role of Offsets to Public Sector Costs

PRESENTER: **Josefa Henriquez**, University of Newcastle

AUTHORS: Jacob Glazer, Thomas McGuire, Francesco Paolucci

A deliberate goal of government policy in Australia has been increasing participation in private health insurance (PHI), with the objective of relieving pressures on the public health system and, as a result, on public finances. This motivated in the mid 90's, the introduction of a series of "carrots and sticks" policies, which include the Medicare Levy Surcharge (MLS), a levy on high income earners which do not take PHI, and premium rebates, a means and age tested subsidy for PHI products. A critical input into the benefits to government from these policies is the offsets. By "offset" we mean health care costs saved by the government because an individual is enrolled in PHI. We regard the subsidy component of the MLS as tax revenues forgone as individuals enroll in PHI. Using insurance benefits data and data on incomes and enrollment, this paper provides estimates of the offsets and the net (of MLS and premium rebate schedule subsidies) costs to government of PHI. Our estimates show large offsets for the government. When considering government subsidies, net savings of PHI to the government remain. In addition, we show that while savings are larger for older age groups, the net social cost which captures the effect of PHI on total resource use is greatest for these groups. We consider the implications of our findings for government policies subsidizing enrollment in PHI.

Regulatory and Product Features As Determinants of Demand for Private Health Insurance in Australia: A Behavioral Experiment

PRESENTER: **Francesco Paolucci**, University of Newcastle

AUTHORS: Emmanouil Mentzakis, Jacob Glazer, Thomas McGuire, Michael McLean

Increasing participation in private health insurance (PHI) in Australia is a deliberate goal of government policy, which is expected to take financial pressure off the public system. To elicit individual preferences and identify which regulatory features and product characteristics impact participation in PHI, this paper estimates the economic values for key features in the PHI market, namely, the Medicare Levy Surcharge (MLS) (a levy on high income earners which do not take up appropriate PHI), premium rebates (a means and age tested subsidy for PHI products), Lifetime Health Cover (LHC) (a premium penalty for individuals that do not take up PHI after the age of 30), base premium and level of cover (among the four existing product tiers: basic, bronze, silver, and gold), which are subject to policy analysis. An experiment was run, where each respondent saw a status quo scenario (the current state of the market and premium levels) plus randomly selected scenarios (which varied one or two features at a time). In each scenario respondents were asked to indicate the PHI product they would purchase or whether they would rather opt-out and forgo PHI. The probability of purchasing PHI or opting-out was estimated, as well as the probability to choose one of the possible product options in each scenario. Results show that changes in MLS rates or removal have a significant and sizable effect on PHI uptake and PHI product choice. Similarly, removal of the premium rebates exhibits significant and considerable effects on PHI product choice. Changes in base premiums showed effects in line with economic theory, but as with changes in LHC rates or thresholds, effects are small in size and of limited significance. Our findings reveal that among the existing regulatory features, the MLS and premium are powerful tools for driving participation, especially when the focus is placed on the removal or introduction of such features. On the contrary, consumers appear to be price inelastic, with little behavioural change driven through the range of base premiums tested.

10:30 AM –12:00 PM   TUESDAY   [Economic Evaluation Of Health And Care Interventions]

Cape Town International Convention Centre | CTICC 1 – Room 2.44-2.45

Valuing the Impact of Antimicrobial Resistance on Health and Economic Outcomes

MODERATOR: **Nichola Naylor**, London School of Hygiene & Tropical Medicine (LSHTM)

ORGANIZER: **Sedona Sweeney**, London School of Hygiene & Tropical Medicine (LSHTM)

DISCUSSANT: **Jean Pierre Nyemazi**, World Health Organisation; **Chantal Morel**, University of Bern

Comparing the BPaLM Regimen to the 2020 WHO Guidelines for the Treatment of Rifampicin-Resistant Tuberculosis: A Cost-Effectiveness Analysis Incorporating the Effects of Acquired Drug Resistance

PRESENTER: **Lyndon James**, Harvard University

Background: Emerging evidence suggests that shortened, simplified treatment regimens for rifampicin-resistant tuberculosis (RR-TB) can achieve comparable end-of-treatment outcomes to WHO-recommended longer regimens. Treatment decisions should take account of clinical outcomes and the potential amplification of drug resistance, and policymakers will also want to weigh these against costs.

Methods: We use a microsimulation model to compare 6 months of bedaquiline, Pretomanid, linezolid, and moxifloxacin (BPaLM) to the 2020 WHO Guidelines, two treatment strategies for patients 15 years old and over with rifampicin-resistant TB diagnosed using GeneXpert in Moldova, a country with high RR-TB burden. Genomic and demographic data from a Moldovan patient cohort, previously collected for the purposes of research, were used to parameterize a model simulating long-term treatment outcomes for each of these strategies. Individuals are followed over their lifetime, simulating the natural history of TB and associated treatment effects, as well as the process of acquired drug resistance. Outcomes of quality-adjusted life expectancy (QALE) and costs are measured in quality-adjusted life years (QALYs) and 2020 USD respectively. A third outcome – the mean duration with TB disease resistant to each of 12 drugs – is measured in months, as the mean

for all patients initiating treatment. A scenario analysis limits this third outcome variable to count time with resistance only among those who are not receiving treatment, and thus more likely to transmit that particular strain of TB.

Results: The results of the cost-effectiveness analysis show that the BPaLM regimen is dominant: it improves mean QALE per patient by 0.41 QALYs, and reduces mean costs per patient by 2588 USD. For the duration with resistance to each drug, the BPaLM regimen increases the mean duration with TB disease resistant to some drugs (such as linezolid), and decreases it for others (such as clofazimine, cycloserine, and delamanid), relative to the WHO Guidelines strategy. In the scenario analysis, when counting the duration with resistance only in the period of time an individual is not receiving treatment, for most drugs the duration is worsened for the BPaLM regimen as compared to the WHO Guidelines.

Discussion: Using a conventional cost-effectiveness approach, the findings of our study provide support for the implementation of the BPaLM regimen in Moldova, and other settings with a similar pattern of resistance to TB drugs. When presented with the mixed picture on the drug resistance outcomes, policymakers must evaluate a tradeoff: is the potential emergence of resistance to some second-line TB drugs – which could have negative consequences for patients in the future – outweighed by the health and economic benefits accruing to patients receiving the new treatment regimen today? To aid in the evaluation of this tradeoff, we explore how we might approximate future health gains and losses arising from the modeled drug resistance outcomes.

Treatment Success Vs. Reduced Emergence of MDR-TB: Is Improved Adherence to TB Treatment Cost-Effective?

PRESENTER: **Sedona Sweeney**, London School of Hygiene & Tropical Medicine (LSHTM)

Introduction: High levels of TB treatment adherence are considered important for cure and reducing disease recurrence. There have been several recent studies indicating that improving drug adherence can lead to an improvement in a composite 'favourable' treatment outcome. It is difficult, however, to translate these findings into meaningful economic evidence for policy decisions, as the 'composite' outcome is not comparable across interventions and disease areas and cannot be easily used to represent potential comparative value for money for different investments in the health system. There is minimal evidence on the mechanism by which adherence technologies can improve health outcomes, making it difficult for economic evaluations to accurately capture the actual health impact of these technologies.

Methods: We conducted a modelling analysis to show how the potential cost-effectiveness and willingness to pay for adherence technologies can vary depending on the mechanism by which technologies can improve health outcomes. We collected primary unit cost data from a randomized clinical trial on medical reminder devices for drug-susceptible TB patients in China from the societal perspective, using a bottom-up, retrospective approach to resource use estimation. We conducted scenario analyses, evaluating the potential cost-effectiveness of the intervention assuming improvements in four distinct clinical outcomes amongst patients with improved adherence: improved treatment completion, reduction in risk of relapse, reduction of acquired multidrug or rifampicin-resistant tuberculosis (MDR/RR-TB) following relapse, and reduction of acquired multidrug or rifampicin-resistant tuberculosis (MDR/RR-TB) following treatment failure.

Results: In the interventional arm of the trial, 23% (296/1261) of patients missed four or more consecutive treatment doses, as compared with 63% (828/1306) in the standard of care arm. Total patient-incurred costs were similar in both arms ($70.55 per month SoC; $71.35 per month intervention). Provider-incurred costs were slightly higher in the intervention arm ($17.69 per month SoC; $19.89 per month intervention). Scenario analyses show that if improved adherence led to a 2% or higher improvement in treatment success, or a 15% or higher reduction in risk of relapse, the intervention would be considered highly cost-effective. Willingness to pay for an adherence technology could range from $30-$90 per month, depending on the degree of reduction of relapse arising from improved adherence. Prevention of acquired MDR/RR-TB had no impact on the cost-effectiveness of the intervention.

Conclusions: Overall we found that willingness to pay for adherence technologies varies substantially depending on the ultimate effect on impact patient outcomes. The mechanism by which improved drug adherence impacts treatment outcomes is a crucial piece of the puzzle for policy makers seeking to make informed decisions about improving their TB programmes. Further research is needed to understand the relationship between drug adherence and patient outcomes.

The AMR-Unit Cost Repository: A Global Resource for Estimating the Economic Impact of AMR Human Health

PRESENTER: **Nichola Naylor**, London School of Hygiene & Tropical Medicine (LSHTM)

Introduction: Antimicrobial resistance (AMR) is a global health issue which has been caused large health and economic losses. There are no comprehensive estimates of unit costs associated with AMR and Drug-resistant infections (DRIs), from the healthcare system and societal perspectives. These are needed in international and national health economic evaluations to plan and prioritise investment in tackling public health and economic threats. We therefore created the AMR Unit Cost Repository (AMR-UCR), an open-access, global database. This includes estimates of hospital cost per case, antibiotic cost per unit and labour productivity cost per unit reduction in labour force.

Methods: For hospital costs, we conducted a rapid review of systematic reviews which had been conducted on the burden of AMR and DRIs. We then use evidence synthesis, collation and analyses to compile unit cost per hospital case. An inverse variance meta-analysis with random effects is used to estimate excess hospital costs per case. Average values across key literature sources are utilised for antibiotic unit cost estimation, whilst international databases are consulted for economic data (including labour productivity metrics). Productivity losses are estimated through human capital and production function approaches, tested on previously published AMR-epidemiology scenarios. Inflation

and exchange rate data are used to preserve local currency units and local economic shifts, where possible. All results are then presented in 2019 USD.

Results: MDR TB presented the highest average hospital excess cost per case across regions, with costs associated with resistance estimated to be $20,000 - $50,000 per case, whilst other drug-bug-syndrome combinations estimated varied between less than $100 per case to $20,000 per case. Large uncertainty intervals were seen in hospital cost per case estimates. Antibiotic unit costs were centered around $1, but had large variation, even when accounting for formulation and dose. The human capital and production function approaches for calculating labour productivity losses, estimated lost wages at $2 million to $250 million, or a reduction in GDP of 0.003% to 0.006%, translating to losses of $6 million to $400 million over a 15-year time-horizon, depending on region and AMR scenario.

Conclusions: AMR significantly impacts healthcare system payer costs and has the potential to impact economic productivity costs substantially. Sensitivity and scenario analyses highlight the large variability in potential economic impact due to uncertainty. More primary data on hospital costs, including antibiotic treatment costs, is needed across syndromes, with the reporting of key statistical values endorsed for such research in future. The impact of methods used for cost-adjustment across perspectives highlights the importance of transparency in economic burden modelling studies in relation to AMR.

10:30 AM –12:00 PM   TUESDAY   [Special Sessions]

Cape Town International Convention Centre | CTICC 1 – Auditorium 2
SPECIAL ORGANIZED SESSION: Equality, Diversity and Inclusion: How is IHEA Performing and how can we Improve?

MODERATOR: **Kara Hanson**, London School of Hygiene & Tropical Medicine (LSHTM)

DISCUSSANT: **Eeshani Kandpal**, The World Bank; **Virginia Wiseman**, Department of Global Health and Development, London School of Hygiene & Tropical Medicine

Why EDI Is Important to IHEA
PRESENTER: **Kara Hanson**, London School of Hygiene & Tropical Medicine (LSHTM)

Analysis of Current and Historical IHEA Membership Data
PRESENTER: **Anton Avanceña**, University of Michigan

Analysis of Current and Historical IHEA Congress Data
PRESENTER: **John Ele-Ojo Ataguba**, University of Cape Town

Analysis of the 2021 IHEA Congress Program through an EDI Lens
PRESENTER: **Tuba Saygin Avsar**, University College London
AUTHOR: Kompal Sinha

Overview of Other IHEA EDI Related Activities
PRESENTER: **Di McIntyre**

10:30 AM –12:00 PM   TUESDAY   [Economic Evaluation Of Health And Care Interventions]

Cape Town International Convention Centre | CTICC 1 – Room 2.61-2.62
Integrated Health Campaigns: The Latest Evidence on Cost, Efficiencies and Incentives

MODERATOR: **Laura Boonstoppel**, ThinkWell

DISCUSSANT: **Sarah Pallas**, U.S. Centers for Disease Control and Prevention

How Much Does It Cost to Conduct an Integrated Measles-Rubella Campaign in Sierra Leone?
PRESENTER: **Christina Banks**, ThinkWell
AUTHORS: Laura Boonstoppel, Flavia Moi, Michael Matthew Amara, Abdulai Hassan Kamara, Silleh Bah, Momodu Kamara, Abdulai Salia Brima, Logan Brenzel

The cost of conducting immunization campaigns in Sierra Leone is not well understood, and there is no evidence available on the cost of co-delivering more than one antigen or health intervention through campaigns. Ahead of introducing the measles-rubella (MR) vaccine into the routine immunization program, a nationwide catch-up campaign was conducted in June 2019 to cover children aged under 15, co-delivered with oral polio vaccines (OPV) in order to boost coverage. Vitamin A supplements and albendazole deworming tablets were also delivered in

half of the country's districts which had the lowest coverage levels. The campaign was largely financed by Gavi, the Vaccine Alliance, complemented by funding from the Sierra Leonean government and other donors. The post-campaign coverage survey found the MR coverage level achieved to be 93.2%. The aim of this study was to estimate the cost of the integrated MR campaign and assess whether integration had any impact on costs.

We conducted an ingredients-based costing study of the campaign from a payer perspective, including 30 facilities across six districts. Three districts delivered MR and OPV only while the other three also delivered the nutritional interventions. Costs were collected from the health system at facility, district and national levels, and also from development partners who were involved in campaign implementation. Unit costs are presented in 2020 USD, weighted by the probability of sampling and volume delivered. Variance in the unit costs was calculated using 95% confidence intervals. Two-sample t-tests and bootstrap regression were used to test for significant differences between subgroups.

The average financial and economic costs per dose delivered were $0.34 and $0.74 respectively. The main financial cost driver was per diem and travel allowances, followed by transport and fuel, and vaccine injection and safety supplies. The economic cost was driven by paid and volunteer labor costs. We found large variation in unit cost estimates across sites. The financial costs ranged from $0.14 to $1.12, with sites that delivered greater volume reporting lower unit costs. The financial delivery cost was $0.42 per dose delivered in MR and OPV only districts as opposed to $0.30 in the co-delivery districts, suggesting efficiencies from co-delivery. A similar trend was observed for the economic unit cost. However, these differences were not statistically significant and likely influenced by the higher volume of doses delivered at sites in co-delivery districts.

This study found that co-delivery may be associated with financial cost efficiencies as the increased delivery volume reduced the unit cost of delivery. However, due to integration not being randomized and the many other differences in characteristics between districts it was not possible to quantify the precise impact of integration on each aspect of the delivery costs. The substantial subnational variation in costs observed highlights that planning and budgeting must be tailored to reach populations across all different settings. The cost evidence can be used by the governments of Sierra Leone and other countries plus donors to support budgeting and planning for future campaigns.

The Cost of Delivering Yellow Fever Vaccines Compared with Co-Delivery of Yellow Fever and Meningitis a Vaccines through Campaigns in Nigeria

PRESENTER: **Florence Tochukwu Sibeudu**, Nnamdi Azikiwe University
AUTHORS: Obinna Onwujekwe, Divine Ndubuisi Obodoechi, Flavia Moi, Christina Banks, Kyle Borces, Laura Boonstoppel, Faisal Shuaib, Maimuna Hamisu, Bassey Okposen, Binta Ismail, Logan Brenzel

Despite their frequent use in Nigeria, little evidence exists on the cost of campaigns, and none thus far on the cost of integrated campaigns. This study aimed to estimate the full economic and financial costs of delivering yellow fever (YF) vaccines, as well as co-delivery of YF and Meningococcal A (MenA) vaccines, through campaigns in Nigeria. The evidence from this study can be used by the Nigerian government and its partners to inform planning and budgeting for future campaign phases, as well as inform other countries and donors.

As part of Nigeria's 10-year yellow fever (YF) elimination plan, immunization campaigns have been implemented in a phased manner across the country. This study includes three states which implemented campaigns from 2019-2020. In one of these (Anambra), the YF campaign, targeting those aged 9 months – 44 years, was integrated with MenA delivery targeting 1- to 6-year-olds. The campaigns were coordinated by the Nigerian government and primarily funded by Gavi, the Vaccine Alliance. Post-campaign coverage surveys reveal coverage levels of 83% in Katsina, 82% in Rivers, and 76% (YF) and 96% (MenA) in Anambra.

Using an ingredients-costing approach, cost data from a payer perspective were collected from two states which only delivered YF vaccines (Katsina and Rivers) and the state where both YF and MenA vaccines were delivered (Anambra). The sample included 78 randomly selected health facilities involved in the campaigns. Data were collected retrospectively between October 2020 and May 2021 from all levels of government as well as development partners. Findings are presented in 2020 USD weighted by the probability of sampling and volume delivered. Variance is shown through the use of 95% confidence intervals.

The average financial cost per dose of YF vaccine delivered was $0.34 in Katsina and $0.29 in Rivers compared to $0.35 for YF and MenA in Anambra, while the economic delivery unit costs were $0.62, $0.85 and $0.71 respectively. The financial cost of the campaign was driven by per diem and allowances, vaccine injection supplies, and transport and fuel costs, while paid and volunteer labor were the key economic cost drivers. Large subnational variation in unit costs were observed especially in regards to economic costs.

The average financial cost per dose across states was somewhat similar in spite of integration of MenA vaccine in Anambra , indicating possible efficiency in the integration of health programs. Due to the many other differences in characteristics and health system capacity across states, and in the ways that campaigns were implemented, it was not possible to assess the precise impact of integration on the delivery costs. However, our findings did not show efficiencies from co-delivery. This may have been because the economies of scale that would be expected from delivering two antigens were not observed. Despite delivering both antigens during the campaign, wards in Anambra delivered fewer vaccines on average than the wards in Katsina and Rivers. This suggests that vaccine volume delivered by the wards seemed to be a more important driver of the delivery unit cost than co-delivery.

Doing More with Seasonal Malaria Chemoprevention Campaigns: Safety, Equity, and Cost of Full Integration with Vitamin A Supplementation in Nigeria

PRESENTER: **Olusola Oresanya**, Malaria Consortium

AUTHORS: Abimbola Phillips, Ebenezer Okechukwu, Taiwo Ibinaiye, Olabisi Ogunmola, Kabir Muhammad, Jesujuwonlo Fadipe, Emmanuel Shekarau, Nneka Onwu, Helen Counihan, Jane Achan

Given the current scale of Seasonal Malaria Chemoprevention (SMC) in the Sahel region in Africa, and its expansion into new geographies, the SMC presents an opportunity to reach more children under age five with additional life-saving interventions. Following an initial implementation research study in 2019 to test the feasibility and acceptability of co-implementing vitamin A supplementation (VAS) with SMC campaign in one local government area (LGA) in Sokoto, Nigeria, we conducted a follow-up study in two LGAs (Katagum and Giade) in Bauchi state, to answer additional questions on safety, equity, feasibility in different settings (rural and urban), acceptability and cost of the integrated campaign.

We employed a convergent mixed methods approach using multiple data sources including cross-sectional pre and post-intervention surveys on 540 children aged 6-59 months assessing coverage of the intervention (previously reported), adverse drug reactions reported (safety) and background demographics of household members among others; programmatic cost analysis using the ingredient method; focus group discussions (FGDs) among health workers, caregivers and Community Drug Distributors (CDDs), and key informant interviews (KIIs) among stakeholders. Ethical clearance was obtained from Bauchi State internal ethics review board.

Adverse drug reactions (ADRs) reported at baseline was 8.0% compared to 1.6% at end line (pvalue=0.05), types of reactions reported, vomiting, skin rash, loss of appetite, fever, diarrhoea did not differ between baseline and endline. There was no significant difference between children who did or did not receive the two interventions at endline in terms of age, sex, wealth index, caregiver's educational status or religion. However, children living in urban areas had lower odds of receiving both interventions compared to those living in rural areas (SMC, OR=0.21 [95% CI = 0.10 to 0.41], VAS, OR=0.58 [95% CI=0.37 to 0.92]). The total cost for SMC only was $149,718.76 in cycle 3 (baseline) and SMC+VAS at $171,258.12 in cycle 4 (endline). It costed $0.9 to reach each child with SMC only and $1.1 to reach the same child with both SMC and VAS.

This study demonstrates the viability of the SMC platform to deliver VAS safely and equitably at a mere additional cost of $0.2 per child. It also amplifies the need to explore the factors responsible for limited reach of children in urban areas using the current delivery approach.

Addressing Financial Barriers and Disincentives to Health Campaign Integration and Coordination Among Vertical Programs

PRESENTER: **Annette Ozaltin**, Results for Development

AUTHORS: Edward Owino, Kristin Saarlas

Public health campaigns are used in many countries to maximize the number of people reached with interventions to prevent, control, eliminate or eradicate diseases. Campaigns have historically been organized within disease-specific (vertical) programs, which are often funded, planned, and implemented independently from one another and from routinely offered primary health care services. Global health agencies have voiced support for enhancing campaign effectiveness, including campaign efficiency and equity, through collaboration among vertical programs. However, standalone campaigns have proliferated over the past 25 years, even amidst the call for integration, or mainstreaming, emphasized in global strategy and guidelines.

We conducted a health campaign financing landscape analysis with the aim of shining a light on the financial barriers and disincentives at the global and country level to integration or collaboration among campaigns related to neglected tropical diseases, malaria, vitamin A supplementation, and vaccine-preventable diseases, including polio, measles, meningitis and other diseases. The landscape analysis included a qualitative research study conducted between February and May 2022 including 51 semi-structured interviews with key informants representing these program areas and including funders, implementing partners, and program managers from countries with many externally financed campaigns. We complemented these interviews with a review of global strategy and guidance documents.

The barriers and disincentives we surfaced through this analysis are organized into seven themes. First, there are fundamental issues in the way global health is structured and financed which enforce verticalization and fragment the system. Second, there is unproductive competition for scarce resources and priority among agencies and health programs, with these power dynamics resulting in a redistribution of resources at the global level. Third, there is fragmentation of financing, nonstandard payment rates, and inefficiencies from overlaps, duplications, and misalignment of campaign functions. Fourth, there is little incentive to change the status quo as there are no immediate negative consequences; inefficiencies are hidden from each funding channel and program (i.e., the tragedy of the commons). Fifth, there are powerful disincentives to integration and collaboration, and multiple staggard campaigns have some obvious benefits. Sixth, limited intra and inter communication leads to lack of coordination on strategies, alignment of funding streams, and integrated planning. And finally, integration is complex and leadership for change is hard, with country absorptive capacity limited with competing priorities and an overburdened workforce.

In addition to identifying financial barriers and disincentives through the interviews with experts, we surfaced opportunities and practical actions to overcome these challenges, and to strengthen collaboration among agencies and health programs and to increase integration with health systems. Among a long list, the most promising opportunities relate to collaborating to introduce various health systems and financing interventions in specific geographies, including: 1) aligning and coordinating funding to support integrated planning and harmonization of

payment rates, supported by a pooled financing mechanism; 2) optimized incentive arrangements at various levels of the health system to encourage campaign integration and program coordination; and 3) functional integration to address inefficiencies through investment in joint health system functions and tools across campaigns of different health interventions or antigens.

10:30 AM –12:00 PM   TUESDAY   [Health, Its Distribution And Its Valuation]

Cape Town International Convention Centre | CTICC 1 – Room 1.41

Measuring Capabilities Among Vulnerable Populations in Low- and Middle- Income Countries

MODERATOR: **Neha Batura**, University College London

DISCUSSANT: **Jolene Skordis**, University College London

Using Photovoice to Conceptualise a 'Good Life' with Children 6-10 Years and Adults in Rural South Africa

PRESENTER: **Hassan Haghparast-Bidgoli**, University College London
AUTHORS: Gerard Joseph Abou Jaoude, Jolene Skordis

Background: Monitoring and improving population well-being is becoming a central policy objective in many contexts. Sen's capability approach to conceptualise well-being has led to the development of several capability instruments for use in economic evaluations, which can inform an efficient allocation of limited public resources. However, existing capability instruments have, to date, only been developed for adult populations and all but one have been developed in high income countries.

Methods: We used participatory photography (PhotoVoice) to conceptualise capabilities with children aged 6-10 years and adult educational assistants in rural South Africa. A total of 18 children and 36 educational assistants from Mahikeng Local Municipality participated in our study. The PhotoVoice activity was centred on what makes a 'good' life. Participants independently took photographs of what makes a 'good' or a 'bad' life, individually selected 10 photographs and ranked them by importance. Photographs were then collectively prioritised for discussion in focus groups. Photographs and focus group transcripts are being analysed using inductive thematic analysis.

Results: Two capability lists will be presented from the analysis, one for adults and one for children. The importance of various identified capabilities will be presented based on rankings by children and adults. The adult capability list will be compared against existing general and education-focussed adult capability lists from South Africa, as well as the ICECAP-A adult capability instrument which has been developed in high-income settings for use in economic evaluations. The child capability list will be compared against existing child capability lists from other contexts.

Conclusions: This will be the first study to define a list of capabilities with children in South Africa. Findings from this study are expected to have immediate and longer-term implications. First, findings will inform recommendations to the South African Basic Department of Education on how schools can better support and improve child well-being. Second, while additional work is needed, findings from this study and the capability lists generated can help develop adult and child capability instruments for use in economic evaluations in South Africa and similar middle-income contexts.

Developing a Capabilities-Based Measure for Young People at High Risk of HIV in South Africa

PRESENTER: **Nonhlonipho Bhengu**, South African Medical Research Council

Introduction: HIV-acquisition remains a major challenge, particularly amongst out-of-school young people aged 18-24 years in South Africa. The Siyaphambili Youth Project in KwaZulu-Natal (KZN) aims to establish causal understandings of how contextual factors shape HIV-acquisition risk among young people, and to develop and pilot an intervention to reduce HIV-acquisition risk amongst this vulnerable population. A nuanced understanding of risk factors provides policy-makers, practitioners, and participants with resources to improve health outcomes and overall well-being. However, such interventions typically do not consider young people's capabilities or their ability to convert available resources into a state of well-being. They also do not consider differences in levels of agency that young people may have over a range of actions in different social, economic and cultural settings. If interventions and policies do not take these differences into account, they may equalize resources amongst individuals, marginalising particular groups. Thus, we developed a context-specific measure to capture young people's capabilities.

Methods: We conducted focus group discussions (FGDs) with young men and women aged 18-24 years in rural and urban KZN to gain an understanding of what a 'good life' meant to them, and the attributes that defined a good life. We conducted follow up FGDs to validate our initial findings, and developed a draft capabilities survey, that was based on the ICECAP-A survey. We administered the draft survey to 14 young men and women, and conducted cognitive interviews to understand how the questions were interpreted, and whether the survey adequately reflected the nuances of the attributes of a good life that emerged from the FGDs. Data collection took place between December 2021 and November 2022. All FGDs and interviews were conducted in isiZulu, and were recorded and transcribed to English. We used thematic analysis to understand the experiences and thoughts of a good life described by young people in our sample.

Results: In the FGDs, a good life was described by a range of attributes that were shaped by young people's feelings; relationships with friends, parents, children and community members; social norms and socio-economic circumstances. These attributes could be mapped onto

those captured by the ICECAP-A survey: love, friendship and support; being independent; achievement and progress; enjoyment and pleasure; and feeling settled and secure. Two context specific themes emerged very strongly – physical safety; and respect. We separated feeling settled and secure into two categories to reflect the importance of physical safety, and added the dimension of respect. The findings from the cognitive interview indicated that the survey questions were comprehensible, and reflected the nuances of the attributes of a good life that emerged from the FGDs. Only minor changes were made to reflect accurate phrasing in the isiZulu version of the survey.

Conclusion: We will use this context-specific capabilities measure to capture the impact of Siyaphambili Youth Project on the well-being of young people. Our results suggest that while there might be similarities in the dimensions of well-being captured by existing surveys, it is worthwhile to consider context specific dimensions to assess well-being.

Using the Women's Capabilities Index to Assess the Effect of Kangaroo Mother Care Among Low Birthweight Neonates in Uganda: A Parallel Arm Randomised Controlled Trial

PRESENTER: **Melissa Medvedev**, London School of Hygiene and Tropical Medicine

AUTHORS: Victor Tumukunde, Charity Kirabo-Nagemi, Elizabeth Ekirapa-Kiracho, Catherine Pitt, Ivan Mambule, Joy Lawn, Dr. Giulia Greco, PhD

Introduction: Globally, >80% of neonatal deaths occur in babies who are born preterm or with low birthweight. Mothers of small, vulnerable babies are likely to experience high levels of stress and anxiety due to uncertainties regarding their baby's health and as a result of physical separation, e.g., when the baby is receiving incubator care. Kangaroo mother care (KMC), an evidence-based practice involving prolonged skin-to-skin contact with the mother or another caregiver, has been shown to improve survival among preterm and low birthweight babies. However, there is limited evidence regarding the effect of practicing KMC in this population of mothers. Our objectives were to assess the effect of practicing early KMC on the wellbeing of mothers of neonates weighing 2000 grams or less compared to standard care (incubator or radiant heater) using Sen's Capability Approach, and to evaluate the financial, opportunity, and economic costs of KMC initiated before stabilisation relative to standard care from the household perspective.

Methods: The OMWaNA trial was conducted in 5 hospitals in Uganda between February 2020 and July 2022, with 2188 neonates enrolled in a 1:1 ratio between the KMC and control arms. The Women's Capabilities Index (WCI) was used to assess maternal wellbeing. It is based on women's contributions to conceptualisation of a good life in Malawi and has been adapted to the Ugandan context. The WCI comprises 7 dimensions (physical wellbeing, mental wellbeing, children's wellbeing, partner relations, community relations, economic security, housing), which are measured with 25 indicators. The WCI was aggregated with an equal weight for each indicator, and scores were normalised on a scale from 0 (worst) to 1 (best). We compared WCI scores between arms and explored associations with determinants of women's wellbeing and sociodemographic factors. Household cost data were collected at discharge and follow-up at 28-30 days (d). We examined total costs, cost differences between arms, and heterogeneity of findings.

Results: Accounting for multiple births, WCI data were collected from 1841 mothers at enrolment and 1229 mothers at 28-30d. Mean WCI scores at baseline were 0.70 (SD 0.14) in the KMC arm and 0.69 (0.14) in standard care (p=0.06). Scores at 28-30d were higher in the KMC arm [mean 0.69 (SD 0.14)] relative to standard care [mean 0.68 (0.15); p<0.05]. Mental wellbeing measured with life satisfaction was the only indicator that changed from enrolment to 28-30d [mean 0.07 (SD 0.94) in KMC arm vs. -0.02 (0.94) in control arm; p<0.05]. At follow-up, there were no differences in sub-group analyses by birthweight, marital status, delivery mode, or hospital. Total financial (N=1440) and opportunity (N=1434) costs, respectively, were similar between the KMC arm [mean $58.69 (SD 39.73); $30.71 (80.08)] and control arm [mean $57.51 (SD 41.26); $31.79 (96.14)]. The economic cost per baby was higher in the KMC arm at Kawempe Hospital (mean difference $15.88; p<0.01). There were no between-arm differences in household economic costs at the other hospitals or in total across all sites.

Conclusions: Practicing early KMC had a positive effect on women's wellbeing at no additional cost to households.

10:30 AM –12:00 PM   TUESDAY   [Economic Evaluation Of Health And Care Interventions]

Cape Town International Convention Centre | CTICC 1 – Room 2.41-2.42

How to Incorporate Equity Considerations in Economic Evaluations? [EQUITY INFORMATIVE ECONOMIC EVALUATION SIG]

MODERATOR: **Praveen Thokala**, University of Sheffield

DISCUSSANT: **Piya Hanvoravongchai**, Chulalongkorn University

Incorporating Equity into Health Technology Assessment: The Thai Experience in Applying MCDA for the Universal Health Benefit Package Development.

PRESENTER: **Sitaporn Youngkong**, Faculty of Pharmacy, Mahidol University

Multi-criteria decision analysis (MCDA) has been using as an overall methodological approach for rational and transparent coverage decisions on including health interventions in the Thai universal health benefit package development since 2009.

Equity issues have been also considered in both quantitative and qualitative ways. They have been considered as an explicit and quantifiable criterion of 'social and ethical consideration – in terms of diseases for the poor and those with low-prevalence' of topic selection for further health technology assessment (HTA). Also, for the appraisal step, deliberative MCDA can help capturing equity issues and be considered in collaboration with HTA evidence to make preliminary policy recommendations for inclusion of the new health interventions into the benefit package.

The recent examples of the coverage decisions on automated peritoneal dialysis (PD) under the PD first policy for end-stage renal disease, implant dentures for people who have problem with conventional complete dentures, and absorbent products for urinary and fecal incontinence among disabled and elderly people, have highlighted the usefulness of MCDA in rational, transparent, and fair health care decision makings, and presented the balance between efficiency and equity in prioritization of health interventions in a real-world context.

MCDA was applied in the various steps throughout the process to identify (selection and assessment) criteria, to construct performance matrixes, and to elaborate on these before coming to final conclusions. For more than ten years of experience of implementing MCDA for supporting the coverage decisions, MCDA seems to have considerably contributed to fairness of priority setting.

Equity Impact of Minimum Unit Pricing of Alcohol on Household Health and Finances Among Rich and Poor Drinkers in South Africa.

PRESENTER: **Naomi Kate Gibbs**, University of York

Introduction

South Africa experiences significant levels of alcohol-related harm. Recent research suggests minimum unit pricing (MUP) for alcohol would be an effective policy, but high levels of income inequality raise concerns about equity impacts. This paper quantifies the equity impact of MUP on household health and finances in rich and poor drinkers in South Africa.

Methods

We draw from extended cost-effectiveness analysis (ECEA) methods and an epidemiological policy appraisal model of MUP for South Africa to simulate the equity impact of a ZAR 10 MUP over a 20-year time horizon. We estimate the impact across wealth quintiles on: (i) alcohol consumption and expenditures; (ii) mortality; (iii) government healthcare cost savings; (iv) reductions in cases of catastrophic health expenditures (CHE) and household savings linked to reduced health-related workplace absence.

Results

We estimate MUP would reduce consumption more among the poorest than the richest drinkers. Expenditure would increase by ZAR 353 000million (1 US$=13.2 ZAR), the poorest contributing 13% and the richest 28% of the increase, although this remains regressive compared with mean income. Of the 22 600 deaths averted, 56% accrue to the bottom two quintiles; government healthcare cost savings would be substantial (ZAR 3.9 billion). Cases of CHE averted would be 564 700, 46% among the poorest two quintiles. Indirect cost savings amount to ZAR 51.1 billion.

Conclusions

A MUP policy in South Africa has the potential to reduce harm and health inequality. Fiscal policies for population health require structured policy appraisal, accounting for the totality of effects using mathematical models in association with ECEA methodology

Equity Impact Analysis of Medical Approaches to Cardiovascular Diseases Prevention in Tanzania.

PRESENTER: **Frida Ngalesoni**, Muhimbili University of Health and Allied Sciences

Primary medical prevention of cardiovascular disease (CVD) has received low priority in Tanzania, despite evidence of the rising prevalence of CVD risk factors. Different guidelines have been proposed for medical CVD prevention, including the European Society of Cardiology (ESC) and the World Health Organization (WHO) guidelines, which recommend medical prevention for all individuals based on the consideration of single CVD risk thresholds while a third alternative is the differentiated risk thresholds according to age. This paper performs a distributional cost-effectiveness analysis (DCEA) using the Gini Index to quantify health inequality outcomes and the Achievement Index to integrate health inequality outcomes with total health outcomes. We evaluated the different medical CVD prevention guidelines according to three outcome measures, namely: efficiency, inequality and the combination of efficiency and inequality. We ran a Markov analysis for an estimated Tanzanian population at risk of CVD employing a 40 years' time horizon to estimate the total expected costs and CVD deaths associated with provision of the different guidelines. The results were then used to calculate three outcomes: life expectancy at age 40 as a proxy for efficiency, the Gini coefficient (a measure of inequality), and the achievement index (which combines concerns of efficiency and inequality). Our results suggest that higher life expectancy (28.3 vs. 26.6 years) and more equally distributed health (Gini coefficient of 0.22 vs. 0.24) could be attained if medical CVD prevention was based on the differentiated risk threshold approach compared to the WHO single risk threshold, when the total cost of these approaches is the same. Preventing CVD based on differentiating risk thresholds by age yielded the most favorable cost per life year gained and cost per percentage Gini improvement indicating it to be the better alternative when concerns of both efficiency and inequality are considered important. This work illustrates that evidence on costs and outcomes within a disease area can be used to estimate impact on and distribution of life expectancy using standard summary measures of population health demonstrating applicability of DCEA methods even in resource constrained settings.

Cape Town International Convention Centre | CTICC 1 – Ballroom West
Mentoring Lunch

Cape Town International Convention Centre | CTICC 1 – Jasminum & Strelitzia restaurants
Lunch and Poster Viewing

Cape Town International Convention Centre | CTICC 1 – Ballroom East
Lunch and Poster Viewing

Cape Town International Convention Centre | CTICC 1 – Room 1.62
Determinants of Maternal and Child Healthcare Use

MODERATOR: **Eeshani Kandpal**, The World Bank

Factors Affecting Antenatal Screening for HIV in Nepal: Results from Nepal Demographic and Health Survey 2016
PRESENTER: **Lucie Sabin**, UCL
AUTHORS: Naomi Saville, Hassan Haghparast-Bidgoli
Background and objective:

Antenatal screening for HIV remains low in Nepal despite improvements in coverage over the past decade with an increase from 43% in 2016 to 57% in 2019. Moreover, coverage of screening services is uneven across regions with the availability of HIV screening systems ranging from 2% of facilities in the mountain region to 8% in the Terai region.

In this context, identifying factors influencing the uptake of antenatal screening is essential for the implementation of appropriate interventions to increase the uptake and prevent mother-to-child transmission (MTCT) of HIV, a key health target of Substantiable Development Goals. In this study, we investigated the effects of individual- and district-level characteristics on the utilisation of antenatal screening for HIV in Nepal.

Methods:

We used cross-sectional 2016 Demographic and Health Survey data from Nepal, which includes 1,978 women aged 15–49 years who gave birth in the two years preceding the survey and provided information on antenatal screening for HIV during antenatal care (ANC). We used multilevel models to estimate associations between HIV antenatal screening and potential factors influencing it. We used the districts as a random effect and looked at the intraclass correlation coefficients to disentangle the geographical effects. The same analyses were performed to distinguish barriers to HIV screening from barriers to accessing ANC services, with the dependent variable being a dummy variable indicating whether women attended at least one ANC visit.

Results:

Our results showed that higher uptake of HIV screening was found amongst women with higher education, women participating in household decisions and women who had 4 or more ANC visits. Being from a poorer family, having a low-risk perception and having low knowledge of the availability of medicines to avoid MTCT were associated with lower uptake of screening. From the supply side, having a qualified health professional at ANC and easy access to screening services were the main factors that positively influenced antenatal screening for HIV. Comparing factors associated with antenatal screening and those associated with ANC visits, only wealth and education level were significantly associated with both outcomes.

Our results also show the importance of geographical factors on antenatal screening uptake. According to the intraclass correlation coefficient, 40.87% of the chance of being tested for HIV during pregnancy was explained by differences between districts.

Discussion:

Identifying barriers to antenatal screening is essential for the implementation of appropriate interventions to improve MTCT prevention. Our results contribute to filling the knowledge gap on barriers to antenatal screening in South Asia. They support that antenatal screening could be improved by enhancing, among other things, access to information about MTCT of HIV and to antenatal screening services.

5 keywords: sexually transmitted disease, HIV, antenatal screening, Nepal, barriers and facilitators.

The Role of National Health Insurance in Reducing Catastrophic Health Spending (CHS) on Maternal and Neonatal Health (MNH) Services in Indonesia Year 2018-2021

PRESENTER: **Mutia Astrini Pratiwi**, ThinkWell, LLC/USAID Health Financing Activity
AUTHORS: Yuli Farianti, Iko Safika, Hasbullah Thabrany

Introduction. Indonesia has continued to experience a high maternal mortality ratio (MMR) over the past four decades, remaining high at 177 per 100,000 live births in 2017. One of the key causes has been the underutilization of healthcare services by pregnant women and mothers. In 2014, Indonesia's national health insurance program (*Jaminan Kesehatan Nasional* or JKN) was introduced and currently covers 245.84 million or 89.7% of the total population. The benefits package includes antenatal care (ANC), labor and delivery, and postnatal care (PNC). However, based on data from the national socio-economic survey (SUSENAS), women often had to pay out-of-pocket (OOP) expenses to cover top-up payments or any treatment charges. To evaluate the impact of OOP on households and their income, we conducted an analysis of SUSENAS data from 2018-2022.

Methodology. We analyzed approximately 400,000 females who experienced pregnancy and childbirthing within the last two years, from 2018-2022 Susenas data. We applied multivariate logistic regression to evaluate the difference in the probability of having catastrophic health spending (CHS) among women covered by JKN and those who were not covered by JKN. CHS was the primary dependent variable measured at the 10% and 25% thresholds of the total household income. The primary independent variable was JKN membership, and other control variables included income classes (bottom 40%, middle 40%, and top 20%) and household residence (urban versus rural).

Results. Our findings estimated that there was a higher reduction of OOP among JKN members. Their annual OOP expenditure decreased from IDR1.20 million ($80) in 2018 to IDR1.19 million ($75) in 2020 but increased again to IDR1.29 million ($86) in 2022 due to unused JKN benefits. The non-JKN members spent 19% higher OOP than the JKN members. The incidence of CHS among JKN members was 2-3% of total households at a 10% threshold with an odds ratio of 0.58, while the incidence of non-JKN members was 3-5% of total households. There were variations of CHS incidence by income group, with the highest probability of CHS occurring among mothers in the middle 40% and top 20% household income groups, which may indicate that the poorest 40% of households were the most protected. However, higher income groups may also be paying additional OOP for upgrading services to private rooms.

Conclusion and Policy Implications. JKN members are less likely to experience CHS for maternal and neonatal health (MNH), as indicated by their lower levels of OOP expenditure on these services. Furthermore, there is a gradually declining OOP spending by JKN members on MNH services and the proportion of households who experience CHS. Therefore, expanding JKN coverage for all pregnant women is necessary. For instance, ensuring all kinds of MNH services under JKN and adding more private health providers into JKN's network. However, it imposes a challenge: the supply-side readiness to deliver adequate services based on the JKN standard. We recommend that future studies identify OOP for upgrading benefits and OOP pushing people to pay for essential services.

Does the Gratuité User Fee Exemption Policy Make a Difference on Maternal, Newborn and Child Health Service Utilization in Conflict-Affected Regions of Burkina Faso? Evidence from a Pre-Post Analysis

PRESENTER: **Marie-Jeanne Offosse Ngbesso**, ThinkWell Institute

Introduction

Though considered an important piece of the jigsaw for realising universal health coverage, evidence on effectiveness of user fee exemption policies is varied, mostly based on uncontrolled studies, and limited for conflict-affected settings. In Burkina Faso, a country with ongoing conflicts, user fee exemption policies have been piloted at small-scale since the late 2000s, mostly in partnership with non-governmental organizations (NGOs). These pilots were implemented along with a national government-led user fee reduction policy for delivery and emergency obstetric care (locally referred to as 'SONU': Soins Obstétricaux et Néonataux d'Urgence), which subsidized 80% of care. In 2016, the government introduced a national user fee exemption policy known as Gratuité which aimed at reducing financial barriers and improving access to maternal, newborn, and child health (MNCH) services. This study aims to assess the effect of the policy on MNCH service utilization in conflict-affected districts of Burkina Faso.

Methods

We conducted a quasi-experimental study comparing four conflict-affected districts (Dori, Sebba, Tougan, and Séguénéga), which had the NGO-supported user fee exemption pilot before transitioning to Gratuité (Comparator) with four other districts with similar characteristics (Djibo, Gorom-Gorom, Toma, and Yako) but with no such pilot schemes (Intervention). A difference-in-difference approach was initiated using data from 42 months before the policy launch and 30 months post-implementation. Specifically, we compared utilization rates for

selected MNCH services. The coefficient, including a 95% confidence interval (CI), *p*-value, and the parallel trends test results, were reported. Graphical diagnostics of parallel trends for each outcome showing observed means of the outcome measures between intervention and comparator districts were compared to a linear trends model of these observed means.

Results

The policy led to significant increases in rates of new consultations in children <1 year (Coeff 1.80; 95%CI 1.13–2.47, *p*<0.001), new consultations in children 1-4 years (Coeff 0.81; 95%CI 0.50–1.13, *p*=0.001), uncomplicated malaria cases treated in children <5 years (Coeff 0.59; 95%CI 0.44–0.73, *p*<0.001), and 6th day PNC visits for women (Coeff 0.15; 95%CI 0.01–0.29). ANC1 and ANC5+ rates did not show any statistically significant positive upward trend. Rates of facility delivery, 6th hour and 6th week postnatal visits were found to have increased in intervention areas compared to control areas, but these were not statistically significant.

Conclusion

Evidence from this study suggests that, even in conflict-affected areas, the Gratuité policy significantly positively influences the utilization of MNCH services that were hitherto not widely used by women. The policy also incentivizes parents to take their children to health facilities even for uncomplicated cases of malaria, many of which would have been previously managed at home. There is a strong case for continued funding of the policy to ensure that gains are not reversed, especially if the conflict ceases to abate.

Unlike most studies on fragile and conflict affected countries (FCAs), commissioned by external agencies, this study was requested by the ministry of health, hence bearing a high potential to translated into reforms. The study provides empirical evidence on the effect of fee exemption on the progress towards UHC in FCAs.

The Effect of Cash Transfers on Maternal Health Seeking: Evidence from Ecuador

PRESENTER: **Daniel Maggio**, Cornell University
AUTHOR: Jack Cavanagh

Significance/Background:

To reduce childhood stunting, many countries have adopted maternal benefit schemes intended to bolster facility-based birth rates and demand for antenatal care. These programs are motivated by a demonstrable link between in-utero conditions and long-term physical and cognitive development. However, for these programs to improve downstream health outcomes, they must first credibly increase the demand for health services among pregnant women.

Research Question

We study the impacts of one such program, Ecuador's Desnutrición Cero, a multi-faceted cash-transfer program targeting maternal health-seeking and birth outcomes, that sought to create incentives for care-seeking through cash transfers conditional on antenatal and postnatal care, and lump-sum grants before delivery. Specifically, we ask if Desnutrición Cero improved antenatal and delivery care seeking among recipient women, and improved birth outcomes for their children.

Methods

To estimate the causal impact of the program, we employ a fuzzy regression discontinuity design (RDD) that exploits the near-systematic assignment of Ecuadorian parroquias to treatment based on levels of childhood stunting predicted by a government-led proxy means test (PMT). We utilize administrative data from Ecuador's birth registry containing data on all recorded events across Ecuador during program implementation. As regression discontinuity designs are subject to several researcher choices, we present sensitivity and robustness checks to display that our estimates to different bandwidth or sample choices.

Key Findings

Using our RDD estimation, we do not find evidence of improvement in antenatal care-seeking, trained or facility-based delivery care, or birth outcomes in the locality of the program threshold. Further, we can dismiss the possibility of effects larger than a third of a standard deviation for most outcomes. While there is suggestive evidence that mothers substituted away from private care in program areas, we do not observe an overall increase in care uptake across the birth cycle. Finally, we show that our results are robust to several specification and sensitivity analyses.

Data limitations prevent us from precisely exploring key program limitations, but we propose and discuss three weaknesses surrounding program targeting and implementation: i) the program did not target the correct constraint on in-uterine health; ii) the program did not target the correct population, or iii) the program had insufficient demand.

Knowledge Contribution

There exists a large and growing literature on the effect of cash transfers on perinatal health, and recent evaluations in developed and developing contexts have shown that cash transfers can effectively promote health-seeking. We contribute to this literature by utilizing

national-scale administrative data to evaluate a program with components that aimed to comprehensively improve health-seeking through the birth cycle.

Our results stand in contrast with the weight of the evidence, which often shows large improvements in antenatal and facility-based delivery care-seeking. However, rather than interpreting our results as a refutation of the previous evidence, our results highlight the need for policymakers to focus heavily on targeting, implementation, and the appropriateness of the intervention when planning social protection schemes.

1:30 PM –3:00 PM   TUESDAY   [Economic Evaluation Of Health And Care Interventions]

Cape Town International Convention Centre | CTICC 1 – Room 2.61-2.62
Economic Evaluation of Non-Communicable Illness

MODERATOR: **Jeonghoon Ahn**, Ewha Woman's University

Economic Implications of Disability for Indian Households: Evidence from Two Nationally Representative Surveys

PRESENTER: **Anup Karan**, Public Health Foundation of India (PHFI)
AUTHORS: Suhaib Hussain, Marie Ishida, Sara Varughese, Fairlene Soji, Dhariyal Thakur, Umesh Baurai, Nathan Grills, Bruce Bonyhady, Ajay Singh Mahal

Background

With official estimates of disability prevalence of almost 30 million people, and survey-based estimates suggesting disability prevalence at least double that, India has the highest numbers of people with disability in the world. However, government financial investments in disability support are seem relatively small, and population coverage is incomplete. Low levels of support may partly reflect the absence of reliable information on the economic challenges that households with disabled members face in India, and indeed in many other low- and middle-income countries. We estimated the household economic consequences of living with disability in India, accounting for both income losses as well as the additional expenditure needs of people with disability.

Methods

Data from the Indian Human Development Survey (IHDS) for 2011-12 and the Longitudinal Aging Study in India (LASI) survey in 2017-18 were used to estimate income losses and additional expenditures incurred by people living with disability. The IHDS and LASI are nationally representatives multi-stage stratified random sample survey of 41,554 households (215,754 individuals) and 42,949 households (72,250 individuals of age 45+ years) respectively. Using the Washington Group (short) definition for disability, 5% of individuals reported at least one disability in the IHDS and 9% in the LASI. An "expenditure equivalence" method (*i.e.*, the additional resources required by households with disabled member/s to achieve the same standard of living as an otherwise similar household without disability) was used to arrive estimate the cost-of-living implications of disability. The implications for household earnings were estimated from the impact of disability on workforce participation, hours of work, and hourly earnings of household members. Sub-group analyses were carried out to assess variations in impacts by place of residence (rural-urban), by age, by sex and by number of people with disability in households.

Results

Costs of living for a household containing at least one person with disability were estimated to be 16%-26% higher than similar households without a member with disability. For households containing more than one person with a disability, costs of living were 18%-58% higher. Corresponding estimates for rural and urban households containing at least one member with disability were 20%-23%, and 7%-28%, respectively. Among individuals aged 45+ years reporting at least one disability, work participation was lower by 9%, work hours by 4%, and hourly wages by approximately 10%, compared to individuals with no disability. Findings were similar across rural and urban populations. Effects of disability on work participation were greater for women than men (lower by 14%) and for persons with multiple disability compared to people reporting a single disability (lower by 36%).

Discussion and Conclusions

Our estimates show high costs of disability for affected households, whether in terms of losses in earnings or the cost of living. Interventions to address disability in India and other lower middle-income countries, such as transfer programs, should address the economic consequences that households with disabled members confront.

The Cost-Effectiveness of Early Cancer Surveillance Among Patients with Li-Fraumeni Syndrome in the US and Brazil: A Tale of Two Countries

PRESENTER: **Casey Tak**, University of Utah
AUTHORS: Isadora Frankenthal, Mariana Alves, Maria Isabel Achatz

BACKGROUND: Patients with germline TP53 pathogenic variants (Li–Fraumeni syndrome [LFS]) are at extremely high lifetime risk of developing cancer. This is particularly pronounced in Brazil, where there is a higher prevalence of LFS due to the founder mutation in the TP53 gene p.R337H. Recent data suggest that a rigorous tumor surveillance strategy, known as the Toronto Protocol, may provide a significant benefit through the detection of early cancer. Unfortunately, there are barriers to accessing the screening methods in the Toronto Protocol. Recently, two cost-effectiveness analyses on the Toronto Protocol were conducted to support Brazilian National Health Care System coverage and, separately, US insurance coverage. We aim to describe their approach and juxtapose their findings to draw collective conclusions on the factors driving the cost-effectiveness.

METHODS: Markov decision analytic models were developed to estimate cost-effectiveness of 1,000 LFS carriers under the Toronto Protocol (surveillance) and non-surveillance strategies over a patient's lifetime. The main outcome was the incremental cost-effectiveness ratio (ICER) expressed as cost per additional life year (LY) gained. The model structures were identical and contained multiple health states, including no cancer, cancer, cancer remission, and death. Model cost inputs were populated with country-specific estimates; effectiveness inputs were similar across both models. One-way sensitivity analyses and probabilistic sensitivity analyses examined parameter uncertainty. The Brazil model stratified findings by gender. Both models were developed according to a payer perspective (US: third-party payer; Brazil: National Health Care System) with willingness-to-pay (WTP) thresholds of R$30,000/LY (Brazil) and $100,000/LY (US). Data were analyzed in TreeAge Pro (Williamstown, MA, USA).

FINDINGS: In the Brazil models, females showed a mean cost of $2,222 and $14,640 and yielded 22 and 26·2 life years compared to males' costs of $1,165 and $12,883 and average life years of 23·5 and 26·3 for non-surveillance and surveillance strategies, respectively. These resulted in an ICER of $2,982 per additional LY gained for females and $4,185 for males. Surveillance was most cost-effective in 82% and 62% of iterations for females and males, respectively. The model was most sensitive to the probability of survival for those in the surveillance strategy, the probability of cancer, the probability of survival for those in standard of care, and the cost of surveillance, in that order.

In the US model, there was a mean cost of $46,496 and $117,102 and 23 and 27 LY for the non-surveillance and surveillance strategies, respectively. The ICER for early cancer surveillance versus no surveillance was $17,125 per additional LY gained. Surveillance was found to be cost-effective in 98% of iterations. This model was most sensitive to probability of cancer, cost of surveillance, and surveillance and non-surveillance survival, in that order.

CONCLUSIONS: The Toronto Protocol was cost-effective in both the US and Brazil models, with a higher probability of being cost-effective in the US setting likely due to the difference in WTP. Both models were sensitive to probability of cancer development. The Brazil model was more sensitive to cancer survival whereas the US model was more sensitive to cost of surveillance.

Cost-Effectiveness of Chimeric Antigen Receptor (CAR) T-Cell Therapies for Blood Cancers: A Systematic Review

PRESENTER: **Nishma Patel**, University College London
AUTHORS: Suzanne Farid, Manuel Gomes

Background: Chimeric antigen receptor (CAR) T-cell therapy is an area of rapid development, showing the promise of curing blood cancers. Since 2017, six CAR T-cell therapy products have been granted recommendation for use in patients with (i) B-cell acute lymphoblastic leukaemia (ALL) (ii) diffuse large B-cell lymphoma (DLBCL) (iii) mantle cell lymphoma and (iv) multiple myeloma. Implementation of these products includes complex and novel engineering, manufacturing, and delivery processes, which means very high costs per patient and a threat to the sustainability of healthcare systems. While health gains may justify such high costs, it is currently unclear the extent to which the overall cost-effectiveness of these therapies is determined by key components, such as the cost of the drug, magnitude of health benefits and cost-effectiveness threshold.

Aim: The aim of this systematic review is to summarize the evidence on the cost-effectiveness of CAR T-cell therapies and to identify the key components driving cost-effectiveness across different international jurisdictions.

Methods: We conducted a systematic review using PubMed, Scopus and Web of Science databases to identify economic evaluations published until November 2022. The methodological quality of each study was assessed using the Consolidated Health Economic Evaluation Reporting Standards (CHEERS). We included full economic evaluations, using either RCTs or decision models).. Extracted data was grouped according to type of CAR T-cell therapy and synthesised narratively. All estimates of cost and cost-effectiveness were converted to current prices, applying the US exchange rate (as of March 2023).

Results: The review included 29 full cost-effectiveness studies: Tisagenlecleucel (n = 14), axicabtagene ciloleucel (n = 6), axicabtagene ciloleucel with Tisagenlecleucel (n = 3), brexucabtagene autoleucel (n = 4), axicabtagene ciloleucel with lisocabtagene maraleucel with (n = 1) and axicabtagene ciloleucel with lisocabtagene maraleucel and tisagenlecleucel and (n = 1). Incremental costs varied considerably between -$US6,277 and $US443,619, and QALYs gained ranged from 0.81 to 10.77 over a lifetime horizon. The highest incremental QALYs were reported for tisagenlecleucel in the Netherlands, Singapore and Japan; 10.77, 9.87 and 9.50 for use in paediatric, relapsed/refractory B-cell acute lymphoblastic leukaemia, respectively. The highest incremental cost was reported for brexucabtagene autoleucel in Canada ($US443,619) US ($US432,027), followed by axicabtagene ciloleucel ($US442,491) in the US. The lowest incremental cost was reported for Tisagenlecleucel (US$6,277). Cost-per-QALY ratios ranged from US$3,049 to US$1,615,000. At a willingness-to-pay threshold between US$23,592 and US$570,444, there was a 16% - 100% probability, CAR T-cell therapies were cost effective. Quality assessment showed that 97% of the studies were of good quality according to CHEERS checklist.

Conclusions: To our knowledge, this is the most up-to-date literature review on the cost-effectiveness of CAR T-cell therapies. This review highlights the need for robust evidence to address considerable uncertainty in the cost and effectiveness data given the magnitude of differences in cost-effectiveness estimates.

Cost-Effectiveness of Early Rhythm-Control Versus Usual Care in Atrial Fibrillation Care: An Analysis Based on Data from the EAST-Afnet 4 Trial

PRESENTER: **Sophie Gottschalk**

AUTHORS: Shinwan Kany, Hans-Helmut König, Harry JGM Crijns, Panos Vardas, John Camm, Karl Wegscheider, Andreas Metzner, Andreas Rillig, Paulus Kirchhof, Judith Dams

Background and Aims: The randomized, controlled EAST-AFNET 4 trial showed that early rhythm control (ERC) reduces the rate of a composite
primary outcome (cardiovascular death, stroke, or hospitalization for worsening heart failure or acute coronary syndrome) by ~20%. The current study examined the cost-effectiveness of ERC compared to usual care.

Methods: This within-trial cost-effectiveness analysis was based on data from the German subsample of the EAST-AFNET 4 trial (n=1,664/2,789 patients). Over a 6-year time horizon and from a healthcare payer perspective, ERC was compared to usual care regarding costs (hospitalization and medication) and effects (time to primary outcome; years survived). Incremental cost-effectiveness ratios (ICERs) were calculated. Cost-effectiveness acceptability curves were constructed to visualize uncertainty.

Results: ERC was associated with higher costs (+€1,924, 95% CI [-€399, €4,246]), resulting in ICERs of €10,638 per additional year without a primary outcome, and €22,536 per life year gained. The probability of ERC being cost-effective compared to usual care was ≥95% or ≥80% at a willingness to pay of ≥€55,000 per additional year without a primary outcome or per life year gained, respectively.

Conclusion: From a German healthcare payer's perspective, health benefits of ERC may come at reasonable costs as indicated by the ICER point estimates. Taking statistical uncertainty into account, cost-effectiveness of ERC is highly probable at a willingness-to-pay value of ≥€55 000 per additional life year or year without a primary outcome. Future studies examining the cost-effectiveness of ERC in other countries, subgroups with higher benefit from rhythm control therapy, or cost-effectiveness of different modes of ERC are warranted.

Economic Evaluation of Using a Mobile Stroke Unit for Timely Treatment of Acute Ischemic Stroke

PRESENTER: **Suja S Rajan**, University of Texas - Health Science Center at Houston

AUTHORS: Jose Miguel Yamal, Mengxi Wang, James C Grotta

Introduction: Acute ischemic stroke is among the top 10 most expensive conditions billed to Medicare in the US. The ischemic stroke event needs immediate management and administration of thrombolytics within 4.5 hours of stroke symptom onset, and treatment within the first hour of symptom onset has the maximum benefit for patients. Mobile Stroke Unit (MSU), which is an ambulance equipped with a computerized tomography scanner and other equipment for thrombolytics administration, facilitates immediate treatment of ischemic stroke patients inside the ambulance without needing to transport the patient to a hospital for treatment initiation. Introducing and operating an MSU entails significant capital investment. However, it is unclear if outcome improvements and follow-up costs associated with ischemic stroke treatment within MSUs justify the extent of capital investment. This study for the first time economically evaluates MSUs using one-year follow-up data to determine the cost-effectiveness or cost-savings associated with MSUs.

Methods: The study is an observational, prospective, multicenter, alternating-week trial in the U.S. The economic evaluation was performed based on Medicare's perspective. Extensive patient-reported data, such as resource utilization forms (RUFs) and EQ-5D surveys, were collected at baseline, discharge, and every 3 months for up to 12 months after discharge. Patient cost information was estimated based on these RUFs that captured the extent of healthcare utilization. The utilizations were converted to costs using Medicare reimbursement amounts for those utilizations. The primary effectiveness outcome was quality-adjusted life years (QALYs) estimated using the EQ5D surveys. Cost-Effectiveness Analysis was performed using the Incremental Cost-Effectiveness Ratio (ICER) method. The cost and effectiveness estimates were adjusted to control for baseline socio-demographic and clinical characteristics to control for confounding before the ICER was estimated. Bootstrapping methods were used to compute the confidence intervals, and the cost-effectiveness plane and cost-effectiveness acceptability curves were plotted to estimate the robustness of the results.

Results: The ICER based on stroke-related 1-year follow-up costs after the stroke event was USD 33,537 /QALY. For the sub-group of patients with no disability at baseline the ICER was USD 10,740 /QALY. Because the costs associated with the MSU are predominantly upfront fixed costs the ICERs are very sensitive to the volume of patients treated per year. Consequently, MSUs are cost-effective if 110 or more ischemic stroke patients are treated every year.

Conclusion: MSUs facilitate better outcomes and potential cost-savings for patients, providers, and payers. Due to the savings in follow-up stroke care costs during the year after the stroke event, MSUs are cost-effective even at the very conservative threshold of USD 50,000/QALY used in the literature. Immediate treatment due to the MSUs seems to have the most benefit for patients with no baseline disability. The cost-effectiveness is strongly dependent on the number of patients treated with thrombolytics per year by the MSU. MSUs being cost-effective supports their implementation and reimbursement by payers, such as Medicare, in the US.

Assessing the Impact of Ex Vivo Lung Perfusion in Lung Transplantation Outcomes

PRESENTER: **Bijan Borah**, Mayo Clinic
AUTHORS: Jorge Mallea, James Moriarty, Todd Huschka, Launia White

Introduction

Ex vivo lung perfusion (EVLP) is a technique that allow for the assessment of marginal donor lungs. EVLP can potentially increase the supply of available lungs for transplantation in patients with end-stage lung disease. EVLP-induced increased lung supply can in turn reduce the time on the waitlist and improve transplant outcomes. The goal of this study was to estimate the impact of different projected growth rates for EVLP on lung transplant outcomes including the number of lung transplants performed per year, time on the waitlist, waitlist mortality, survival after transplant and cost.

Methods

Using Arena® simulation software (Version 14.0, Rockwell Automation, Coraopolis, PA), we build a simulation model that tracks how patients move through various lung allocation score (LAS) states until their eventual transplant, death, or dropping out of the waitlist. LAS for a prospective lung transplant patient determines the priority in the waitlist. The simulation model was parameterized by data from United Network for Organ Sharing (UNOS) database, which has comprehensive transplant data for the US since 1987. Additional parameters for the model including mortality and cost were obtained from a large multisite and multi-state healthcare system in the US. To handle the additional lungs made available through EVLP, we modified the increased probability of transplant due to EVLP against 5 scenarios (6%, 12%, 18%, 24% and 30%). The simulation model was run for 10 years into the future with a 5% increase in the first year and 2.5% increase in EVLP-induced lungs each year, resulting in a 27.5% increase in lungs by year 10. Our simulation model was run with 50 replications of 10 years into the future starting in 2021.

Results

At the baseline, assuming current trends for all metrics, the 10-year average for the number of transplants and patients on the waitlist starting in 2021 were 3,057 and 1,563 respectively. With 6% increased EVLP-induced transplants the number of transplants increased from 3,239 with 1,031 on the waitlist; at 30% increase in transplants, the numbers were 3,535 and 300 respectively. When the EVLP-induced transplant rate is assumed to be 18%, the predicted outcomes from year 1 to year 10 were as follows: the probability of death while in the waitlist declined from 5.5% to 1.4%; removal from waitlist due to reasons other than transplant or death declined from 12% to 6%; percent of patients receiving a transplant increased from 95% to 99%; the time on the waitlist reduced from 4.1 months to 1.5 months; survival after lung transplant increased from 67 months to 74 months; incremental cost per additional life year gained varied from about $35,000 to $45,000 per year post-transplant.

Conclusion

The study findings suggest that increasing the rate of EVLP could positively impact nearly all outcomes associated with lung transplantation including the number of transplants, waitlist characteristics, waitlist mortality, post-transplant survival and cost. Therefore, stakeholders including patients, healthcare providers and reimbursement agencies should negotiate ways to increase adoption of EVLP in lung transplantation practice.

The Cost Effectiveness of a Virtual Intervention to Prevent Eating Disorders in Young Women in Sweden

PRESENTER: **Filipa Sampaio**, Uppsala University
AUTHORS: Patricio Martinez de Alva, Ata Ghaderi, Inna Feldman

Objective: To determine the cost-effectiveness of a virtual version of the Body Project (vBP), a cognitive dissonance-based program, to prevent eating disorders (ED) among young women with a subjective sense of body dissatisfaction in the Swedish context.

Method: A decision tree combined with a Markov model was developed to estimate the cost-effectiveness of the vBP in a clinical trial population of 149 young women (mean age 17 years) with body image concerns. Treatment effect was modelled using data from a trial investigating the effects of vBP compared to Expressive writing (EW) and a do-nothing alternative. Population characteristics and intervention costs were sourced from the trial. Other parameters, including utilities, treatment costs for ED and mortality were sourced from literature. The model predicted the costs and quality adjusted life years (QALY) related to the prevention of incidence of ED in the modelled population until they reached 25 years of age. The study used both a cost-utility and return of investment (ROI) framework.

Results: In total, vBP yielded lower costs and larger QALYs than the alternatives. The ROI analysis denoted a return of US$ 152 for every US$ invested in vBP over 8 years against the do-nothing alternative and US$ 105 against EW.

Discussion: vBP is likely to be cost-effective compared to both EW and a do-nothing alternative. The ROI from vBP is substantial and could be attractive information for decision makers for implementation of this intervention for young females at risk of developing ED.

Cape Town International Convention Centre | CTICC 2 – Freesia

Topics in Disease Expenditure Tracking

MODERATOR: **Joseph Dieleman**, University of Washington

ORGANIZER: **Jonas Minet Kinge**, University of Oslo/Norwegian Institute for Public Health

Decomposition of Long-Term Health Care Spending By Diseases – Methodological Challenges and Results from Three High-Income Countries

PRESENTER: **Simon Wieser**, University of Zurich

AUTHORS: Michael Stucki, Emily Bourke, Jonas Minet Kinge, Joseph Dieleman

Background: Many high-income countries allocate a significant proportion of health care spending to long-term care (LTC) and this proportion is likely to increase with ageing. Despite its relevance for health care budgets, little is known about what medical conditions the resources are spent on. This is partly due to data scarceness and methodological challenges. Recent studies from Switzerland, Norway and the US followed different methodological approaches to decompose LTC spending by disease, age, and sex. In this session presentation we compare LTC spending by disease in these countries.

Methods: We compared spending estimates for institutional LTC and homecare by medical conditions, age, and sex in the United States (estimates for 2016), Norway (2019), and Switzerland (2017). Diseases were classified uniformly using the Global Burden of Disease classification. Moreover, we compared the different methods that were applied in the studies for the three countries and assessed their impact on the results.

Results: In contrast to the US and Norway, there is no diagnostic coding in LTC in Switzerland. Spending estimates for Switzerland thus relied on an indirect approach combining multiple data sources. The studies for the US and Norway both followed a main diagnosis approach and adjusted the spending for the presence of comorbidities.

The US spent significantly less on institutional LTC than Norway and Switzerland. Spending in all countries was dominated by neurological and mental disorders. They accounted for 58% of spending in Norway, 41% in the US, and 64% in Switzerland. Cardiovascular diseases accounted for only 1% of spending in Switzerland, but 12% in Norway and almost 17% in the US. Norway assigned 5% to injuries, while in the Switzerland and the US this number was 11%.

Conclusion: Differences in disease specific LTC spending across the three countries may partly be explained by differences in the methodological approach, differences in the extent of coverage, and by differences in population structure. Assigning spending to diseases is more challenging than in acute care, as frailty and multimorbidity, which affect most patients in LTC, are by definition multidimensional syndromes. As LTC is expected to substantially increase in ageing societies, understanding the impact of single diseases on LTC spending may nevertheless be essential.

Comparing Healthcare Spending Attributable to Modifiable Risk Factors

PRESENTER: **Emily Bourke**, Australian Institute of Health and Welfare

AUTHORS: Joseph Dieleman, Vanessa Prescott

Background: Globally, exposure to key health risks, like obesity, tobacco use, health diets, lack of exercise, and air pollution vary dramatically. For public health officials, being able to quantify how exposures to modifiable health risks is valuable for making arguments for investment in programs in support of healthier living. Moreover, international comparisons make it possible to consider successes and failures in public health programs in preventing risk exposure, although little is known about healthcare is attributable to healthcare spending. This panel discussion aims to provide some information about how healthcare spending has been attributed to modifiable risks in two different countries – Australia and the United States.

Methods: In the US project, healthcare spending in 2016 was attributed to 97 modifiable risks using population attributable fraction developed for the Global Burden of Disease project, adjusted for healthcare utilization rates. Because risk exposure is often concurrent, estimates of spending attributable to modifiable risks are not mutually exclusive, but additional models have been used to estimate attribution for all risks collective as well. In the Australian project, 95 conditions had spending from risk factors attributed to them. We extracted risk exposure and spending attributed to modifiable risks from each project, and compared estimates to assess which modifiable risks were associated with the most spending in each country, and assessed if differences in spending levels were due to risk exposure, norms for care, or prices and intensity.

Results: In the US, $734 billion or 27.0% of healthcare spending was attributable to modifiable risks in 2016. The health risks with the most spending attributed were high body mass index ($239 billion attributable), which is prevalent in 44% of the US population; high blood pressure ($180 billion), which is prevalent in 22% of the US population; high fasting plasma glucose ($172 billion), which his prevalent in 20% of the US population; dietary risk ($144 billion), and tobacco use ($130 billion), which is falling but remains in 23% of the US population. In Australia, $24 billion was spent on diseases due to risk factors (39% of disease spending, and 12% of total health system

spending). Spending was highest for: overweight (including obesity) ($4.3 billion); tobacco use ($3.3 billion); high blood plasma glucose ($3.2 billion); alcohol use ($2.1 billion); and impaired kidney function ($1.9 billion). Ongoing research is decomposing the differences between the US and Australia to assess if spending per capita differences are due to different levels of risk exposure, different norms for healthcare, or prices and intensity.

Conclusions: A major portion of healthcare spending in both the US and Australia can be attributed to modifiable risk factors. Curbing risk exposure is important for improving health and reducing healthcare spending. Understanding spending patterns in some example countries can provide information used to improve public health programs, and provide information about how similar studies could be conducted elsewhere.

Comparing Healthcare Spending on Mental and Substance Use Disorders in Norway, Switzerland, Australia, and United States

PRESENTER: **Jonas Minet Kinge**, University of Oslo/Norwegian Institute for Public Health
AUTHORS: Simon Wieser, Michael Stucki, Emily Bourke, Joseph Dieleman

Background

Mental health disorders cover a broad range of diagnoses, including but not limited to ADHD, substance use disorders, depressive and anxiety disorders, and schizophrenia and other psychotic disorders. Mental disorders are treated in specialized inpatient and outpatient services, primary care, long-term care and with prescribed pharmaceuticals. However, treatment, care and consequently total spending on mental disorders varies widely between countries. In this presentation we compare mental disorder spending and prevalence in in Norway, Switzerland, Australia, and United States, by age and type of disorder.

Methods

Data on mental health spending per capita, mental health spending as % of GDP and mental health spending as % of total health spending is presented for Switzerland, Australia, Norway, and the US. Data on prevalence's of disorder were from the GBD. The spending estimates are also broken down into 5-year age categories and compared with the prevalence of mental disorders by age. We also present data on health spending and prevalence on 12 mental disorders, by age, sex, and type of care from the US, Norway and Switzerland. Finally, we present data on mental disorder spending by type of care (ambulatory, inpatient, prescribed pharmaceuticals, and nursing homes).

Results

The total health spending share of mental disorders was 6.7% in the US, 7.2% in Australia, 14.3% in Switzerland and 20.7% in Norway. The prevalent cases of mental disorders per 100,000 were 16,151 in the US, 17,635 in Australia, 16,343 in Switzerland, and 15,394 in Norway. The highest proportion of mental care spending were in the ages 20 to 44 with 11.6%, 15.9% and 45% of spending in the US, Switzerland, and Norway, respectively. The largest difference by type of care was for inpatient care, with much higher inpatient spending on schizophrenia, severe depression, alcohol and drug use disorders in Norway, compared with the US, Australia and Switzerland.

Conclusion

Spending on mental disorders varied widely across the countries. However, the age composition of the spending, were comparable. The most pronounced differences were for inpatient spending on severe mental disorders, which were up to four times as high in Norway. The cross-country differences in prevalence of mental disorders were if anything negatively correlated with cross-country differences in spending.

1:30 PM –3:00 PM   TUESDAY   [Health Beyond Health Care Services: Social And Related Determinants]

Cape Town International Convention Centre | CTICC 1 – Room 1.44
Health Decline in Older Age

MODERATOR: **Ninez Ponce**, University of California at Los Angeles

Does Schooling Improve Cognitive Functioning at Older Ages: Heterogenous Treatment Effect Estimation Using Bayesian Causal Forests

PRESENTER: **Andrej Srakar**, Institute for Economic Research
AUTHOR: Valentina Prevolnik Rupel

Despite a large number of studies, the evidence on the causal effect of education on health remains inconclusive. Among other things, it might be related to the fact that the impact of education on health in most cases is evaluated at the mean whereas little is known about what happens in other parts of the distribution. We build on earlier studies of Schneeweis et al. (2012) and Kyzyma and Pi Alperin (2021) who study relationship between education and cognitive functioning at older ages by exploiting compulsory schooling reforms in an instrumental variable causal model. Using data of individuals aged 50+ from the Survey of Health, Aging and Retirement in Europe (SHARE), Schneeweis et al. (2012) assess the causal effect of education on old-age memory, fluency, numeracy, orientation and dementia, to find a

positive impact of schooling on memory. Kyzyma and Pi Alperin (2021) extend this to analyze the education gradient in health and its underlying factors from a distributional perspective. They estimate differences in the level of health between the lower and higher educated at different points of the health distribution using distributional decomposition techniques (standard Oaxaca-Blinder decompositions). Our extension goes in the line of estimating the education gradient in health from a Bayesian distributional causal perspective, which allows significantly richer analysis and broader and more concise information on the causal effect. Bayesian additive regression trees (BART) perspective has been developed by Chipman et al. (2010) and popularized in recent years in its usage in regression and causal inference problems (e.g. Tan and Roy, 2019). Commonly it uses a specific regularization prior, sometimes combined with Gaussian, Dirichlet, Dirichlet Process mixture, Pitman-Yor Process mixture and semiparametric perspectives. Additionally, Hahn, Murray and Carvalho (2020) have developed Bayesian Causal Forests (BCF) as a novel regularization approach for nonlinear models geared towards situations with small effect sizes, heterogeneous effects, and strong confounding, including propensity score (with a BART prior) in the outcome model specification to improve on the earlier BART perspective. Recently, Bargagli-Stoffi et al. (2022) have extended this to a novel instrumental variable BCF (BCF-IV) causal model. We use the latter approach using SHARE dataset for individuals aged 50+ in extending the general instrumental variable strategies in the earlier literature, allowing us to complete the desired Bayesian distributional causal perspective. Our results confirm the general findings of higher educated individuals, on average, enjoying better health than those who are lower educated. However, health gradient follows a nonlinear pattern best described by a piecewise polynomial shape with several knots describing rises and falls conditional on health of the respondents. We are able to estimate precise locations of the knots and provide explanation for the nonlinearities. Compared to previous studies fit of our model is improved in most criteria. Our study provides important novel information for the estimation of causal effects of education on health and application of recent cutting-edge approaches, so far rarely if at all used in health economics to estimate heterogeneous treatment effects in econometric causal models.

Vietnam-Era G.I. Bill Eligibility Improved Memory Levels Uniformly across the Distribution, but Had Little Effect on Age-Related Memory Decline: Evidence from a Natural Experiment

PRESENTER: **Aayush Khadka**, University of California San Francisco
AUTHOR: Anusha Murthy Vable

Studies have shown that increased educational attainment is associated with increased levels of cognitive function in later-life, but not with age-related rate of cognitive decline. However, these studies have exclusively focused on the education-cognition relationship at the outcome mean. An emerging body of evidence suggests that the education-cognition relationship may be different at different levels of cognitive function among young adults. Whether these differences persist into old age remains an open question.

We aimed to answer this question by quantifying the causal impact of Vietnam-era G.I. Bill eligibility, a large-scale program which primarily subsidized college education for eligible veterans in the US, on later-life levels and rate of change of cognition along the outcome distribution. To identify these effects, we exploited the Vietnam draft lottery as a natural experiment.

For our analysis, we used US Health and Retirement Study (HRS) data (1998-2018), a nationally representative, longitudinal study which collects information on, among other things, cognitive health and demographics. To determine draft eligibility status based on the Vietnam draft lottery, we downloaded lottery random numbers from the US Selective Service System and merged it with the HRS. We restricted our analysis to men born between 1947 and 1953 as the draft lottery only affected men and previous studies have shown that the relationship between the lottery and military service, a prerequisite for accessing the G.I. Bill benefits, is strongest for these birth cohorts. Our analytic sample consisted of 2,337 respondents contributing 15,433 person-waves of data.

We proxied G.I. Bill eligibility using draft eligibility, an indicator variable which equaled 1 if a respondent's lottery number was less than or equal to the draft threshold chosen by the military. Our outcome was repeated measures of an algorithmically defined memory score in the HRS. We fit linear regression and quantile regressions to estimate intention-to-treat effects on levels and age-related memory decline at the mean and at each decile of the memory distribution. We controlled for month-and-year-of-birth fixed effects and practice effects in all regressions. We clustered standard errors at the individual-level.

Draft eligibility increased baseline memory score across the distribution, with greater increases at lower memory quantiles relative to higher quantiles (i.e., at the worse-off part of the distribution relative to the better-off part). Age-related rate of memory decline was substantially faster at lower quantiles of memory relative to higher quantiles. Draft eligibility appeared to slightly increase the rate of age-related memory decline, especially at lower quantiles of memory relative to higher quantiles.

Our results reinforce the idea that education affects levels but not rate of change of cognitive function. They also motivate the need to develop programs targeted at those with lower cognitive function as these individuals appear to experience the fastest declines and are thus at highest risk of having dementia.

The Mortality Effects of Pensions in South Africa: A Regression Discontinuity Design Study

PRESENTER: **Carlos Javier Riumallo Herl**, Erasmus University Rotterdam
AUTHORS: David Canning, Chodziwadziwa Kabudula

Background

Existing studies show descriptive evidence suggesting that income in general, and pensions specifically, can improve health and well-being. In general, previous studies have found that pensions improve self-reported and objective health amongst the elderly. Few studies however

have evaluated the effect of pensions on mortality as an outcome, and those that have are often descriptive and do not provide estimates for the causal impact of pensions on mortality. In this study, we examine the immediate impact of receiving the South African old age state pension on mortality and health behaviours.

Methods

We evaluated the effect of the old−age state pension grant in South Africa on mortality and health behaviours using data from a demographic surveillance site census and a longitudinal ageing survey data in Agincourt from 2014-2019. We identified the effect of old−age state pensions using a regression discontinuity design exploiting the age eligibility for the pensions as the source of discontinuity. Our primary outcomes were mortality, self−reported drinking behaviours, and self-reported physical activity. We evaluated the heterogeneous effects by gender.

Findings

Eligibility to old-age state pensions was associated with a 1.3 percentage point (95% CI 0.006-0.019) increase in mortality or an 81.3% increase relative to the 1.6% death rate of the comparison group- those aged 60 and less. Most of the effect is concentrated amongst males for whom eligibility to the pension program was associated with a 1.9 percentage point increase in mortality (95% CI 0.008-0.031). Using the pension uptake rates at age 60, we estimate that pensions themselves were associated with an increase of 3.7 percentage points on general mortality (95% CI 0.017-0.054) and 7.7 percentage points for males (95% CI 0.032-0.126). Using survey data, we find that the mortality discontinuity in males is potentially explained by the uptake of bad behaviours like binge drinking and reduced physical activity.

Interpretation

Many studies in the literature suggest a strong positive association between income and good health. However, those effects are conditional on how the income is used. Our findings first show that income may have a causal effect on health, and second, that higher income need not lead to better health. This is particularly the case if higher income encourages bad health behaviours such as alcohol consumption. Our findings highlight that beyond income, it is necessary to encourage and promote the right health behaviours. Overall, we find that amongst certain individuals old−age state pensions may be leading to a worsened wellbeing.

More to Live for: Health Investment Responses to Expected Retirement Wealth in Chile

PRESENTER: **Marcos Vera-Hernández**, University College London (UCL)
AUTHORS: Grant Miller, Nieves Valdes

Background:

A large body of research links long-term economic growth to population health improvement. However, the precise ways by which economic growth improve health are complex. Considerable past research focuses on the contemporaneous role of income and consumption (nutrition and use of medical care, for example) in health production and on how child nutrition fosters economic productivity in adulthood More poorly understood, however, is the possibility that economic growth strengthens forward-looking incentives for individuals to invest in their own health.

Aim:

This paper provides new empirical evidence on these forward-looking incentives by studying how current health behaviours respond to changes in expected future (but not current) wealth.

We link two rich data sources at the individual level, joining four waves of Chile's nationally representative Social Protection Surveys (or Encuesta de Proteccion Social (EPS)) with monthly administrative records from Chile's public pension system (from the Historia Previsional de Afiliados (HPA) database).

This linked EPS-HPA data enables us to calculate expected pension wealth at retirement for every individual in our nationally representative sample - while also observing their private health behaviour (physical activity, alcohol consumption, and smoking), use of screening tests (specifically for diabetes, cholesterol, and hypertension), and chronic disease diagnoses (for cardiovascular disease, diabetes, hypertension, and kidney failure).

Methodology:

We exploit a large public pension reform introduced by the Chilean government in 1981, converting its Defined Benefit (DB) system into a Defined Contribution (DC) system. Because of the way that participants in the old DB system were compensated for their previous contributions, the reform creates a kink on the cohort-pension wealth profile that we utilize to estimate how individuals' private investments in their future health responds to changes in expected pension wealth. This allows us to use a Regression Kink Design to obtain the causal effect of expected pension wealth on health behaviours.

Results:

We find that greater expected pension wealth increases men's use of key tests (screenings for high cholesterol, hypertension, and diabetes), which lead to higher diagnosis rates of major chronic diseases sensitive to them. We also find that greater expected pension wealth improves some healthy lifestyle behaviours (i.e. physical activity, smoking).

Conclusion:

We find that health investments improve in response to to changes in expected future wealth.

1:30 PM –3:00 PM   TUESDAY   [Health, Its Distribution And Its Valuation]

Cape Town International Convention Centre | CTICC 1 – Room 1.42

Rethinking Outcome Measurement and Design Towards Inclusive and Equitable Economic Evaluation of Dementia Care [MENTAL HEALTH ECONOMICS SIG]

MODERATOR: **Paul Mitchell**, University of Bristol

ORGANIZER: **Irina Kinchin**, Trinity College Dublin

What a 'Good Life' Means to People Living with Dementia and How Well Instruments Used in Economic Evaluation Reflect This Construct?

PRESENTER: **Irina Kinchin**, Trinity College Dublin, The University of Dublin

Introduction

This study aims to gather the perspectives of people living with dementia, their insights, and preferences for assessing quality of life to inform economic evaluation outcome measurement and design with the goal of creating a more robust evidence base for the effectiveness and value of care. Specifically, this study elucidated what a 'good life' means to a person with dementia and how well instruments currently used in economic evaluation met this description. This study further tested the acceptability of capability wellbeing instruments as self-report measures and compared them to generic and dementia-specific preference-based instruments.

Methods

People living with dementia, diagnosed, or waiting to receive a formal diagnosis and with the capacity to participate in the research were invited to participate in an hour-long 'think aloud' interview. Participants were purposefully selected to cover a range of dementia diagnoses, ages, and sex, recruited through the integrated care, geriatric, and post-diagnostic clinics at St James' and Tallaght University Hospitals and dementia support groups in the Republic of Ireland. During the interview, participants were invited to reflect on a 'good life' and to 'think aloud' while completing four economic quality of life instruments with a perspective that goes beyond health (AD-5D /QOL-AD, AQOL-4D, ICECAP-O, ICECAP-SCM). The analysis identified the frequency of errors in comprehension, retrieval, judgment, and response from verbatim transcripts. Qualitative data were analyzed using constant comparison.

Findings

At the time of submission of this organized session, 20 think-aloud interviews had been conducted with people living with dementia of different diagnoses (Alzheimer's dementia, Lewy Body Dementia and Parkinson's Dementia; Young Onset Dementia); recruitment for this study is ongoing until about mid-December 2022. Preliminary findings indicate that factors such as personal and social relationships, being respected by others, and independence contribute significantly to the overall quality of life of a person living with dementia and evolve once the condition progresses. Participants were able to self-complete and reflect on adapted versions of the capability wellbeing instruments at the early stages of dementia.

Discussion

Instruments with a narrow health focus do not capture all aspects of the quality of life that people living with dementia consider important. Further, conventional quality of life instruments (for example, AQoL and original ICECAPs) increase the difficulty for people living with dementia to complete and require an adaptation using, for example, augmentative and alternative communication tools to allow engagement with people with dementia with more prominent visual impairment and progressive cognitive decline. Implications of these findings warrant further discussion for the measurement of quality of life with people living with dementia for use in economic evaluation.

Assessing Health Related Quality of Life Using the EQ-5D-5L with Older Aged Care Residents: Insights from the Application of Eye Tracking Technology

PRESENTER: **Rachel Milte**, Flinders University

Introduction

Increasingly, there are calls to routinely assess the health-related quality of life (HRQoL) of older people receiving aged care services, however the high prevalence of dementia and cognitive impairment remains a challenge to implementation. Eye-tracking technology facilitates detailed assessment of engagement and comprehension of visual stimuli. Identifying different patterns of engagement with HRQoL instruments may be useful in flagging individuals and populations who cannot reliably self-complete. This study aimed to apply eye-tracking technology to explore how older residents with cognitive impairment respond to the EQ-5D-5L as compared to older residents without cognitive impairment.

Methods

Consenting older aged care residents were purposefully recruited to one of three cognition subgroups based on their cognitive impairment level (good, mild or moderate cognitive impairment, classified according to internationally recognized mini-mental state examination (MMSE) thresholds). Participants completed the EQ-5D-5L on a laptop computer with a Tobii Pro Fusion eye tracking system. The raw data was collected and filtered using the Tobii Pro Lab Software default Tobii i-VT (Fixation) filter excluding raw gaze data points that fixated for <60 milliseconds or had a velocity of over 30 degrees per second. Areas of Interest (AOI) were applied to the EQ-5D-5L display to identify the number and length of fixations (i.e., longer periods of gaze focused on a particular stimulus) for participants on relevant components of the EQ-5D-5L descriptive system (e.g. dimensions labels, dimension descriptors, response levels) and the EQ-5D VAS. Eye-tracking metrics across the three cognition subgroups were calculated and empirically compared.

Findings

Complete eye-tracking data was obtained for 41 residents, 9 with good cognition, 20 with mild and 12 with moderate cognitive impairment. The majority of participants were female (61%), mean age 86 years (range 68-105 years) with EQ-5D-5L utilities indicating some degree of HRQoL impairment for the vast majority (94%) of participating residents (Mean 0.506; SD 0.387). Participants with cognitive impairment followed similar patterns of fixations to those with good cognition when completing the EQ-5D-5L instrument, although taking longer amounts of time to complete on average (mean time to complete: 137 seconds good cognition, 145 seconds mild cognitive impairment, 173 seconds moderate cognitive impairment) and spending relatively less time overall attending to the relevant AOI. For each EQ-5D dimension, participants with good cognition also tended to fixate for a longer period on the AOI for the response option they chose relative to those with mild or moderate cognitive impairment.

Discussion

This exploratory study applying eye tracking technology provides novel insights, adding to the evidence base on the validity of self-reported health related quality of life assessments from older people with cognitive impairment and dementia. Further work to build upon these initial findings in larger and more diverse samples of older people and in different health and aged care settings is warranted.

The Capabilities of People with Advanced Dementia: Do Proxy Respondents Show Adaptive Preferences?

PRESENTER: **Joanna Coast**, University of Bristol
AUTHORS: Lesley Dunleavey, Paul Mitchell, Gareth Myring, Nancy Preston, Catherine Walshe

Introduction

Capability assessment may be suited to conditions like dementia where intervention outcomes relate to wellbeing rather than health. People living with advanced dementia do not have the cognitive capacity to self-complete capability measures; instead, proxies may be used. Adaptive preferences happen when people unintentionally alter their assessments to account for the possibilities available to them. Adaptive preferences are challenging for resource allocation decision-making, as their use may cause the true benefits of services to be underrated. Adaptive preferences have generally been considered in relation to self-completion. This paper looks at the perspective that care home staff use when making judgements about the capability of residents living with advanced dementia, focusing on whether their judgements shift to reflect adaptations in their life circumstances.

Methods

Think-loud interviews were conducted with care home staff completing the ICECAP-O (for older people) and ICECAP-SCM (Supportive Care Measure) on behalf of residents living with advanced dementia. Sampling was purposeful, aiming for a range of residents across different nursing homes. Staff were asked to think aloud whilst completing measures for a resident for whom they provided care. Interviews were fully transcribed. Constant comparison was used to obtain in-depth understanding of the capabilities of people living with advanced dementia and reasonings used by staff in judging capabilities.

Findings

Think-loud interviews were undertaken with staff (working in care homes for 1-18 years) completing measures on behalf of 12 residents living with advanced dementia (ages 71-92; 9 male) and residing in the care home (3-44 months). Staff made strong efforts to respond from the perspective of residents ('answering questions as if I'm looking through her eyes'), but also talked about their own perspectives. Even when thinking from the perspective of the resident, it was often unclear to staff whether they should provide responses on an adapted or unadapted basis ('...he smiles a lot and interacts with us, I would say that he's getting enjoyment and pleasure from his life... 'cos he's very rarely looking down, but talking about his old self he probably wouldn't have thought that that would be the case.') In practice, and to be

authentic to the respondent in their current states, many responses were based on an adapted viewpoint, but sometime respondents related their assessment to their perception of what the person would have felt in their pre-dementia state ('I would say they can't do anything that makes them feel valued because they can't be the person they were.')

Discussion

These findings emphasize the importance of perspective in drawing judgements about wellbeing. For individuals with cognitive decline, there is not just a contrast between the individual and a proxy respondent, but also in the proxy respondents' views about which 'version' of the person's view is most important: their view pre-cognitive decline, or with cognitive decline. Discussion would be helpful about whether judgements that show adaptive preferences but are true to the person's current state, or judgements that do not show adaptive preferences, are more helpful in collecting information for people living with advanced dementia.

1:30 PM –3:00 PM   TUESDAY   [Economic Evaluation Of Health And Care Interventions]

Cape Town International Convention Centre | CTICC 1 – Room 1.64

Promoting Efficiency in Theory and Practice

MODERATOR: **Angela Bate**, Northumbria University

Economic Evaluation of Multi-Sectoral Public Health Programmes: A Scoping Review
PRESENTER: **Ibrah Kato Seninde**, University of the Witwatersrand, Johannesburg
AUTHOR: Frikkie Booysen

Background

Economic evaluation aims to compare costs and consequences of alternative programmes. The conventional approaches tend to capture health related outcomes, and are not well suited to evaluate multi-sectoral public health programmes with multiple outcomes across various sectors. While there is a growing body of research that seeks to address such existing methodological challenges, an overview of these developments is still lacking.

Objective

The aim of this scoping review is to map methodological literature, appraise the quality of applied case-studies and identify priorities for further research of economic evaluation of multi-sectoral public health programmes.

Methods

We systematically searched for relevant English literature across five electronic databases: PubMed, PROQUEST Central, EBSCOhost, SCOPUS and the National Health Service-Economic Evaluation Database (NHS-EED), from their date of inception to 24 May 2022. We included applied case-studies, methodological- and theoretical papers that applied a multi-sectoral approach to economic evaluation for public health programmes. We presented a narrative summary of the existing conceptual or methodological approaches, as well as a qualitative appraisal of the methodological quality of included case-studies based on a standardized checklist. We further conducted thematic coding to identify dominant themes for further research.

Results

Eight methodological approaches, ten applied case-studies and thirteen priority-or agenda setting records were included. Approaches that aggregate outcomes in monetary units (e.g., cross-sectoral cost–benefit analysis) emerged as the most frequently applied. Our review identified significant variations in methodological quality, which undermines conclusions on the cost effectiveness of multi-sectoral public health programmes.

Conclusion

This scoping review provides a far-reaching, yet narrative overview of methodological research. Further research should prioritize development of instruments that enable valuation and aggregation of cross-sectoral outcomes using a more comprehensive economic evaluation framework that can address the existing methodological uncertainty related to economic evaluation of multi-sectoral public health programmes.

Optimizing Health Investments through Health Benefit Package Modelling: A Case Study of the Nigerian Ward Health System
PRESENTER: **Dr. Oritseweyimi Ogbe**, National Primary Health Care Development Agency (NPHCDA)
AUTHOR: Sarah Felicity Martin

Background: Policy makers must make choices about the allocation of scarce resources given budget constraints. Decisions have become increasingly pressing since the COVID-19 pandemic with weak efforts at ring-fencing. To influence budgetary decisions, policy must be evidence-based. Health Benefits Packages (HBP) are a tool frequently used in low-resource settings for priority setting to ensure more can be delivered given resource constraints.

Aim: Using a framework for HBP design to assess the cost-effectiveness of interventions currently included in Nigeria's Ward Health Service (WHS) package. Modelling the optimal benefits package for Nigeria based on the current budget and using a feasibility study to assess the net health losses that could be resolved through systems strengthening and additional PHC investments.

Methods: A model was created in Microsoft Excel. Incremental Cost-Effectiveness Ratios (ICERs) were applied to interventions based on the current WHS package, using the Tufts Global Cost-effectiveness Analysis Database. Interventions were then compared to a Cost-effectiveness Threshold (CET),[1] and those with an ICER below the CET were deemed cost effective. Per patient costs and DALYs averted for each intervention were estimated with inputs from the One Health Tool, and then scaled up to population estimates. The Net Health Benefit (NHB) of the total service package was estimated to understand the health gain which can be achieved by providing services at capacity utilisation (100%) with the implicit budgetary requirement. Varying feasibility constraints were applied to reflect different levels of health system utilisation. This was used to estimate the consequences of Nigeria's current health systems constraints, primarily from under-investment, i.e., how much NHB is being lost from not having a fully functioning health system.

Results: The model estimates the optimal HBP for Nigeria given the current health budget and expected impact of population health; whilst also indicating the cost to the health system of current constraints (both supply and demand side) as demonstrated by the loss of net economic benefit. The model also highlights where investments in scaling-up interventions could be made versus investment in system strengthening to enable increased coverage. This can inform effective resource allocation decisions based on current HBP expenditure; and influence new investments in system strengthening.

Conclusions: Findings can be used to prompt further discussion between government, donors and stakeholders around the trade-offs involved in the provision of health services, increased health investment, and resource allocation.

[1] Estimated CET for Nigeria is based on Ochalek et al. (2018) range of $214-$291

Ochalek, J, Lomas, J & Claxton, K 2018, 'Estimating health opportunity costs in low-income and middle-income countries: a novel approach and evidence from cross-country data', *BMJ Global health*, vol. 3, no. 6, e000964, pp. 1-11. https://doi.org/10.1136/bmjgh-2018-000964

Preferences for Criteria Used in Health Technology Assessment for Universal Health Coverage in Kenya

PRESENTER: **Melvin Obadha**, University of Oxford
AUTHORS: Audrey Mumbi, Rebecca Gathoni Njuguna, Edwine Barasa

Introduction: In pursuit of universal health coverage (UHC), health policy makers have to make difficult decisions on health technologies and interventions as resources are finite. Evidence based decision making is also lacking as existing processes are ad hoc and rely on historical patterns especially in countries like Kenya. Systematic health technology assessment (HTA) processes have been identified as key in fostering evidence-based decision making for UHC. Kenya is one of the countries pursuing UHC and institutionalising HTA is key. For this reason, we set out to elicit the preferences of Kenyan stakeholders for criteria used in HTA for UHC. We used the example of Kenya's UHC benefit package. Secondly, we aimed to generate scores and weights to be used in ranking health interventions for a Multi-Criteria Decision Analysis (MCDA) part of the study.

Methods: A discrete choice experiment (DCE) was conducted to elicit preferences for five criteria, namely, burden of disease, congruence with existing priorities, effectiveness of intervention, equity, and health systems capacity. The DCE was unlabelled with two hypothetical health interventions without an opt-out. Full profiles were incorporated. Criteria were obtained from a previous HTA process in Kenya and refined using researcher judgement, qualitative semi-structured interviews with experts, and a pilot DCE with stakeholders.

A Bayesian efficient design was used for the experimental design and 12 choice tasks were generated. Bayesian priors were obtained from a pilot study. Five stakeholder groups were targeted by the study, namely, patients, academics/researchers, providers, policy makers/purchasers, and the public. The DCE questionnaire was administered to 312 stakeholders, in-person, using computer assisted personal interviewing (CAPI) in the presence of a researcher. Concurrent Think Aloud (CTA) method was additionally used to understand stakeholders' thought process. Choice data were analysed using multinomial logit and mixed multinomial logit models. The study received ethics approval from the Kenya Medical Research Institute Scientific and Ethics Review Unit (KEMRI-SERU) and Oxford Tropical Research Ethics Committee (OxTREC).

Results: Stakeholders significantly preferred interventions that addressed conditions/diseases with a higher burden, were more congruent with existing priorities, had greater levels of effectiveness, targeted conditions/diseases that mainly affected the poor, and those that the country had adequate capacity to implement. Burden of disease was the most important attribute followed by effectiveness of intervention. The least important attribute was health systems capacity. Overall, there was inter-stakeholder preference heterogeneity.

Conclusion: In conclusion, the weights of the criteria/attributes can be used to support systematic HTA process in Kenya such as multi-criteria decision analysis and boost the country's push towards achieving UHC.

Cost-Effectiveness Thresholds in Healthcare Decisions: Recommendations from the Brazilian National Committee for Technology Incorporation (CONITEC)

PRESENTER: **Ivan Ricardo Zimmermann**, University of Brasilia

AUTHORS: Marisa Santos, Ricardo Ribeiro Alves Fernandes, Priscila Gebrim Louly, Luciene Fontes Schluckebier Bonan, Clementina Corah Lucas Prado, Vania Cristina Canuto Santos

Background: Cost-effectiveness is one of the explicitly criteria for decisons related to reimbursement of new health technologies in the Brazilian health system (SUS). During the years of 2020 to 2022, the National Committee for Health Technology Incorporation (Conitec) formulated recommendations on the use of cost-effectiveness thresholds in SUS.

Objectives: To describe the process and main results of Conitec's deliberations on the adoption of cost-effectiveness thresholds in its decisions

Methods: A literature review was conducted to identify methodological approaches for defining cost-effectiveness thresholds. After identifyng the available evidence, discussions with specialists and members of Conitec were carried out in two face-to-face meetings, regarding issues related with the threshold methods based on: values of prior decisions; willingness to pay; opportunity cost and efficiency frontier. Based on the evidence and discussions, Delphi rounds were conducted in order to formulate recommendations on the use of cost-effectiveness thresholds. The formulated recommendations were then made available in a open public consultation for Brazilian Society contributions and, later, a public hearing was also held on the subject. As a final result, suggestions were incorporated into Conitec's positions.

Results: As the main result of the discussions, there was a clear consensus on the importance of adopting cost-effectiveness thresholds in Conitec's decisions. The Commission and contributions from society, however, highlighted that the cost-effectiveness should not to be a dominant criterion in the Commission's decisions. Similarly, there was a position in favor to adopt the quality-adjusted life years (QALY) as the main outcome for cost-effectiveness. Nevertheless, the consideration on alternative outcomes in justified situations was also recommended. CONITEC decided in favor of the opportunity cost approach when setting the threshold values. This decision was supported by previous work carried out by the University of York on the efficiency of the English health system (NHS) and in global estimates conducted by the Institute for Clinical Effectiveness in Health (IECS). However, the members considered the possibility of also using the efficiency frontier approach when comparators are already available in SUS, as well as in situations where other outcomes but QALY are justified. Currently, the values proposed as a cost-effectiveness reference for Brazil have been defined as BRL 40,000.00/QALY ($ 15,835.30 PPP-2021) or BRL 35,000.00/year of life gained ($13,855.90 PPP-2021). Stimulating innovation and equity, the Commission agreed to adopt alternative thresholds of up to 3 times the reference value in situations of vulnerability: a) Rare diseases (affects up to 65 people in every 100,000 individuals); b) Disease affecting children (under 18 years old); c) Severe illness; and d) Endemic disease in low-income populations with few therapeutic alternatives available. No recommendations were stated for the criteria and thresholds in ultra-rare diseases, as well as the definition of budgetary impact thresholds, which will be subject of future discussions.

Conclusions: The definition of criteria and methods for cost-effectiveness thresholds promotes the transparency of decisions on the uptake of health technologies. The recent recommendations of the CONITEC are an important milestone for the improvement of the HTA process in Brazil.

1:30 PM –3:00 PM   TUESDAY   [Economic Evaluation Of Health And Care Interventions]

Cape Town International Convention Centre | CTICC 1 – Room 2.44-2.45

Is Full Health Technology Assessment Cost-Effective? Adapting It Could be More Efficient

MODERATOR: **Anna Vassall**, London School of Hygiene & Tropical Medicine (LSHTM)

ORGANIZER: **Cassandra Nemzoff**, Center for Global Development

DISCUSSANT: **Francis Ruiz**, London School of Hygiene & Tropical Medicine (LSHTM)

Adaptive Health Technology Assessment: A Scoping Review of Methods

PRESENTER: **Cassandra Nemzoff**, Center for Global Development/London School of Hygiene and Tropical Medicine

Health technology assessment (HTA) is an established mechanism for explicit priority setting to support universal health coverage. However, full HTA requires significant time, data, and capacity for each intervention which limits the number of decisions it can inform. Another approach systematically adapts full HTA methods by leveraging HTA evidence from other settings. We call this 'adaptive' HTA (aHTA), although in settings where time is the main constraint, it is also called 'rapid HTA'.

The objectives of this scoping review were to identify and map existing aHTA methods, and to assess their triggers, strengths, and weaknesses. This was done by searching HTA agencies' and networks' websites, and the published literature. Findings have been narratively synthesized.

This review identified 20 countries and one HTA network with systematic aHTA methods in the Americas, Europe, Africa, and South-East Asia. These methods have been characterized into five types: rapid reviews, rapid cost-effectiveness analyses, manufacturer-led submissions, transfers, and de facto HTA. Three characteristics 'trigger' the use of aHTA instead of full HTA: urgency, certainty, and low budget impact. Sometimes, an iterative approach to selecting methods guides whether to do aHTA or full HTA. aHTA was found to be faster and more efficient, useful for decision makers, and to reduce duplication. However, there is limited standardization, transparency, and measurement of uncertainty in aHTA.

aHTA is used in many settings. It has potential to improve the efficiency of any priority-setting system, but needs to be better formalized to improve uptake. This presentation will provide an overview of the identified aHTA methods to frame the discussion about formalizing aHTA approaches within an HTA system.

Exploring 'Adaptive HTA' Approaches in Ghana – Implications for HTA Institutionalization Goals

PRESENTER: **Brian Asare**, Ministry of Health

Ghana's National Medicines Policy, 3rd edition 2017, set out a commitment to institutionalize Health Technology Assessment (HTA), in recognition of the country's progress to lower-middle-income status, as well as the stated goal of government to make further systematic progress towards attaining universal health coverage. In this context, the need for evidence-based approaches such as HTA to maximise the value of available health resources and support the sustainability of health financing, became an imperative among policy makers.

The use of HTA to directly support policy involving multidisciplinary teams was initially explored as part of a pilot supported by international partners examining the value for money of first line hypertension medicines. This led to a change in hypertension management within Ghana's Standard Treatment Guidelines, 3rd edition, 2017. This was followed by the formal establishment of key HTA committees as part of institutionalization in 2019, and the release of the Ghana HTA strategy, 1st edition in 2020.

Further HTAs have been conducted, notably with respect to childhood cancer, but as highlighted in the HTA strategy, there remains challenges with respect to building the necessary capacities within the country for the full deployment of the time-consuming, data-demanding assessment and appraisal functions typically associated with HTA.

HTA process guidelines developed by the MoH HTA secretariat noted that expedited HTA processes may be acceptable for certain technologies. It also recognized that further work was needed to define the sub-process pathway and relevant criteria for more 'adaptive' HTA (aHTA) approaches that would leverage international evidence where possible. This was even more relevant as Ghana's nascent HTA entity sought to meet the evidence needs of policy decision-makers in a timely manner.

Ghana has now defined and tested aHTA approaches to allow for timely input into decision making. This need was evident, particularly with respect to the COVID-19 pandemic, where the relevant HTA infrastructure was used to rapidly support an assessment of the costs of vaccine deployment in the country. More recently, the HTA secretariat have applied aHTA to explore the local value for money of selected diabetes medicines, through leveraging international evidence and reimbursement decisions.

This paper will set how and which aHTA methods were identified to support the current landscape of HTA implementation in Ghana. It will identify the pros and cons of using aHTA, with special consideration for establishing an acceptable risk-benefit trade off for using aHTA. It will conclude by exploring the implications for choosing different process and methodological routes for aHTA for selected interventions in the Ghanaian HTA institutionalization context, using various cases including recent aHTAs for diabetes mellitus as a case study.

'Full' and 'Adaptive' Health Technology Assessment Methods and Applications for AB PM-JAY in India

PRESENTER: **Shankar Prinja**, Postgraduate Institute of Medical Education and Research

The National Health Authority (NHA) of India has established the Health Financing and Technology Assessment (HeFTA) unit to ensure the best value for money of its benefits package, Ayushman Bharat – Pradhan Mantri Jan Arogya Yojana (AB PM-JAY), by employing the principles of Health Technology Assessment (HTA). The objective of institutionalizing HTA within the NHA is to improve access to healthcare, increase financial protection, and reduce inequalities in health by facilitating evidence-informed priority setting at national and state level.

The aim of this paper is to highlight the experience of the NHA in using a two-pronged HTA system under which 'full' HTA methods requiring intensive analysis and resources are complemented by 'adaptive' HTA (aHTA) methods which systematically adjust for time, data, and resource constraints. When appropriate, the latter can quickly provide policy makers with guidance for the selection of topics or evidence for decision making, and improve the overall efficiency of the HTA system.

The HTA process within the NHA is initiated by eliciting topics for nomination using a centralized 'HBP New Inclusion Portal', alongside a system for horizon scanning, through which the NHA can identify new technologies for potential adoption.

The NHA then reviews all potential topics and makes an explicit decision about the level of analysis needed to make a recommendation, either full HTA or aHTA. This is done by completing a generalizability check to evaluate whether and how existing HTA evidence can be used for the Indian context. If an aHTA which leverages national or international evidence is sufficient, this will be chosen in lieu of a further detailed evaluation. Broadly, the NHA is exploring the applications of aHTA methods such as reviewing international evidence on clinical and cost-effectiveness and benchmarking other countries' cost-effectiveness estimates using purchasing power parity.

If a full HTA is needed, it takes rigorous analytics including systematic literature review, cost-effectiveness analysis, and budget impact analysis, and demands significant time, data, and capacity to complete; therefore, HTAIn, the HTA body is then requested to undertake such assessments through its Regional Resource Centres (RRCs).

Final recommendations from the HTA are then presented to the NHA decision making committees. The evidence informs decisions regarding inclusion and non-inclusion of interventions, particularly high-end and costly health technologies in the Health Benefits Package (HBP); design and update of Standard Treatment Guidelines (STGs) and other quality assurance indicators; setting of reimbursement prices; and guiding reforms like Diagnosis Related Groups (DRG) and Value Based Care (VBC).

Acknowledging the quintessential role of HTA evidence in healthcare decisions, the NHA has an established mechanism for evidence-based decision making to ensure better health outcomes, financial risk protection and equitable healthcare delivery to the beneficiaries.

This presentation will introduce the NHA's full and adaptive HTA approach, and provide lessons learned in its use so far, with a particular focus on where it is most useful and for which technologies it is most appropriate.

1:30 PM –3:00 PM   TUESDAY   [Health Care Financing & Expenditures]

Cape Town International Convention Centre | CTICC 2 – Nerina
Reforming Provider Payment: New Developments from African Health Systems [FINANCING FOR UHC SIG]

MODERATOR: **Jane Chuma**, World Bank

Using Agent-Based Modelling to Inform Incentive Design across Three Levels of Care in the Payment for Performance (P4P) Scheme for Childbirth Care in Tanzania
PRESENTER: **Abdullah Alibrahim**, Kuwait University
AUTHORS: Josephine Borghi, Anna Foss, Nicholaus Mziray, Peter Binyaruka, John Josephn Maiba, Rachel Cassidy, Zaid Chalabi

BACKGROUND: Recognising the critical interplay of individual decisions and resource availability in shaping healthcare outcomes, this study sheds light on the complexities within Tanzania's Maternal and Child Healthcare sector. Focusing on the Bagamoyo district, we specifically investigate the dynamics within the Pay-for-Performance (P4P) system. The emphasis is on understanding the influence of key elements—patient choice, geographic accessibility, facility expansion—in shaping the effectiveness of P4P.

METHODS: An enhanced Agent-Based Model (ABM) was employed to simulate these dynamics. Building on previous work, our ABM incorporated the capacity of women agents to choose among multiple healthcare facilities during delivery, underpinned by a realistic geographical representation of the Bagamoyo district. Each facility was mapped according to its real-world coordinates, with women agents scattered around to simulate the catchment area. The model also factored in expanded facility agent capacities, enabling them to increase their service capacity by acquiring additional beds or resources, contingent on meeting specific conditions.

RESULTS: The findings show that bypass behaviour contributed to an average 20% improvement in facility-based deliveries, even without P4P or capacity expansions. This underscores the influence of patient choice in healthcare service utilisation. When P4P schemes were introduced, service delivery rates increased by up to 12%, with the combination of P4P and bypass behaviour leading to a 33% improvement. Capacity expansion alone resulted in a marginal increase of about 3%, but when combined with P4P and bypass, an improvement of 7% was observed.

CONCLUSIONS: This research contributes significantly to the field of computational healthcare policy analysis in low- and middle-income countries. The findings emphasise the need for a comprehensive approach in P4P initiatives that considers patient choice, provider incentives, and capacity enhancements. Our enhanced ABM provides policymakers with a robust tool, allowing them to experiment with and visualise the multifaceted implications of their decisions. This innovative approach will facilitate more strategic P4P implementations, fostering improved Maternal and Child Health outcomes in the Bagamoyo district of Tanzania and other similar settings.

Capitation Vs Fee-for-Services: Lessons and Experiences to Improve the Designs for Healthcare Provision in Tanzania

PRESENTER: **August Kuwawenaruwa**, Ifakara Health Institute

AUTHORS: Suzan Makawia, Agnes Gatome-Munyua, Fatuma Manzi

Background: Provider payment mechanisms are often characterized with incentives and disincentives to providers of health services. There is growing interest from stakeholders, on how incentives created by provider payment by the two health insurers in Tanzania – National Health Insurance Fund (NHIF) and improved Community Health Fund (iCHF) have affected service provision in Tanzania. The study aimed to explore provider experience with reimbursement, and how incentives encourage them to deliver efficient, equitable and quality healthcare services, and any disincentives in the current provider payment design that can be improved, to better align providers to health system goals.

Methods: We used quantitative and qualitative data including a desk review of existing policies, documents and a secondary analysis of Facility Financial Accounting and Reporting System (FFARS) data for fiscal year 2019/2020 from Shinyanga region. FFARS is the governments' financial reporting system used by all public health facilities and was used to extract expenditure data. Only public providers were included in this analysis.

Results: NHIF uses fee-for-service (FFS) while iCHF uses adjusted capitation. Revenues to the healthcare providers from these schemes have caps and ceilings in the reimbursement guidelines. The FFS payment was well understood by providers. FFS was observed to create incentives to increase volume of services to increase revenue. The capitation payment design is budget neutral – based on the iCHF enrollment and volume of services delivered. The capitation payment was viewed as less transparent by providers, as they were not familiar with the adjusters used to calculate the capitation payment, which varies based on iCHF enrollment rates and member utilization. The two provider payments mechanisms provided varying incentives to providers. For example, NHIF pays higher FFS rates for ambulatory/outpatient services provided by clinical specialists, while these services can be provided by lower cadre clinical officers. This provides the disincentive to recruit specialists instead of lower cadres that would be more cost-effective. For capitation, the providers were dissatisfied, and discouraged healthcare worker to provide friendly, comprehensive, and high-quality care to iCHF beneficiaries.

Conclusion: The findings show that incentives in the current design of NHIF and iCHF may influence healthcare providers behavior in different ways that may distort healthcare costs, quantity and quality of healthcare provided to beneficiaries. There is a need to refine the design of the two financing schemes to optimize access to care, revenue and provider responsiveness.

Towards Strategic Health Purchasing in Ethiopia: Piloting Capitation to Reform the Provider Payment Modality (PPM)

PRESENTER: **Fitsum Hadgu Woldeyohannes**, Clinton Health Access Initiative

AUTHORS: Felegush Birhane, Firehiwot Abebe, Habtamu Tadesse, Leulseged Ahmed, Michael Tekle Palm, Muluken Argaw

<u>Introduction</u> Health insurance is one of the forefront pillars through which Ethiopia is aiming to achieve universal health coverage. Despite commendable achievements, the insurance system is increasingly grappling with challenges affecting the schemes' sustainability and health facilities ability to deliver quality services due to a lack of a proper risk-sharing mechanism to curtail providers' moral hazard and delays in reimbursements to facilities. To alleviate this challenge Ethiopia's health purchaser, with the technical support of CHAI-Ethiopia, has undertaken a pilot project to reform the PPM. This study aims to assess the extent to which this payment reform has succeeded in addressing implementation challenges through controlling costs, improved service quality and patient satisfaction.

<u>Method</u> An agile and consultative approach was adopted to assess the pilot in the 62 health facilities. Data was collected quarterly using a structured questionnaire that would evaluate patient and community satisfaction and facility's service availability and readiness. Medical charts from each pilot and control health facilities were assessed using a purposive sampling approach, where commonly prevalent diseases that are believed to have diagnostic ambiguity were chosen. The average cost-per-visit was compared in both the pilot and control facilities as a proxy to measure facility's cost control. An excel based analysis tool was prepared to analyze the findings, while comparisons and interpretations were made using descriptive analysis methods.

<u>Result</u> Capitation has enhanced health facilities' cost control, product availability, financial sustainability, and quality of service. It has improved cost consciousness and efficiency, where the average cost-per-visit was lower in pilot facilities compared to those in control. Capitation has also improved the quality of service, where the adherence to standard treatment guidelines was higher in pilot facilities compared to the controls, 88.8% and 76.3% respectively. Tracer drug availability for pilot facilities was 56% while 53% for control facilities. The self-reported members' satisfaction rate was generally high in pilot schemes, while increasing to 79% from a baseline of 63% in the pilot schemes it has largely remained similar in the control schemes.

<u>Conclusions</u> Although the capitation pilot has been challenged by several factors, important lessons have been learned during its two-year implementation. The importance of accurate and up-to-date membership data, the impact of the timing of capitation payments in relation to enrollment processes, and the importance of strong local government commitment were some of the key lessons learned. Despite some systemic implementation barriers, capitation has the potential to transition Ethiopia's health insurance system from a passive to a more strategic health purchasing approach.

<u>Policy implications</u> Based on the two-year pilot evaluation and the efficiency gain observed; Ethiopia, in the long run, is planning to make capitation the primary payment modality for health centers by adopting the design features and lesson learned from the pilot project. To this

effect, the country is aspiring for a phased capitation scale-up strategy, where capitation is anticipated to expand to 40 schemes in the first phase, to another 270 schemes in the second phase, and have full-scale transition in the third phase.

Can Delayed Performance-Based Financing Still Motivate Providers in Rwanda? a Mixed-Methods Investigation of the Supply-Side Effect of Social Health Insurance

PRESENTER: **Zhubin Chen**, The Graduate Institute Geneva

Background: Rwanda achieved universal health coverage in 2011 through its flagship community-based health insurance (CBHI) scheme. There is a voluminous literature on the demand-side effect of CBHI, e.g., its impact on health care utilization. However, few studies have investigated its supply-side effect, especially how CBHI affects the practice of public providers through the provider payment mechanism.

Public providers in Rwanda receive monthly position-based fixed salaries and performance-based financing (PBF), a de facto bonus. The latter evaluates provider performance following a list of performance indicators set by the health facility. Only providers whose score higher than 80 in their performance evaluation can receive their PBF in full. However, its actual payment is also subject to the availability of funds. As the major source of facility income, the delayed CBHI payment to health facilities in turn delays PBF payment to providers.

Objectives: To investigate how the delayed PBF payment affects the performance of public providers in Rwanda.

Methods: The study applied a mixed-methods approach with an exploratory sequential design. First, a multi-site ethnography was conducted at three representative district hospitals in Rwanda to inform the hypothesis of the supply-side effect of CBHI. District hospitals play an essential role in the Rwandan referral system. The ethnography involves participant observation and semi-structured interviews with providers and their supervisors at the three hospitals.

Second, an empirical analysis was conducted to test the hypothesis informed by the ethnography. I analyzed the effect of delayed PBF payment on the performance of public providers at all the district hospitals in Rwanda using compiled hospital accreditation data. The annual hospital accreditation evaluates the overall performance of district hospitals following a five-risk-area-based evaluation framework, which corresponds to the performance indicators of PBF on a larger scale. The vacancy of the CBHI officer at the district hospital was reported by informants as one of the main factors that caused the delay of CBHI payment to hospitals and hence PBF payment to providers. Therefore, I used the vacancy data of hospital CBHI officers as an instrumental variable to assess how the delayed PBF payment affects the performance of public providers in Rwanda.

Results: More than 40 public providers at the three district hospitals were observed during their practice and 26 were further interviewed between October and December 2022. The PBF payment was found to delay between 2 and 6 months at the three hospitals. CBHI officers were found vacant at two hospitals. When asked if PBF can motivate their performance, informants confirmed the effectiveness of PBF but also emphasized the prerequisite of its regular and punctual payment. The empirical analysis on the full sample of district hospitals further confirmed the negative effect of the delayed CBHI payment on provider performance.

Conclusion: The supply-side effect of social health insurance is often neglected by both policymakers and researchers. The results provide new evidence of the supply-side effect of CBHI on the performance of public providers in Rwanda and shed light on the mechanism for the systematic correlation between social health insurance and provider performance.

1:30 PM –3:00 PM   TUESDAY   [Health, Its Distribution And Its Valuation]

Cape Town International Convention Centre | CTICC 1 – Room 1.41
Productivity Costing: International Applications

MODERATOR: **Zanfina Ademi**, Monash University

A Systematic Review of Methods for Valuing Productivity Losses Due to Illness in Low-and Middle-Income Countries (LMICs)

PRESENTER: **Dr. Angela Devine**, Menzies School of Health Research
AUTHORS: Ery Setiawan, Natalie Carvalho, Kamala Ley-Thriemer, Sarah Cassidy-Seyoum

Background: Productivity losses are often included in costing studies and economic evaluations to provide a comprehensive understanding of the economic burden of disease. Global guidance on estimating productivity losses is sparse, especially for low-and middle-income countries (LMICs) where informal and unpaid workers remain dominant.

Objective: This study aims to describe current practices for estimating productivity losses in LMICs with a focus on methods for assigning a monetary value.

Methods: We conducted a systematic search of PubMed, Cochrane Library, and Web of Science. Reference lists of included articles were manually screened to identify additional studies.Any costing or economic evaluation study conducted in an LMIC that provided methodological details in estimating productivity losses was included. Two reviewers independently screened articles for inclusion, extracted

data and assessed the quality of the studies. We performed a comparative analysis of the methodological variation for estimating productivity losses.

Results: The review identified 4,411 studies. After excluding 4,130 studies for not meeting the inclusion criteria, 281 articles were included. The human capital approach was the most frequently used to measure and value the reduced productivity due to illness (39%). When considering that one study could have more than one method for assigning a monetary value to productivity losses, 312 observations were considered in the data synthesis. The methods that were most commonly used to assign a monetary value were standard wages (51%), self-reported wages (28%), and macroeconomic measures (15%). A range of other approaches, such as willingness-to-pay for work replacement, were applied less frequently. The standard wage method may not work for countries that do not have this data readily available or when wages are needed by sector, type of employment, or geographical region.

Conclusion: The choice of valuation method for productivity losses will be a tradeoff between the population characteristics (i.e., paid or unpaid labour) and data availability in the country. While a range of methods have been used to estimate productivity losses, these can be challenging to apply to unpaid populations. Better methods may be needed for studies that include these populations. These results may be useful to inform future economic evaluations and cost of illness studies that want to include productivity losses in their cost estimates. The results may also be of use as countries develop economic evaluation guidelines.

Productivity Costs Using Friction Cost and Human Capital Methods Based on Finnish Individual-Level Register Data: Case Diabetes

PRESENTER: **Olli Kurkela**, Tampere University
AUTHORS: Jaakko Nevalainen, Saara Metso, Pekka Rissanen, Leena Forma

Title

Productivity costs using friction cost and human capital methods based on Finnish individual-level register data: case diabetes

Background

Loss of paid and unpaid work and replacements due to morbidity and mortality result in productivity costs. Common approaches to estimating these costs are the human capital (HCM) and the friction cost (FCM) methods. The methods differ with respect to the underlying assumptions, and the productivity cost methodology remains a field of controversy.

Research aim

This study aims to apply friction cost and human capital methods to estimate productivity costs using Finnish register data. Both methods are applied in the context of people with diabetes.

Methods

The study data include the whole working age population (17-63 years) with diagnosed diabetes in Finland from 1998 to 2017 detected from several population-wide healthcare and administrative registers. Information on the negative labor market outcomes including sick leaves, early retirements, and deaths before the average age of retirement (63 years) that occurred during the study period 1998-2017 was collected for each patient. In addition, data was complemented with information on each patient's socioeconomic status, both before and after the patient's diabetes diagnosis. The outcome variable was the productivity costs, calculated using both HCM and FCM. Both the annual average wages of the population and annual occupation-specific wages were used to value the lost productivity. The HCM estimates will be further adjusted for the risk of unemployment and future working ability. The FCM estimates will be adjusted for the length of the vacancy chain and possibilities of adjusting for team production and compensation mechanisms will be investigated. In addition, extensive sensitivity analysis of the valuation strategies, length of friction period, and further adjustments will be carried out.

Results

The study population consisted of 501,922 patients at working age with diabetes (n_{type1} = 64,463, n_{type2} = 437,459). According to the preliminary results, the difference between annual total FCM and HCM estimates was over 10-fold at the end of the study period (approximately 100 million € vs 1,500 million). A decrease of approximately 50% and 40% in the annual total productivity costs were observed during the study period using HCM and FCM, respectively. Simultaneously, an approximately 50% increase in the mean HCM estimates was witnessed during the study period while mean FCM estimates remained relatively stable. The largest contributor to productivity costs was early retirement constituting 86% of annual productivity costs in 1998, however, a notably lower proportion of 66% was observed in 2017. Productivity costs increased steeply close to the statutory retirement age, which was more evident with HCM estimates compared to FCM estimates.

Conclusions and implications for policy

Finnish register data enable reliable estimation and routine monitoring of productivity costs using state-of-the-art methods, however, estimates' dependence on underlying assumptions should be carefully reported. Reliable, real-world productivity cost estimates could be

useful for various purposes e.g. as outcomes or costs in economic evaluation of occupational health interventions and pension system planning.

Employment Status and Productivity after Bariatric Surgery: A Comprehensive Systematic Review and Meta Analysis

PRESENTER: **Qing Xia**, University of Tasmania

AUTHORS: Thomasina Donovan, Stella T Lartey, Jiahao Diao, Tingting Xu, Hannah Carter

Background: Obesity has been linked with reduced productivity in the workplace and is associated with higher levels of unemployment and absenteeism and incur huge societal costs. The impact of bariatric surgery on the subsequent ability to work is frequently reported; however, these data were not comprehensively synthesized and used to support bariatric surgery related cost-effectiveness analysis (CEA). The adoption of a societal perspective has the potential to modify the CEA results. We therefore perform a systematic review and meta-analysis to synthesise the evidence of bariatric surgery-related productivity (including mortality and morbidity [e.g., sick leave, presenteeism, disability pension, and wage loss]) impacts to guide the development of comprehensive database of indirect cost inputs to be used in the future health economic evaluation models of obesity interventions.

Methods: We conducted a systematic review of empirical studies for bariatric surgery published to October 2022 that included occupational/productivity elements. Two authors independently performed literature screening, data extraction, and quality assessment. The type and frequency of productivity elements were summarized. Productivity outcomes (e.g., sick leave and presenteeism) before versus after surgery, or their differences between surgically and conventionally treated obese patients (where feasible) were meta-analysed using random-effects model. Between-study heterogeneity and sources of bias were evaluated. Subgroup analyses by surgery type were conducted.

Results: N=47 studies between 1977 and 2022 from 16 countries were included. The number of studies reporting the productivity elements of bariatric surgery has been increasing, indicating a growing recognition in this field. All but three studies were conducted in Europe and North America. Roux-en-Y Gastric Bypass (RYGB) was the most reported surgery type, and females were dominant. Most studies followed outcomes for up to 5 years. The sample size ranged from 21 to 54,681, with half of the studies involving less than 100 participants. Larger studies mostly came from Europe, and were published since 2012. N=35 studies reported employment rates, 21 reported unemployment rates, and 15 reported absenteeism. 28 studies reported "before vs. After" comparisons, four reported "surgery vs. Control" comparisons, and nine reported both. Post-surgery employment rates increased and remained stable within the 5 years following surgery. Meanwhile, unemployment rates decreased post-surgery and returned to baseline by the fifth year. The surgery group had consistently higher employment rates throughout the study period.Unemployment rates were initially lower in the surgery group but were higher in the control group after the first year. However, the limited number of available studies means these findings are not definitive. Results showed that sick leave days increased in the first year post-surgery, then substantially decreased from the second year onwards. Being female, older, less educated, having a chronic disease, or not being in paid work before surgery were significant risk predictors for not being employed post-surgery. Other potential risk factors were inconsistent across studies.

Conclusion: Bariatric surgery positively affects workforce productivity, but its effect on employment return is variable and dependent on several factors. Certain subgroups, such as females, may require additional post-surgery employment support.

1:30 PM –3:00 PM   TUESDAY   [Health Care Financing & Expenditures]

Cape Town International Convention Centre | CTICC 2 – Orchid

COVID-19 Vaccination in Low- and Middle-Income Countries: Delivery Costs, Vaccine Prices and External Financing [IMMUNIZATION ECONOMICS SIG]

MODERATOR: **Jennifer Asman**, UNICEF

ORGANIZER: **Ulla Griffiths**, UNICEF

DISCUSSANT: **Sarah Pallas**, U.S. Centers for Disease Control and Prevention

Tracking External Financing for COVID-19 Vaccine Delivery

PRESENTER: **Nikhil Mandalia**, UNICEF

Background

Tracking availability and use of health sector resources is critical for policymakers and programme managers. This can be challenging in the health sector, particularly where there are multiple external financial channels. Given the known risks and burden to health services due to fragmentation of health financing, external partners have a responsibility to ensure coordination at both country and global level to enable more efficient and effective allocation and use of external health sector resources against priority health-related targets. Such coordination can be more challenging during responses to health emergencies or rapidly changing health priorities.

Research question or aim

The aim was to continuously track, document and report external financing for COVID-19 vaccine delivery in LMICs. The presentation will focus on discussing lessons learned from this effort.

Methods

The recent example of donor coordination in relation to support to deliver COVID-19 vaccines provides several valuable lessons that can inform the establishment and management of future pandemic or health emergency financial coordination. UNICEF has played a central role in both mobilizing and coordinating donor resources to support COVID-19 vaccine delivery across low-and-middle income counties. This was made possible through the conceptualization and realization of a global, top-down, resource tracking system - the COVID-19 Vaccine Financial Monitoring (C19VFM) database. This exercise focused on ensuring timely information to inform the equitable distribution of external resources across countries, according to urgent, short and medium-term funding needs. Given the time sensitivity and fluid parameters of the evolving COVID-19 pandemic and vaccine response, the C19VFM exercise followed a pragmatic approach to global resource tracking. Data frameworks, collection methods and reporting requirements were designed to facilitate ease of reporting for donors and development partners to allow for more frequent updates and closer monitoring.

Key results

As of 22 November 2022, the C19VFM has recorded the commitment of US$ 4.6 billion to support COVID-19 vaccine delivery efforts across 138 LMICs from 35 external partners, as well as monitoring disbursement of these funds. Beyond the comprehensiveness and coverage of the financial tracking, the value has been driven by organizational factors related to implementation and application. Resource tracking efforts that are embedded within the governance structures of donor coordination groups offer benefits to all stakeholders in facilitating informed decision making, strengthening the case for participation in activities such as identifying relevant financing sources, engaging relevant organizations, and facilitating data sharing agreements.

Implications for policy and practice

The experience in the design, application and evolution of C19VFM, which provides a key perspective on the factors that can facilitate or constrain the success and practicality of global resource tracking in relation to health emergency and pandemic response. As the governance structures for pandemic, preparedness and response (PPR) are realized, the lessons learned from the C19VFM provide important insights on technical, organizational and operational elements of global resource tracking that can be applied to ensure future exercises can effectively harmonize donor funding and support strengthening of national health systems and service delivery.

Costs and Financing Gap of Delivering COVID-19 Vaccine to 133 Low- and Middle-Income Countries

PRESENTER: **Ibironke Oyatoye**

Background

COVID-19 vaccination pace has declined in many countries during 2022. Reasons for this decrease include reduced perception of risks from less virulent COVID-19 variants, competing health priorities with a refocus on backsliding on childhood immunization, weak health systems limiting delivery capacity, as well as socioeconomic and political factors. For many LMICs with low COVID-19 vaccination coverage, the declining vaccination pace expands projected coverage gaps and estimated financial costs required to close those coverage gaps.

As global health actors accelerate commitments to scale-up COVID-19 vaccine delivery in LMICs, it is important to estimate the costs and the required financial resources, and relate these to projected health financing trends.

Research question

The purpose was to estimate COVID-19 vaccine delivery costs and funding gaps for 133 LMICs to inform global resource mobilization and allocation of COVID-19 vaccination resources between countries.

Objectives

1. Estimate COVID-19 vaccine delivery costs and financing gap in 133 LMICs
2. Understand cost drivers of COVID-19 vaccine delivery under different country coverage target scenarios
3. Draw recommendations for global and country actors financing COVID-19 vaccine delivery and other immunization services

Methods

Estimates were generated using a cost model that contains global and country specific data and parameter assumptions. Input unit cost data were gathered from an intensive scan of the literature on costs of delivery of childhood and adult flu vaccine and recalibrated with data from available country studies that retrospectively assessed delivery costs using primary data collection methods. Country-specific assumptions and predictions on future COVID-19 vaccine delivery scaleup and delivery strategies were based on data and data from national plans where available. For other countries, assumptions and predictions were modelled from globally available data matched to country archetypes. Historical country-specific COVID-19 vaccine absorption rates were used to predict vaccination pace.

Key results

For all 133 countries, total delivery costs ranged between US$ 2.5 billion and US$ 5.6 billion, depending on whether country-defined targets or more ambitious global vaccination targets should be achieved by the end of 2023. Costs of human resource for health, demand generation and vaccination supplies were significant cost drivers across country groups. Costs varied across countries relative to the size of coverage gaps, predominant vaccine delivery method (whether routine or campaign mode), and existing human resource capacity. In the national coverage target scenario, 55 countries were predicted to have a funding gap, amounting to US$ 1.3 billion. In the global target scenario, 101 coverage would have a funding gap, totaling US$ 3.3 billion. In priority countries, the funding gap ranged between 2% and 46% of general government health expenditures. It should be noted that these values were generated in September 2022. At the time of the IHEA conference, the estimates will be updated with new coverage data and external financing available in countries.

Implications for policy and practice

The study enhances our knowledge on financial resources required to scale-up COVID-19 vaccination coverage in LMICs. Recommendations will be drawn for global health financing actors considering available resources for COVID-19 vaccine delivery and global health financing trends

COVID-19 Vaccine Prices and Procurement Expenditures in Low- and Middle-Income Countries during the Pandemic

PRESENTER: **Maria Teresa (MAITE) Irurzun Lopez**, VICTORIA UNIVERSITY OF WELLINGTON

Background

In the first year since their introduction, the number of doses of COVID-19 vaccines delivered (12.5 billion) was more than double that for all other vaccines together (5.5 billion). Similar trends are expected when comparing immunization expenditures as the price of vaccines is a key cost driver of vaccination costs.

International data compiled by UNICEF Supply Division show that COVID-19 vaccine prices range widely, from less than $2 to more $40 per dose in the public market, with higher prices in private markets. Yet, we lack a clear understanding of how the variation of prices may affect immunization expenditures in the middle to long term. As we move from emergency response to longer-term planning, it is essential to examine the impact that COVID-19 vaccine procurement costs have had on national health expenditures and, in particular, vaccine prices as a key cost driver.

Research question or aim

The purpose was to provide policy makers with an analysis of evidence on COVID-19 vaccine prices and vaccine procurement expenditures to plan for future funding needs and sustainability of immunization financing.

Objectives

To understand how COVID-19 vaccine prices have varied across vaccine types, countries/regions and procurement arrangements

1. To understand drivers and factors associated with COVID-19 vaccine prices
2. To investigate the impact of COVID-19 vaccine procurement on immunization expenditures
3. To draw recommendations to promote immunization and health equity goals

Methods

We triangulated data from literature review and interviews:

- Analysis of COVID-19 vaccine price data publicly available from UNICEF Supply Division COVID-19 Vaccine Market Dashboard, and from other UNICEF, WHO, Gavi and MSF sources
- Review of published literature through a PubMed search on COVID-19 vaccine prices, complemented with Google Scholar, and grey literature from stakeholders contacted
- Consultation/interviews with key stakeholders, to clarify and expand data available

Key results

We screened more than 700 peer-reviewed articles from PubMed and extracted data from 70 included articles. The review showed that data on COVID-19 prices and expenditures are scarce. Most references contained global level data with only a few revealing country specific vaccine prices. Hence, the UNICEF COVID-19 vaccine market dashboard was the most important source.

There was wide variation of prices across vaccine products, with greater price variation observed between vaccine manufacturers than between countries. The median price per COVID-19 vaccine dose was lowest in South Asia (US$ 2.5) and highest in Europe and Central Asia (US$ 17.5). However, this analysis is limited by the data publicly available, and final prices may differ as the prices agreed between country and manufacturer are most often kept confidential.

Implications for policy and practice

This study enhances our understanding of how COVID-19 vaccine prices affect the sustainability of immunization financing, particularly for low- and middle-income countries. Recommendations will be drawn to support global immunization financing and health equity goals.

Costs of Delivering COVID-19 Vaccine: Case Studies from Botswana

PRESENTER: **Kelsey Vaughan**, ThinkWell

Background

Beyond vaccine procurement, there are considerable costs associated with vaccine delivery, known as delivery or operational costs. Particularly for the main cost drivers of human resources, cold chain, social mobilization, and vaccination services delivered outside health facilities, delivery cost estimates are essential for optimal planning and budgeting at country level, and for fundraising and advocacy at global level. Until now, the only source of cost estimates for COVID-19 vaccine delivery was the mathematical model (paper 2), based on childhood immunization estimates.

Research question or aim

The aim was to evaluate the costs of COVID-19 vaccine delivery in Botswana from its start in early 2021 until early 2022.

Study objectives were:

1. To estimate the total costs of COVID-19 vaccine delivery during the first year of delivery
2. To estimate the total costs of COVID-19 vaccine procurement during the first year of the programme
3. To estimate the costs per dose delivered

Methods

We tested new approaches to immunization cost data collection, including collecting data from national and regional level instead of facilities, top-down methods and focusing primarily on the main cost drivers. In this presentation we will report cost per dose findings and compare them with the modelled estimates and with costs of routine immunization.

Key results

The findings suggest that rolling out a new vaccine to an entire population in the middle of a global pandemic is much costlier than previous vaccination efforts in Botswana or elsewhere, and costlier
than modelled estimates predicted. We will offer explanations for why the expected large expenditures for cold chain expansion and social mobilization and transport did not happen, and how human resources for health gaps were filled. We will also provide feedback on the new approaches to data collection and make methodological recommendations for improving future immunization cost data collection.

Implications for policy and practice

Previous research has shown that cost data are generally insufficiently used by policy makers. We will open up for discussion on how the results can best be used in Botswana.

1:30 PM –3:00 PM   TUESDAY   [Cross-Cutting Themes And Other Issues]

Cape Town International Convention Centre | CTICC 1 – Room 2.41-2.42

Measuring Preferences and Child Health [HEALTH PREFERENCE RESEARCH SIG]

MODERATOR: **Katie Page**, University of Technology, Sydney (UTS)

Why Are People Averse to Inequalities in Health?

PRESENTER: **Matthew Robson**, University of York
AUTHORS: Owen O'Donnell, Tom Van Ourti, Tim Doran

Background: People are generally averse health inequalities and the extent of their aversion differs greatly. Whilst many papers corroborate this finding, the reasons for differences in health inequality aversion between people are little understood. In this paper, we run an online experiment to estimate health inequality aversion parameters across a representative sample of the UK adult population (n=903). We gather extensive questionnaire data to allow us to explore the reasons for variation in health inequality aversion across participants. Our study is the first to analyse such extensive participant-level data, and thus is able to provide novel insights into who is averse to health inequalities, and why.

Objective: To better understand the distribution of, and heterogeneity in, health inequality aversion across the UK public.

Methods: We run an interactive online experiment which enables us to estimate participant-level health inequality aversion parameters. Alongside this, we gather extensive questionnaire data on variables related to: demographics, socioeconomic status, social and cultural capital, geographical location, health, economic preferences, political views and beliefs. This allows us to estimate the relationship between participant's health inequality aversion and their characteristics, preferences and beliefs. We estimate median preference parameters conditionally on each characteristic, to identify heterogeneity between groups, and use Shapely Decomposition to identify the contribution of each characteristic in explaining variation in health inequality aversion.

Results: We find that the majority of the UK population have a significant degree of health inequality aversion. We find that the degree of altruism, political views, health conditions and beliefs about quality-adjusted life expectancy (QALE) drive some heterogeneity in health inequality aversion. With those who are more altruistic, more left wing, who have a health condition and believe there is a lower QALE in the UK with a higher degree of inequality aversion. However, we find surprisingly little heterogeneity across, and explanatory power of, the majority variables relating to demographic characteristics and socioeconomic status.

Conclusion: Health inequality aversion is found to be pervasive across the UK population. Altruism, political views, health conditions and health beliefs drive some heterogeneity in health inequality aversion; however, a significant degree of aversion is present across the majority of groups in the UK. This indicates that policies, treatments or interventions which reduce health inequalities would gain support from the majority of the population.

Keywords: Health Inequality Aversion, Experiment, Social Welfare

Preferences for Antiretroviral Refill and Pickup through Private Pharmacies in Kenya

PRESENTER: **Rebecca Ross**, Palladium
AUTHORS: David Khaoya, Emily Macharia

Background: Kenya's HIV response is heavily donor dependent, with 62 percent of the total HIV expenditure financed by external resources (MOH, 2019). As external funding plateaus, Kenya must diversify its sources of HIV financing. Engagement of the private sector and non-governmental stakeholders has potential to increase access and maximize limited financial resources. Previous studies demonstrated that public sector HIV clients have willingness to pay for HIV care in the private sector, suggesting that differentiated service delivery with decentralized distribution of antiretrovirals through private pharmacies could meet client demands for enhanced convenience, discretion, and quality. The USAID-funded Health Policy Plus project surveyed current HIV-care clients and pharmacy owners to further understand demand- and supply-side interest in a private pharmacy ARV distribution model.

Methods: In three Kenyan counties, Busia, Kajiado, and Nairobi, HP+ used a double-bounded dichotomous choice survey to assess the willingness to pay among clients for antiretroviral (ARV) refill and pick-up from private pharmacies. Across counties, HP+ sampled 1,379 clients from the top five high-volume PEPFAR-supported ART sites representing public, private, and faith-based sectors. With client responses, HP+ interviewed 41 private pharmacies to assess interest in distributing free ARVs and minimum dispensing fees each would charge (willingness to accept). The study team used DBDC methodology to elicit client and pharmacy WTP/WTA and explored influencing factors and individual characteristics to generate potential client profiles.

Results: Across the three counties, about 46 percent of clients surveyed expressed interest in the hypothetical model that would allow them to pick up free ARVs from private pharmacies after paying a dispensing fee. Client interest ranged from 51 percent in Busia County to 32 percent in Nairobi County. The average maximum dispensing fee respondents were willing to pay per pickup ranged from KSh 181 (US$1.68) to KSh 274 (US$2.50). The study established that in Busia County, age of clients negatively affected WTP and that wealth status positively affected WTP in Kajiado County. Clients who travelled more than 100 kilometers to ART sites were also willing to pay a higher dispensing fee. Ninety-five percent of pharmacies interviewed expressed interest in dispensing ARVs to stable HIV clients. Across all counties, pharmacies were willing to accept an average minimum dispensing fee per ARV pickup of between KSh 163 (US$1.50) and KSh 200 (US$1.86).

Conclusion: Results indicate that clients' average willingness to pay is greater than pharmacies average minimum fee they would accept to add ARV dispensing services. These prices, and other client preferences results, can be used to design a pilot program for dispensing ARVs at private pharmacies in certain Kenyan counties.

Preferences of Citizens in Peru for School Opening during a Public Health Crisis: A Participatory Value Evaluation Study

PRESENTER: **Karen Trujillo Jara**, Erasmus School of Health Policy and Management, Erasmus University Rotterdam.

Background:

The outbreak of COVID-19 early 2020 was followed by an unprecedented package of measures to protect public health. More than 150 countries mandated school closures to reduce social contacts and the risk of transmission. In Latin America, about 60% of children missed an entire school year. Children in Peru are among the most affected due to a 2-year school closure, which led to significant learning and well-being losses.

Decisions whether to (keep) open or close schools involve trading-off important effects on public health, learning outcomes and well-being of children, productivity of parents, and potentially other effects. For policy makers facing such societally impactful decisions and seeking public support, it is relevant to know the opinions of citizens about such trade-offs.

Objectives:

Investigate the preferences of citizens in Peru for school opening during a public health crisis as posed by COVID-19 using a choice experiment, in *two scenarios*. **(i)** when the threat from COVID-19 is low and *schools are open*. **(ii)** when the threat from COVID-19 is high and *schools are closed*. In addition, considering this was the first application of this type of choice experiment in a developing country, we assessed respondents' experiences with the method.

Methods:

This study uses Participatory Value Evaluation (PVE), a preference elicitation method that puts citizens in the position of a policy maker and asks them to evaluate a number of policy options and their impacts. In the fall of 2022, 2,007 respondents quota-sampled to be representative of the general population of Peru assessed which measures to implement in the *two scenarios*. Respondents were shown a range of measures that could be implemented, such as "6 additional hours of class per week", "quarantine for suspected and confirmed COVID-19 cases"; "primary schools offer teaching on location" and "primary schools offer hybrid teaching". In addition, they received information concerning the effects of each measure on public health (number of COVID-19 weekly infections), well-being (number of children with emotional problems), and learning deficit (number of months of learning loss for children).

Results:

In the *schools are open* scenario, most respondents opted for mandatory third dose vaccination for teachers and quarantine for suspected and confirmed cases. Middle-aged respondents who have children more often selected additional hours of class. Respondents who are teacher or have a teacher as family member more often selected health mitigation measures. In the *schools are closed* scenario, the majority of respondents opted for reopening primary and secondary schools, mandatory third dose vaccination for teachers and quarantine for suspected and confirmed cases. Furthermore, most of respondents from the Highland region selected opening schools with teaching on location while most respondents from the Coast region selected hybrid teaching.

The vast majority of the respondents (82%) evaluated PVE as a good method to involve citizens in policy decision-making. Approximately 77% indicated that their acceptance of these policies would increase if the government involved citizens in decision-making using PVE. Finally, 81% stated they would like PVE to be used more often by decision-makers to inform major policy decisions.

1:30 PM –3:00 PM   TUESDAY   [Economic Evaluation Of Health And Care Interventions]

Cape Town International Convention Centre | CTICC 1 – Auditorium 2

Methodological Developments for Including Children and Young People in Economic Evaluations [ECONOMICS OF CHILDREN'S HEALTH AND WELLBEING SIG]

MODERATOR: **Lisa Gold**, Deakin University, Institute for Health Transformation, Deakin Health Economics

Views and Guidance Around the Inclusion of Children and Young People's Time in Economic Evaluations: Findings from an International Survey and a Delphi Exercise.

PRESENTER: **Lazaros Andronis**, University of Warwick
AUTHORS: Cam Donaldson, Emily Lancsar, Cameron Morgan, Stavros Petrou

Economic evaluations are routinely called upon to inform decisions on which programmes, interventions or treatments should be provided to adults and children. In economic evaluations that adopt a wide, societal perspective, it is important that all salient inputs and their opportunity cost are accounted for, especially if these are expected to differ between programmes competing for funding. People's time is such an input: it is limited, valuable and its use entails an opportunity cost. There is an increasing number of economic evaluations that account for and value loss of time while receiving care, yet nearly always these relate to adults' time. While few would argue that children and young people's (CYP) time is not valuable, attempts to account for this in economic evaluations are rare and inconsistent. To address this, we need to (i) understand the uncertainties that hinder the inclusion of CYP's time-related costs in economic evaluation and, accordingly, (ii) discuss, debate and agree on posssible solutions.

The two objectives of this work have been pursued iteratively, through an international survey of health economists (completed) and a Delphi consensus building exercise (ongoing). We developed and carried out a list-based survey administered through an online questionnaire that sought to capture respondents' views on persisting uncertainties and methodological gaps through close and open-ended questions. We piloted the questionnaire through a series of cognitive interviews with a convenience sample and we e-mailed unique links to the final version of the questionnaire to 1957 individuals in the sampling frame. We, then, designed a multiple-round international Delphi exercise to reach consensus around appropriate methods and priorities for future research.

Most respondents (235, 86% of all respondents) agree that CYP's time spent receiving care should be considered for inclusion in societal economic evaluations. However, respondents also pointed out a number of obstacles to doing so, chiefly lack of guidance around how and when to include (or, as appropriate, exclude) CYP's time-related costs, challenges with measuring forgone time in young children and, most commonly, the lack of any defensible estimates of the 'unit cost' of CYP's time. Building on these findings, the Delphi exercise is designed to compile 'good practice' guidance on when and how to account for CYP time, gather panelists' opinion on debates and normative questions surrounding the topic, and make recommendations on areas for further research (final round findings will be available in March 2023).

The Effect of Duration and Time Preference on the Gap between Adult and Child Health State Valuations in Time Trade-Off

PRESENTER: **Zhongyu Lang**, Erasmus University Rotterdam

Composite time trade-off (cTTO) utilities have been found to be higher when adults value health states for children than for adults. It is not clear if these differences reflect adults assigning truly higher utilities to the same health state when experienced by a child than by an adult, or if they are caused by other factors, which are not accounted for in the valuation procedure.

We test whether the difference between children's and adults' cTTO valuations changes if a longer duration than the standard 10 years is used. Personal interviews with a representative sample of 151 adults in the UK were conducted. We employed the cTTO method to estimate utilities of four different health states, where adults considered states both from their own and a 10-year-old child's perspective, for durations of 10 and 20 years. The TTO valuations for perspective-specific time preferences were corrected in a separate task, again for both perspectives.

We replicate the finding that TTO utilities are higher from the child perspective than from the adult perspective. However, the difference is only significant when controlling for other variables in a mixed-effects regression. Time preferences are close to 0 on average and slightly smaller for children than adults. After correcting TTO utilities for time preferences, the effect of perspective is no longer significant. No differences were found for cTTO tasks completed with a 10- or 20-year duration. Our results suggest that the child-adult gap is at least partially explained by differences in time preferences and highlight the importance of correcting cTTO utilities for these preferences.

Practicality, Construct Validity and Responsiveness of Using the Proxy Version of the CHU-9D for Children Aged 2 to 5 Years

PRESENTER: **Tracey Sach**

AUTHORS: Stella Lartey, Charlotte Davies, Lucy Bradshaw, Laura Wyatt, Alan Montgomery, Sandra Lawton, Matt Ridd, Rachel Haines, Joanne Chalmers, Richard Swinden, Eleanor Mitchell, Kim S Thomas, Sara Brown, Carsten Flohr, Michael Perkin, Joanne Brooks, Nicola Jay, Maeve Kelleher, Hillary Allen, Stella Tarr, Eric Simpson, Michael Cork, Susan Davies-Jones, Robert Boyle, Hywel Williams

Background

Measuring child utility in economic evaluations is challenging. The Child Health Utility (CHU-9D), a generic preference-based measure with 9 dimensions and 5 levels, has been used with children aged ≥5. Few studies have examined the psychometric properties of CHU-9D. We explore the practicality, construct validity and responsiveness of the proxy CHU-9D with children aged 2 to 5.

Methods

Data was used from the BEEP trial, a UK multicentre, pragmatic randomised controlled trial examining whether the application of daily emollients in infancy could prevent eczema in high-risk infants. The main parent/carer completed the proxy CHU-9D, using the developers' additional guidance for completion in pre-schoolers. Patient-Orientated Eczema Measure (POEM), a condition-specific instrument measuring patient-reported eczema symptoms, was also elicited for each child at age 2, 3, 4 and 5.

Practicality was assessed by completion rates, which meant completion of all nine questions. We assessed construct validity by whether the CHU-9D could discriminate between (a) individuals who had eczema according to established diagnostic criteria, or otherwise; (b) any parental report of a clinical diagnosis of eczema, or otherwise; (c) five eczema severity levels on POEM (i) Clear/Almost clear (score 0-2), (ii) Mild (3-7), (iii) Moderate (8-16), (iV) Severe (17-24) and (v) very severe (25-28). Significance was tested using t-tests for comparisons between (a) and (b), and a one-way analysis of variance (ANOVA) for (c). Responsiveness was determined by the ability to discriminate between three groups: those whose POEM score, i) did not improve, ii) improved by <3.4, and improved by ≥3.4 (where 3.4 represents the minimal clinically important difference) using a one-way ANOVA and a p-value of <0.05 in STATA 17.

Results

1,394 infants (53% male) participated in BEEP. 1143 (82%) had at least one first degree relative with history of eczema. Mothers' mean (sd) age at randomisation was 31.6 (5.3) years. No evidence of eczema or other atopic disease prevention was found, thus the whole sample is used without distinguishing treatment group.

Of 1,394 children in the study 1212 (87%), 981 (70%), 990 (71%), and 976 (70%) completed study questionnaires at 2, 3, 4 and 5 years respectively. Of these the CHU-9D was completed for 1066 (88%), 685 (69.8%), 925 (93.4%) and 923 (94.6%) at 2, 3, 4 and 5 years. Completion rates for the POEM were similar in years 4 and 5 but higher at 2 and 3 years.

For construct validity, CHU-9D discriminated between those with/without eczema (using either definition) and between those reporting different eczema severity (p <0.05). 486 participants had responsiveness data: 70% participants did not improve on POEM, 12% improved by <3.4 points, and 17% improved by ≥3.4 points. Mean utility change for these groups was -0.0007, 0.0084, and 0.0236 respectively with significant between-group differences (F-score=5.86, p<0.0159).

Conclusion

This new utility data from the proxy CHU-9D in children aged under 5 years shows it performs well in terms of validity and responsiveness. A minority of participants had difficulties completing the CHU-9D. Further research is needed to corroborate these findings and to examine other measurement properties.

1:30 PM –3:00 PM   TUESDAY   [Health Beyond Health Care Services: Health Behaviors]

Cape Town International Convention Centre | CTICC 1 – Room 1.61
Health, Income, Risk and Behaviour [ECONOMICS OF RISKY HEALTH BEHAVIORS SIG]

MODERATOR: **Jawa Issa**, Erasmus University of Rotterdam

The Response of Ambulance Transport to Anticipated Income Changes

PRESENTER: **Yoko Ibuka**, Keio University
AUTHOR: Junya Hamaaki

Background: Mortality is associated with various economic factors. Literature shows that mortality responds to anticipated income changes and increases immediately after income is received. However, there is scarce evidence of a behavioral response that induces health changes following income receipt.

Purpose: To understand people's behavioral change following income receipt, we studied within-month cycles in ambulance transport, using an example of the Japanese National Pension System for the elderly. We chose elderly pension payments for three reasons. First, in Japan, pension payments are, in principle, bimonthly on the 15th of every other month, which permits a comparison of within-month variations in ambulance transport between the months of payment and non-payment. Having non-payment months as the control is imperative, as within-month cycles could be driven by other demand- and/or supply-side factors that affect behavior on specific days of a month. Second, pension payments represent a large share of the elderly's income, and there are no significant income shocks on other days for the majority of the elderly. Third, unlike many other income sources, there is almost no uncertainty about the amount and timing of pension payments. This is ideal for assessing responses to anticipated income shocks.

Method: We examined the ambulance transport data between 2007 and 2019, which included all ambulance transport cases in the country. The data exhibited changes both in people's activities, through a change in the time and place of ambulance events, and in health status. We examined whether ambulance transport among the elderly increased on the day pension payments were made. Additionally, we examined how ambulance transports varied based on the age of a patient, the location, time, and the cause.

Results: We found that ambulance transport on the day of income receipt increased by approximately 4.5% compared with three days before payment. An increase in ambulance transport was found only in the payment months and not on the same day of the non-payment months. An increase in ambulance transport was observed only among the elderly who were eligible to receive pension and not the young who were not, from public places and streets rather than from workplaces or homes, and for transport due to traffic accidents, injuries, and sudden illness rather than from other causes such as natural disasters or industrial accidents. Emergency transport increased between 9:00 a.m. and midnight and no such changes were recorded before 9:00 a.m., which is suggestive evidence to show the effect of income receipt.

Conclusions: These results indicate that the changes in health status after income receipt reported in the literature are due to behavioral changes related to economic activities. Our findings inform policymakers on how to prepare the healthcare system for payment arrival. The results also have implications for a better design of public benefit payments.

Public Health Impacts of Conditional Cash Transfers through Household Improvements: Evidence from Colombia

PRESENTER: **Ana Correa**
AUTHORS: Neha Batura, Lara Gosce, Jolene Skordis
Background and research aim

Evidence indicates that conditional cash transfers (CCTs) result in both positive and negative externalities in many areas, including health. In this study, we propose that CCT beneficiaries might use their increased income to improve the sanitation and infrastructure of their household, which can affect the incidence of communicable diseases in the community. Ecological studies in Brazil have found that CCTs are associated with a decrease in the incidence of communicable diseases, but the mechanism has not been explored.

In this study, we focus on the Familias en Acción (FA) CCT programme in Colombia and four communicable diseases: dengue, diarrheal diseases, Chagas disease, and leishmaniasis. These are all vector-borne diseases, which are impacted by improvements in sanitation and infrastructure that disrupt the habitat of the vector. Our research explores whether FA has led to sanitation and infrastructure improvements, and whether these have reduced the incidence of these diseases in the community.

Methods

We used the Colombian SISBEN survey, an annual household survey covering measures of household deprivation, to determine changes in sanitation and construction. Households with aqueduct and sewerage connections were classified as having good sanitation, and dwellings with brick or concrete wall and floor materials were classified as having good construction.

We use a mediation analysis to evaluate the impact of FA on disease incidence, via the mediating effect of household improvements. Using a difference-in-differences design with heterogeneous treatment, we first explored whether an increase in FA beneficiaries in a given municipality was associated with improvements in sanitation or construction. The second step used the same design to assess whether these improvements were associated with a change in the incidence of disease; sanitation for dengue and diarrheal diseases, and construction materials for Chagas disease and leishmaniasis. We controlled for rurality, income per capita, and population at the municipality level.

Results

We found that an increase of 10% in CCT beneficiaries led to an additional 21.1 households per 100,000 having good sanitation and 23.2 households per 100,000 having good construction materials (p<0.01). However, the link between these improvements and incidence of infectious disease varied by disease. For every additional household per 100,000 with improvements in construction materials, the annual incidence rate of Chagas disease was reduced by 0.005 per 100,000 population (p<0.05). For leishmaniasis and diarrheal diseases, the results were not statistically significant, while dengue incidence increased following sanitation improvements.

Discussion

Our results show that CCTs are associated with household improvements, but this does not necessarily result in lower communicable disease incidence. The insects transmitting the Chagas-causing parasite have a wide range of climactic tolerability and have shown insecticide resistance, making household improvements a stronger prevention strategy. The other diseases investigated may be more vulnerable to factors such as temperature, humidity, and vector control. Further research is needed to understand which diseases may be most amenable to the positive public health externalities of CCTs.

The Social Cost of Modifiable Risk Factors in Singapore

PRESENTER: **Cynthia Chen**, National University of Singapore
AUTHORS: Vanessa Tan, Katika Akksilp, Julian Lim, Stefan Ma

Background

Close to half of all disease burdens are attributable to modifiable risk factors, indicating that many illnesses are preventable by modifying behaviours such as increasing physical activity levels or maintaining a healthy diet. This study estimates the social cost attributable to modifiable risks in Singapore, one of the most rapidly ageing populations in the world.

Methods

Our study builds on the comparative risk assessment framework from the Global Burden of Disease (GBD) study. A top-down prevalence-based cost-of-illness approach was undertaken to estimate the social cost of modifiable risks. These include healthcare costs from inpatient hospitalisation and productivity losses from absenteeism and premature mortality. Modifiable risk clusters include (i) lifestyle risks, (ii) substance risks, (iii) metabolic risks, (iv) environmental and occupational risks, and (v) other modifiable risks. Lifestyle risks include high body mass index, low physical activity, dietary risks (high sodium, low wholegrain, low fibre, high red meat). Substance risks include tobacco, alcohol, illicit drug use. Metabolic risks, which include high fasting plasma glucose, high LDL cholesterol, high systolic blood pressure.

Findings

The total cost across the five risk clusters was primarily driven by non-communicable diseases such as cardiovascular diseases, diabetes and kidney diseases, and neoplasms. Metabolic risks had the highest total cost of S$2.20 billion (95% uncertainty interval [UI] 2.05 – 2.51 billion), followed by lifestyle risks of S$1.98 billion (95% UI 1.85 – 2.26 billion) and substance risks of S$1.56 billion (95% UI 1.49 – 1.69 billion). The total costs were environmental and occupational risks (S$659 million, 95% UI 610 – 759 million) and other modifiable risks ($588 million, 95% UI 538 – 692 million). Across the risk factors, the costs were driven by productivity losses, heavily skewed towards the older working-age group and among males. Most of the costs were driven by cardiovascular diseases.

Interpretation

Modifiable risks rarely occur in isolation. This study provides evidence of the high social cost of modifiable risks and highlights the importance of developing holistic public health promotion programmes. Besides understanding the cost related to a single risk factor,

estimating the aggregated cost generated by two or more risk factors in a population may be of greater interest as it can be used to inform public health programmes to alleviate several health risks spontaneously. Studies have shown that the clustering of risk factors typically has a synergistic effect. As modifiable risks often do not occur in isolation, implementing effective population-based programmes targeting multiple modifiable risks has a strong potential to manage the cost of the rising disease burden in Singapore.

Keywords

Modifiable risk factors; Social cost; Population attributable fraction; Global Burden of Disease

Did More Generous Social Health Insurance Lead to Ex-Ante Moral Hazard? Evidence from Rural China

PRESENTER: **Jiawang Liu**, Xi'an Jiaotong University
AUTHORS: Jingxian Wu, Danlei Chen

Did More Generous Social Health Insurance Lead to Ex-ante Moral Hazard? Evidence From Rural Residents in China

Background

A motivation for broadening health insurance benefit is to improve health outcomes for impacted populations. However, economic theory suggests that expanding the generosity of health insurance induces an increasing tendency in reducing individual preventive efforts and causing ex ante moral hazard. Most research on this issue has been conducted on private health insurance while little is known with regard to publicly funded health insurance programs. In 2016, China consolidated its rural and urban resident social health insurance (SHI) programs, i.e., New Rural Cooperative Medical Scheme (NRCMS) and Urban Residents' Basic Medical Insurance (URBMI), into one unified program, i.e., Urban and Rural Residents' Basic Medical Insurance (URRBMI), with a goal to reduce disparities between rural and urban populations. This policy has significantly improved the insurance benefits of rural residents, providing a natural experiment setting for testing the ex-ante moral hazard with increased generosity in SHI benefit. Therefore, this study aimed to assess the effect of such SHI consolidation on the preventive health behavior of rural Chinese and to investigate whether more generous SHI induced ex-ante moral hazard.

Methods

Data were obtained from the 2015 and 2018 waves of the China Health and Retirement Longitudinal Study (CHARLS), a nationally representative household survey on middle-aged and elder Chinese. Preventive health behaviors were measured by whether the respondents smoked, drunk, or took physical exercise actively. Based on descriptive statistics, we applied a difference-in-differences (DID) model to identify the causal effect of SHI consolidation on the preventive health behaviors of rural respondents. We took respondents enrolling in the NRCMS in both 2015 and 2018 in a control group, while respondents enrolling in the NRCMS in 2015 and enrolling in the URRBMI in 2018 in a treatment group.

Results

our main results about the effect of SHI consolidation show that ,being consolidated into the URRBMI from NRCMS will increase the odds of smoking, drinking and taking active exercise by 1.525(p>0.1), 1.413(p<0.01) and 1.046(p>0.1) times respectively. We use different ways to measure the family's economic situation, which verifies the robustness of our results. By conducting the estimation on the subsamples grouped by household economic status, we find the increase in the probability of drinking caused by more generous health insurance is only significant among the respondents in the low-income group.

Conclusion

We found some evidence of ex-ante moral hazard with receipt of more generous SHI among rural middle-aged and elder Chinese adults as the SHI consolidation increased their probability of drinking. This effect was more evident among people with a poor economic condition since this group of enrollees is more sensitive to the economic compensation brought by increased SHI benefit. We suggest policies taken to improve enrollees' health literacy while broadening the generosity of SHI benefit, thus enhancing universal health coverage in China.

1:30 PM –3:00 PM TUESDAY [Demand & Utilization Of Health Care Services]

Cape Town International Convention Centre | CTICC 1 – Room 1.63
Mental Health [MENTAL HEALTH SIG]

MODERATOR: **Irina Pokhilenko**, University of Birmingham

Happy Pills? The Health Consequences of the Dramatic Increase in Antidepressant Use

PRESENTER: **Giuliano Masiero**, University of Bergamo
AUTHORS: Fabrizio Mazzonna, Sandro Steinbach
Objectives:

The use of antidepressants has doubled since 2000, making them the most prescribed drug category globally (OECD, 2019). This increase could provide substantial benefits to our society, reducing the economic burden of depression and improving individuals' well-being. However, in many countries, the expansion of antidepressants has been driven by prescriptions in primary care, most of them without depression diagnosis (e.g., Mojtabai and Olfson, 2011; Wong et al., 2017). There is evidence of under- and over-treatment with antidepressants (e.g., Editors et al., 2013), and the appropriateness of current thresholds for drug prescription has been questioned. Exploiting the random assignment to doctor during military conscription in Sweden, Bos et al. (2021) argue that young Swedish males, at the margin, are harmed by being diagnosed with a mental illness. Cuddy and Currie (2020a, b) show that inappropriate mental health treatment with antidepressants in adolescent children impacts the future total cost of care and poses health risks. Our work analyses the health consequences of the upsurge in antidepressant use in Switzerland, providing causal evidence of adverse health outcomes.

Methods:

We exploit substantial spatial and temporal variation in antidepressant sales at the product level, individual hospital admissions, and suicide events for the whole country from 2002 to 2014. In particular, our research design exploits the large product innovation in the antidepressant market using a modified version of the popular shift-share instrument (see, e.g., Bartik, 1991; Goldsmith-Pinkham et al., 2020), and the fact that the introduction of a new antidepressant in the market sells more in regions where the pharmaceutical company has larger market power (and larger influence on doctors' prescribing behavior).

Results:

We find that increased sales of one defined daily dose (DDD) per 1,000 inhabitants leads to 1.8 percent more emergency hospital admissions for mental disorders and an even more considerable increase in hospitalizations for depression symptoms (5.6 percent). Evidence on suicides is also generally positive, although the point estimates are noisier. Since these results might reflect the side effects of an otherwise successful increase in depression treatment, we also investigate the presence of spillovers into the labor market. We can reasonably reject any economically relevant impact on unemployment, labor force participation, income, and working hours.

Discussion:

Our results are consistent with previous evidence focusing on over-treatment. The prescription threshold for antidepressants has shifted towards the lower end of the severity distribution of depression over time, despite prescription guidelines dictating psychotherapy for mild depression and, at most, a combination of psychotherapy and pharmacotherapy for moderate cases. Our results imply that the marginal patient treated with antidepressants nowadays may no longer benefit from antidepressant treatment. A policy recommendation arising from our work would be to advance measures that ensure adherence to prescription guidelines and emphasize the importance of alternatives to pharmacotherapy, especially for mild and moderate depression.

The Impact of Behavioral Health Parity on Access to Specialty Mental Health Care: Evidence from the U.S. Military Health System

PRESENTER: **Dr. Christian Alexis Betancourt, PhD**, Uniformed Services University of the Health Sciences
AUTHOR: Jangho Yoon

In the U.S. and elsewhere, health insurance benefits and coverage for mental health and substance use disorders have traditionally been much less generous than medical care benefits, with separate deductibles, higher copayments or coinsurance, and lower limits on covered services. In October 2016, TRICARE, a federally-funded healthcare program for over 9.6 million uniformed service members and their families in the U.S., implemented full parity for behavioral health benefits to eliminate gaps between behavioral health and medical care benefits. We examine the extent to which the implementation of behavioral health parity led to an increase in specialty mental health care use among TRICARE beneficiaries.

Data come from the 2010-2020 Medical Expenditure Panel Survey, the largest national longitudinal healthcare survey of non-institutionalized civilian Americans. Samples include non-elderly adults aged 18-64 (the policy group of 5,138 TRICARE's dependent beneficiaries and the comparison group of 305,065 privately-insured/uninsured individuals) and separately children aged 5 to 17 (1,248 TRICARE beneficiaries and 70,676 privately-insured/uninsured children). Primary outcomes include psychotherapy visits and psychiatry visits, separately for office-based and hospital outpatient care settings. A psychotherapy visit is defined as a visit with a psychologist or a visit for psychotherapy or mental health counselling that did not occur during a physician visit. A psychiatry visit is defined as a visit with a psychiatrist. We compare pre-post changes in the outcomes for TRICARE beneficiaries with counterfactual trends from the comparison group with a difference-in-differences (DiD) model specification and its extensions, such as DiD on 5-nearest neighbor propensity score matching and a DiD event study. We estimate two-part count outcome models where probit and negative binomial are used for the first and second parts, respectively. We compute average marginal effects and bootstrap standard errors. Estimates are survey-weighted and adjusted for a multistage complex survey design.

We find that the implementation of behavioral health parity in TRICARE had no statistically discernable effect on the probability of psychiatry or psychotherapy visit, for either adults or children. However, the parity implementation led to an increase in psychotherapy visits by 9.4 visits a year among adults who ever had a psychotherapy visit that year, mainly through office-based providers. An increase in psychiatrist visits is positive but too small to be statistically discernable for adults. The parity implementation on average led to an increase of 7.3 outpatient psychiatrist visits a year among children who ever had a psychiatrist visit. The increase in psychotherapy visits among adults is

the largest for those with poor to low household income (17 more visits/year among those who had any visit). In comparison, the increase in psychiatrist visits among adults is the largest for those with high household income (4 more visits/year among those who had any visit).

We conclude that the behavioral health parity implemented in TRICARE overall led to an increased access to specialty mental health care. However, there are heterogeneous effects by age group, care setting, and household income level. Whether such heterogeneity in response to behavioral health parity has led to different behavioral health outcomes warrants further investigation.

The Effects on Mental Health of Political Disagreement with the Government

PRESENTER: **Joaquin Artes**, Universidad Complutense de Madrid

The determinants of psychological well-being and life satisfaction have been extensively studied in recent decades. However, the psychological effects of political events have barely been studied before despite being potentially large. In this paper we test the effects of government's political orientation on individual's psychological well-being. We use panel data on 22 European countries from the Survey of Health, Aging and Retirement in Europe (SHARE) throughout a 13-year window (2nd to 7th wave) on people older than 50 years old. We merge these data with political data from ParlGov. We use a battery of indicators typically used in the health literature to measure well-being, such as such as life satisfaction, pessimism, irritability and depression and lack of enjoyment of life.

Our main finding is that changes over time in government ideology have economically relevant and statistically significant effects on a variety of well-being measures, net of other individual level characteristics, country level controls and both country and individual level fixed effects. Left-wing individuals suffer a clear well-being and mental health toll when a right-wing government takes power and vice-versa, right-wing individuals suffer when a left-wing government is in power. Our results are not short-run emotional effects around election days because each wave of the panel is conducted every four years. This means that on average we measure mental health status approximately two years into each electoral term, far from election night. Finally, we also find that effects are heterogeneous. People residing in countries in which politics are more polarized suffer a much higher health toll when a government of an opposite ideology is in power. Similarly, individuals on the extremes of the ideological scale suffer considerably more when there is a ideological switch in power. On the other hand, we find no differences across gender, education, information levels, or income.

Overall, our paper is a first step towards a deeper understanding of the effects that politics, ideology, the political climate, the relation among parties and between parties and constituents have on mental well-being. We show that there are potentially severe implications on health that come not only from the policies governments will implement but from how much parties of a different ideology are perceived as opposed to one's ideology. To the extent that affective reactions of individuals towards politics are shaped by campaigning, parties strategies, media and interest groups, our results have also clear normative implications regarding the dangers of political radicalization.

Exchange Rate Shocks and Mental Health

PRESENTER: **Lukas Kauer**
AUTHORS: Lukas Schmid, Valentina Sontheim

This paper explores how perceptions of economic conditions affect mental health in the context of a substantial appreciation of the Swiss Franc in 2015. We document that the exchange rate shock was highly salient in the public debate and deteriorated perceptions about job security and unemployment expectations, while actual unemployment remained constant. Using individual-level panel data from a large health insurance company and a difference-in-differences design, we compare demand for mental health treatment of individuals who are more affected by the currency shock, those living close to the eurozone border, to individuals who are less affected by the currency shock, those living farther from the border. Our findings document that this change
of perceptions of economic conditions increased the likelihood of a visit with a psychotherapist, and the probability of purchasing a prescribed psychotherapeutic drug.

1:30 PM –3:00 PM   TUESDAY   [Economic Evaluation Of Health And Care Interventions]

Cape Town International Convention Centre | CTICC 1 – Room 2.64-2.65
Vaccination Programmes [IMMUNIZATION ECONOMICS SIG]

MODERATOR: **Fiammetta Bozzani**, London School of Hygiene & Tropical Medicine (LSHTM)

Modelling the Impact on Educational Attainment and Lifetime Productivity: A Cost-Effectiveness Analysis of the RTS,S/AS01 Malaria Vaccine in Ghana

PRESENTER: **Hannah Schirrmacher**, Office of Health Economics

Despite significant progress in the last 20 years in reducing the case-incidence of malaria, it remains a large public health burden. Ghana, one of three countries in the Malaria Vaccine Implementation programme, is among the 15 highest burden malaria countries in the world and accounted for 1.9% of global deaths and 2.1% of global cases in 2020.

In October 2021, the World Health Organisation (WHO) recommended widespread use of the RTS, S/AS01 vaccine. Vaccines have wide societal benefits (commonly referred to as broader value elements), such as increasing the productivity of a working age patient or improving

educational outcomes of children. However, these benefits, particularly the impact on education, are often not included in HTA, leaving vaccines at risk of being undervalued. This research aims to contribute to the literature by incorporating educational outcomes, and the impact of education on lifetime income, within a cost-effectiveness analysis (CEA).

A literature review was performed to inform the economic analysis undertaken. A Markov model was developed to simulate malaria progression in a hypothetical Ghanian birth cohort. Parameters were based on published data. The impact of malaria on education and subsequently lifetime income was modelled using two different approaches. The first, valued the opportunity cost of a child's time as a function of days of education lost due to infection within the model. The second approach valued the opportunity cost as a function of days of education gained. Both healthcare and societal perspectives were explored. Health outcomes were measured in disability-adjusted life years (DALYs) averted and costed in 2019 USD. Incremental cost-effectiveness ratios (ICERs) were calculated, and sensitivity analyses were conducted. One times GDP per capita per DALY averted was used as the cost-effectiveness threshold.

The results show that vaccinating children was very cost-effective from both a societal and healthcare perspective. When a child's time was valued using days of education lost, the vaccine resulted in a decrease in lifetime income across the cohort. This is a result of more individuals surviving and having more opportunities to pass through the malaria health states. However, when a child's time was valued using days of education gained, the vaccine resulted in more days of education gained and an increase in lifetime income across the cohort. Overall, the vaccine's ICER was $6.08 per DALY averted from a healthcare perspective, and, from a societal perspective, the vaccine was considered dominant versus standard of care (SoC). This result was robust to changes in most variables, including vaccine price and efficacy. However, the main driver of the more favourable ICER from the societal perspective was the estimation of lost productivity due to illness in adults, not the inclusion of education.

Estimation of the Cost and Implementation Requirements of HPV Vaccine Introduction in Pakistan

PRESENTER: **Salin Sriudomporn**, Johns Hopkins University
AUTHORS: Akram Shah, Soofia Yunus, Fauzia Assad, Arshad Chandio, Christopher Morgan, Cristina Garcia

Background:

Cervical cancer is the second most common cancer among female of reproductive age, and the third leading cancer among all women. Hence, it is essential to introduce Human Papillomavirus (HPV) vaccine as part of the national immunization schedule. This study assessed the cost of HPV vaccination program to support the decision-making on the vaccine introduction in Pakistan.

Method:

Both quantitative and qualitative methods, including desk review, and key informant interviews on potential priority populations, service delivery options, product choices and supportive actions, were conducted over the year 2020 and 2021. Immunization cost data (labor, storage, transportation, capital, and other recurrent costs) and projected cost of campaigns were derived from 2021 National Expanded Programme on Immunization planning tools. These data were applied to the WHO Cervical Cancer Prevention and Control Costing (C4P) - HPV vaccination- to assess the cost of introducing HPV vaccine in Pakistan from 2022-2026. All three vaccine products provided by Gavi (Cervarix, Gardasil, and Cecolin) were evaluated. We conducted a total of nine scenario analysis in order to address all three HPV service strategies -1.a single-cohort introduction over five years with multi-age campaign, 2.a single-cohort introduction over five years, and 3.a single age, single year catchup campaign. Preliminary results, including number of doses administered, number fully vaccinated girls (FVG), financial cumulated cost and cost per FVG, were calculated for each scenario.

Results:

We found that scenario 1, merging catch-up campaigns and routine delivery, is the most preferred strategy. The number of doses administered in this scenario is projected at 38.0 million with number of FVG at 17.9 million. Scenario 2 and scenario 3 were conducted based on the global vaccine availability and in the view of COVID-19 situation. Total doses administered were 7.4 million with projected 3.5 million FVG for scenario-2 and 5.9 and 2.8 million for scenario 3 respectively. Regarding product type, Cervarix was estimated to be the most expensive product at $11.96 per child, followed by Gardasil at $11.70 and Cecolin at $7.80. In scenario 1, the financial cost of FVG was estimated at $14.14, $6.54, and $4.77 respective to the product pricing. Scenario 2, cost of FVG was estimated at $14.07, $13.82, and $10.07 respectively. Cost of FVG in scenario 3 was approximated at $18.12, $17.87, and $14.12 correspondingly.

Conclusion:

As Pakistan progresses towards universal health coverage, new strategic approaches to prevent cervical cancer are required. The costs estimated in various strategies of HPV introduction from this study can help inform policymakers to develop effective strategies for implementation of HPV vaccine in Pakistan and act as an effective tool in advocating for provincial budgetary allocations.

DTP Boost: An Interactive Tool for Modeling the Health and Economic Impact of Introducing Diphtheria-Tetanus-Pertussis-Containing Vaccine Booster Doses

PRESENTER: **Rachel Hounsell**, University of Cape Town

Despite high vaccination coverage and considerable progress in reducing cases and deaths from diphtheria, tetanus, and pertussis, these diseases remain endemic in many countries. The World Health Organization recommends three booster doses of diphtheria- tetanus-

pertussis-containing vaccines (DTPCV) to extend protection against these diseases into adulthood. An early childhood booster is recommended at 12–23 months, a childhood booster at 4–7 years, and an adolescent booster at 9–15 years of age. To provide and sustain optimal pertussis, tetanus and diphtheria immunity for both sexes, age- and epidemiologically appropriate combinations of DTPCVs should be used. As these booster doses are administered at ages beyond the primary vaccination series recommended in the first year of life, they require additional vaccination encounters and potentially different delivery platforms (e.g., school-based) that may incur delivery costs that differ from costs incurred to deliver the primary series. To support country-level decision-making, there is a need for evidence regarding the potential health and cost impacts of introducing these booster doses.

DTP Boost is a new interactive web-based tool developed by the Modelling and Simulation Hub, Africa (MASHA) at the University of Cape Town in collaboration with AFENET and U.S. CDC with guidance from an expert steering committee. The tool allows users to design vaccination strategies to explore the health impact, budget impact, and cost-effectiveness of introducing DTPCV booster doses in a selected country, focusing primarily on use for low- and middle-income country settings that have not yet introduced DTPCV boosters. Multiple vaccination strategies can be designed, allowing a detailed and interactive exploration of the relative costs and benefits of different numbers of DTPCV booster doses, vaccination coverage levels, introduction approaches (e.g., concurrent, staggered), vaccine formulations and vaccination delivery platforms (e.g., health facility, outreach site, school-based).

DTP Boost is powered by an integrated epidemiological and health economic model. Because diphtheria, pertussis and tetanus have fundamentally different disease processes, three semi-independent deterministic age-structured compartmental models have been developed. These three models are linked through vaccination and population dynamics. The models are tailored to the selected country, accounting for differences in existing vaccination schedule, current burden of disease, health systems characteristics, costs of illness and vaccination. The integrated health economic model uses the outputs from each disease model (e.g., numbers of clinical cases, deaths), cases per treatment setting (e.g., outpatient, inpatient), and number of doses of vaccine administered to compute benefits (e.g., cases and deaths averted) and costs (e.g., the financial and economic costs of routine vaccination, new vaccine introduction and costs of illness) for further health economic analysis. A budget impact analysis and separate cost-effectiveness analysis are presented for each vaccination strategy designed by the user. Results are reported in local currency for the selected country as well as US dollars for comparison. The health economic analyses are carried out from the provider perspective.

We will demonstrate the DTP Boost tool then discuss the results and lessons learned from its design and first use.

A Novel Mobile Phone Strategy As a Nudge for COVID-19 Vaccination in Colombia

PRESENTER: **Andres Vecino-Ortiz**, Johns Hopkins University

Background:

Despite the success of COVID-19 vaccines in preventing morbidity and mortality associated to the virus, there is still misinformation about the vaccine's safety and effectiveness, and vaccine hesitancy. In Colombia willingness to receive a COVID-19 vaccine declined from 44% in 2021 to 27% in 2022. Given the considerable amount of skepticism about the COVID-19 vaccine, it has become increasingly important to identify public health communication strategies that can increase COVID-19 vaccine uptake. This work is aimed at testing mobile phone message interventions to increase COVID-19 vaccine uptake among adults in Colombia.

Methods:

We implemented a randomized controlled trial with three treatment message arms and one control arm in Colombia. The minimum sample size for each arm was estimated at 200 completed surveys to allow for a 10% difference and a double-tailed distribution at $p<0.05$. Phone numbers were selected through random digit dialing. The messages were designed using previous information from qualitative interviews among under-vaccinated individuals. Messages were delivered through Interactive Voice Response (IVR) using mobile phone numbers. All the participants were adults who lived in Colombia, speak Spanish, and were not fully vaccinated. Participants in arm 1 (factual message) received evidence-based information on vaccine's safety and effectiveness. Participants in arm 2 (narrative message) received real-life testimonials about the vaccine's safety and effectiveness. Participants in arm 3 (mixed message) received a combination of factual and narrative messages. Participants in the control arm did not receive any message intervention. Participants in the treatment arms received seven different messages, repeated twice a week during seven weeks (a different message every week). All participants were asked about COVID-19 vaccination during the last week and were tested about the content of the message. Participants were compensated with 1 USD of credit in their mobile phone account. Given the censored data structure of our dataset, we used a duration model to estimate the effectiveness of the messages. The primary outcome was time-to-vaccination in the last week.

Results

A total of 2,409 people consented to receiving the first message. We found that participants who received any intervention (factual, narrative, or mixed) were 17.69% more likely to be vaccinated than those who did not receive the intervention. Participants in the factual, narrative and mixed arms were more likely to be vaccinated than those in the control arm, 21.30%, 6.80% and 22.31%, Subgroup analyses revealed that those responding correctly to the test after the message, those with higher education levels, and participants aged between 45 to 59 years old were substantially more likely to report having been vaccinated after receiving the intervention.

Discussion:

Communication interventions using IVR appears to be an effective intervention to encourage COVID-19 vaccination in Colombia. We identified factors increasing the probability of success of the messaging intervention, and propose strategies to increase uptake in some specific groups.

Given that mobile phone interventions are often cost-effective, this might be a useful tool for policymakers in low- and middle-income countries to increase the vaccination rate or to explore its effectiveness for other behaviors in health.

Relationship between Household Member Vaccine Acceptance and Individual Vaccine Acceptance Among Women in Rural Liberia

PRESENTER: **Hawa Iye Obaje**, Last Mile Health
AUTHORS: Molly Mantus, Rachael Piltch-Loeb, Jenny Chung, Lisa R Hirschhorn, Marion Subah, Savior Mendin, Mark J Siedner, John Kraemer

Background

Several months after COVID-19 vaccines became available in Liberia, only a small percentage of the population had received their first dose. Whereas prior data have demonstrated that an individual's family can have a strong normative influence on health behavior, few studies have explored how behavioral intent about vaccination among household members affects individual vaccination acceptance. Such data are particularly lacking in rural, resource-limited settings like Liberia, where vaccination update remains low.

Research Aim

We respond to this gap in knowledge by analyzing data from a household survey of women in rural Liberia with the goal of understanding how household COVID-19 beliefs and vaccine behavioral intent correlated with individual household members' beliefs and vaccine behavioral intent. Our overarching aim was to identify targets to increase vaccination uptake in rural Liberia.

Methods

We analyzed data from a population-representative, household-based stratified cluster-sample survey in Grand Bassa County, Liberia, conducted from March to April 2021. All women aged 15-49 in selected households were invited to complete a questionnaire, which included a COVID-19 module on protective health behaviors and vaccine acceptance. Because vaccines were not available in this setting at the time of the survey, the question that asked about vaccine acceptance measured behavioral intent rather than current behavioral practices. We defined each household as being concordantly vaccine hesitant, concordantly vaccine accepting, and discordant (some members accepting and some members not accepting of vaccination). We fitted multivariable logistic regression models to identify correlates of concordant acceptance. The model was adjusted for potential confounders, including individual age, wealth (constructed as a household-level wealth index using principal components analysis), education, distance to nearest health facility, and National Community Health Assistant Program (NCHAP) implementation status.

Key Results

A total of 2,620 women in 2,201 households completed the survey. Forty-two percent of households had discordant views on the vaccine, versus 33% of households concordantly accepting, and 25% concordantly hesitant (n = 352). There were no significant differences in demographic characteristics between households that had discordant, concordantly accepting, and concordantly hesitant vaccine beliefs. In adjusted models, having a household member who is accepting of the COVID-19 vaccine was associated with an 18.1 percentage point greater likelihood of being accepting of a COVID-19 vaccine (95% CI 7.3-28.9%, p=0.001). The other correlate of vaccine acceptance at the individual level included living 10 to less than 20 kilometers from the nearest health facility (95% CI 0.2-13.8%, p=0.043).

Conclusions and Implications

Only approximately one in three households in a rural community in Liberia were fully COVID-19 vaccine accepting. The strongest predictor of whether someone was accepting of the COVID-19 vaccine was whether someone else in their household was also vaccine accepting, and increased the proportion of acceptance by nearly 20 percent. Social norms around vaccine acceptance within households appear to be a major determinant of individual acceptance. Interventions that target hesitant households may have an outsized effect on vaccine acceptance rates in this setting.

Cape Town International Convention Centre | CTICC 2 – Daisy
Analyses Inputting to the MOF-MOH Dialogues and the Country Dialogue in Malawi.

MODERATOR: **Edward Kataika**, East Central and Southern Africa Health Community (ECSA-HC)

ORGANIZER: **Paul Revill**, University of York

DISCUSSANT: **Shu-Shu Tekle-Haimanot**, Global Fund for AIDS, TB and Malaria

African Union Commitments to Strengthening Health Financing: Opportunities and Challenges for the Health Economics Discipline

PRESENTER: **Takondwa Mwase**, Health Economics and Policy Unit, Kamuzu University of Health Sciences

In February 2019, the African Union Commission convened African Heads of State, and other global and regional health leaders, for the African Leadership Meeting (ALM)- Investing in Health. The meeting led to the landmark "Addis Ababa Commitment toward Shared Responsibility and Global Solidarity for Increased Health Financing Declaration" (the ALM Declaration). This represented a major commitment to shared responsibility in increasing domestic resources for health and reorienting health systems in Africa.

A series of commitments were made in the ALM Declaration. These included (1) Increasing domestic investments in health across Africa (which would be monitored through a new Health Financing Tracker); (2) Creating hubs in each of the African Union's five regions; and (3) Convening Ministers of Finance and Ministers of Health at least every 2 years, to jointly plan and discuss the implementation of these health financing reforms and commitments.

At the national level, a key activity in each of the African Union member states would be a "national dialogue" between the Ministry of Finance, Ministry of Health, parliamentarians, patient/community representatives, development partners and other key stakeholders to plan activities and means of monitoring to ensure the commitments are achieved. The first such dialogue took place in Lilongwe, Malawi, on 24-26th October 2022.

The Ministry of Finance (i.e., the Treasury) makes decisions about budget and allocation to health and other sectors. For the Ministry of Health to make a substantive case for increased health allocations, it would require evidence on two fronts - i.e., i) what are the economic benefits of health investments and ii) how to efficiently and equitably use scarce health resources. The first question can be addressed through macroeconomics and fiscal analysis (see Presentation 2), and the second through health economics analysis focused on resource allocation (see Presentation 3). This presentation will present and summarise the ALM Commitments and explore how the contributions of researchers can fit within the policy environment, using the example of Malawi, to advance health financing with the ultimate goal of attainment of Universal Health Coverage across the continent.

"More Money for Health": Projecting Fiscal Space for Health

PRESENTER: **Priscilla Kandoole**, University of York

Most developing countries are faced with the challenge of matching limited resources against competing priorities. Considering the macroeconomic and fiscal realities of countries in any health financing policy dialogue is thus important. A panel Structural Vector Autoregressive (SVAR) model with macro-finance and health blocks studies how structural shocks to the macroeconomy, health expenditure and exogenous financial shocks jointly affect the macroeconomy and health outcomes in the short run. The model is estimated jointly for Eswatini, Malawi, Mauritius, Zambia, and Zimbabwe, using annual data over a 20-year period from 2000 to 2019. The variables included in the macro-finance block are real Gross Domestic Product (GDP) growth and the change in total government expenditure as a share of GDP. The health block included health expenditure as a share of total government expenditure and the change in child mortality. The latter is our proxy for health outcomes because it is likely to respond more quickly to changes in health expenditure and macroeconomic conditions compared to other more slow-moving health outcomes such as chronic diseases. The analysis explored the dynamic transmission of three structural shocks, namely, government expenditure, GDP growth, and health expenditure. Structural impulse response functions (IRFs) are used to show the accumulated response of the endogenous variable in the SVAR to each structural shock for a horizon of up to 10 years. The IRFs corresponding to each of these shocks reveal the following results. Firstly, a government spending shock raises total government expenditure as a share of GDP by roughly 2.5 percentage points, resulting in an accumulated change in GDP of roughly 1 percentage point. This lowers the share of health expenditure to total government outlays by roughly 1.5 percentage points. Secondly, a GDP growth shock raises GDP growth by a cumulative amount of 3 percentage points. This shock results in a reduction in the share of government expenditure in GDP of only 0.5 percentage points. Thirdly, the cumulative impact of the health expenditure shock on the share of health expenditure in total public outlays is substantial (above 5 percentage points). Importantly, the total government expenditure as a share of GDP conditional on a health expenditure shock stays constant. Finally, the model also estimates IRFs for the four variables to the external finance premium in African countries. This is because the availability of resources is particularly vulnerable to fluctuations in the ease of access to international liquidity. The external liquidity shock is found to have a substantially negative impact on health expenditure as a share of total government expenditure. These results reveal a tight link between public health spending and health outcomes, even in the short run. Meaning that more spending lowers child mortality. Evidence of rivalry for fiscal capacity across components of public spending is also shown. A clear policy priority is to achieve improvements in population health and robust healthcare systems. However, a holistic approach is paramount in the

balance between increased resources for health alongside efficient, effective, and equitable use of those resources to achieve health sector objectives.

"More Health for the Money": Resource Allocation Tools and Their Use for Health Policy in Malawi and Eastern, Central, and Southern African Region

PRESENTER: **Paul Revill**, University of York

One of the foremost challenges for healthcare systems in Africa is the scarcity of resources in combination with the rising demand for services. This is starkly evident in Malawi and other countries in the East, Central and Southern African (ECSA) region. Economic evaluation methods are commonly used to determine the efficient allocation of resources within the health sector and beyond. In our review, we present many novel advances that have been made in economic evaluation methods in recent years to answer some of the most pressing investment decisions facing health ministries in Malawi. These include the development and adoption of a health benefits package, the formulation of a geographic resource allocation formula to facilitate its delivery by decentralised units, analyses to identify priorities for health systems strengthening, design of contracts to purchase healthcare from non-government providers (in particular, delivery by mission facilities), analyses to guide data collection and future research, and others. We highlight the salient aspects of these tools and how they have contributed to attaining national objectives in ways that make the best use of the resources available (i.e., achieve "more health for the money"), as well as show the value of committing additional resources for healthcare. For instance, we demonstrate how analytical frameworks grounded in the principles of cost-effectiveness analysis (CEA), a commonly used economic evaluation technique, can be used to identify 'best buy' interventions for health benefits packages, evaluate cross-sectoral policies involving heterogeneous stakeholders, address a range of decisions associated with new technologies, and inform deliberations about research priorities in ECSA countries. These tools offer the flexibility to be applied widely based on in-country needs and data availability, include other limits to the health systems in addition to financial constraints, and consider wider social objectives, such as equity and financial protection, alongside health maximisation. We also identify major gaps in the methods and the underlying data needed for implementing these tools and suggest ways to improve them to meet policy needs more appropriately in the future. Results from the application of these tools and methods could provide valuable quantitative insight to help align national decision-making with local, within-country priorities in the ECSA region and, more widely, in Africa.

"More Health for the Money": Setting the Policy Scene for More Efficient Financing in Malawi

PRESENTER: **Emily Chirwa**, Ministry of Health of Malawi

Over the past two decades, Malawi has made significant progress in terms of health outcomes, most notably in maternal and child health. Infant and under-five mortality rates have both declined by more than 80 per cent since 1990. Maternal deaths declined by more than half between 2000 and 2015. Life expectancy has increased from 45 to 65 years since 1999. However, despite this progress, both the under-5 and infant mortality rates remain high, and Malawi remains beset by ongoing infectious and growing non-communicable disease burdens. Moreover, Malawi has one of the lowest gross domestic product (GDP) per capita values in the whole world. It has had low and volatile economic growth and now faces a rising debt burden, which is crowding out other expenditures, including health. The country signed the African Union ALM-investing in health Declaration in 2019, but it faces as large a challenge as any country in meeting these commitments.

This talk will begin by setting up the country context and institutional and administrative context of the health sector in the country. Health financing challenges will be summarised, and the steps to improve the current situation will be presented, including the use of novel forms of health economic analyses within the political and planning structures of the country. Malawi is imminently launching its new 8-year health financing and sector plan: the Health Sector Strategic Plan III: 2022-2030. This is an ambitious agenda for reforming health financing to achieve Universal Health Coverage (UHC). However, Malawi relies heavily on development assistance due to the funding restrictions, as well as the administrative and planning burden to receive desperately needed funds, making the attainment of UHC especially challenging.

In this talk, the main challenges to effective financing will be laid out. These include (1) Donor funding not being well aligned with national priorities and the health benefits package (HBP); (2) Limited room to increase health spending through raising additional revenue; (3) Challenges in reallocating funds to health from other sectors that require convincing political decision-makers and the Ministry of Finance that investing in health has more value than investments in other sectors; (4) Significant efficiency challenges in supply chains for medicines and medical supplies, leading to government overpaying for goods and services and recurrent stockouts at facilities; (5) Expenditure on salaries being around half of the government expenditure on health, yet shortage of health workers still being a binding constraint on increasing service coverage; and (6) More efficient resource allocations at the district level being opaque and facilities do not receive any direct funding.

The contributions of the Malawi MOF-MOH national financing dialogue in extending the impact of health financing research and planning within the institutional realities and constraints in Malawi will be presented. Better coordination between domestic stakeholders and between government and donors and ongoing reforms to strengthen the generation and use of health economic evidence in health-financing decision-making at all levels offers the prospect of equitably improved health outcomes for our population.

Cape Town International Convention Centre | CTICC 2 – Protea
Health Coverage and Quality of Care

MODERATOR: **Yuanyuan Gu**, Macquarie University

Facility-Based Delivery & Immediate Postpartum Sterilization in Indiaan Instrumental Variable Analysis

PRESENTER: **Liana Woskie**, London School of Economics and Political Science (LSE)
AUTHOR: Irene Papanicolas

Introduction: In 1992 as few at 14% of women living in India gave birth in medical facilities, whereas that share increased to 83% by 2014, driven largely by public hospital use. A well-established literature has illustrated the significant role the Janani Suraksha Yojana (JSY) program played in this transition, through financial incentives to women giving birth in a recognized health facility. Prior to India's investment in increasing institutional delivery, states in India with a higher share of facility-based births also had a higher share of sterilizations occurring in the immediate postpartum period. These data suggest the recent increase in institutional delivery may have led to more women getting sterilized when they entered facilities to give birth. However, people giving birth in institutions in the 1990s may have been more likely to receive a postpartum sterilization for other reasons (e.g. differential access to care, preference for clinical intensity, etc.).

Methods: To address issues of unmeasured confounding, we exploit variation in the policy that drove India's increase in institutional delivery – the JSY program. With data from the fourth National Family Health Survey of India (NFHS-4), JSY coverage at the district level is used as an instrument to identify the causal effect of institutional delivery on sterilization. Using birth-level data, cases are identified where the Century Month Code (CMC) of a given birth matches the month of the mother's date of sterilization, also coded as a CMC variable. Because there was intentional variation in JSY's roll out and corresponding distribution of the program at the state level, the country-wide sample is divided into three core geographic regions based on program eligibility. The Instrumental Variable (IV) model is run separately for each subgroup because we cannot assume "as good as random" assignment of JSY between the three groups.

Results: For the first-stage test, the Cragg-Donald Wald F statistic exceeded the standard threshold of 10 for all models. In the second 2SLS model, high rates of institutional delivery at the community level had a statistically significant effect on a woman's odds of being sterilized immediately following childbirth in poor northern states (0.109; 95% CI 0.0784 to 0.1256) and Christian-majority states 0.857; 95% CI 0.7609 to 0.9531), but not wealthy southern states. These findings held when controlling for a concurrent caesarian-section and key demographic characteristics, such as family wealth, caste and parity. The same model shows no concurrent changes in the adoption of other forms of modern family planning (mFP). In addition, women sterilized in the immediate postpartum period were 1.3 times more likely to express regret with the procedure than non-postpartum sterilized peers. Higher regret was concentrated amongst women with a historically marginalized caste or tribal designation.

Conclusions: Higher institutional delivery led to higher rates of immediate postpartum sterilization amongst women who would not otherwise deliver in facilities. Given higher rates of regret in this population, careful attention should be paid to spillover effects of increasing institutional delivery and the potential repercussions for reproductive autonomy.

The Role of Advocacy in Maternal and Child Health Policy Processes: Towards Achieving Universal Health Coverage in Nigeria

PRESENTER: **Chinyere Cecilia Okeke**, University of Nigeria
AUTHOR: Benjamin Chudi Uzochukwu

The Role of Advocacy in Maternal and Child Health Policy Processes: Towards Achieving Universal Health Coverage in Nigeria

Background: Achieving universal health coverage (UHC) requires commitment from a wide range of actors, including policy makers, civil society, academics, journalists, and others. In low- and middle- income countries (LMICs), creating momentum amongst stakeholders can be especially challenging with competing priorities and limited funding. Advocacy coalitions – groups of like-minded organizations coalescing to achieve a common goal – have been used to achieve UHC; however, the effectiveness of advocacy coalitions for maternal and child health (MCH), towards achieving UHC is not well understood. This study was designed to map the maternal and child health policy advocates, identify the roles they played, and the advocacy policy wins towards improving MCH and achieving UHC in Nigeria.

Methods: A cross-sectional, multi-disciplinary mixed methods study was conducted using three disciplines of health policy and systems research: stakeholders mapping, realist evaluation and social sciences to guide the development, testing and refining of middle-range programme theories and the analysis of the relationships between the context mechanisms and outcomes. Review of literature was conducted using a proforma to identify all forms of MCH policy advocacies. Data was collected through In-depth interviews and focus group discussions from 25 and 48 respondents at the national and sub-national levels in 2022. A mapping tool was used for the stakeholder analysis and NVivo version 12 for the qualitative analysis.

Results: Most health advocacy coalition groups and the Federal Ministry of Health were identified as playing major roles in MCH policy processes and so were categorized as 'savior'. The community-based organizations, media and the professional groups were regarded as

friends. Advocacy coalitions played critical roles in achieving identified advocacy wins. Respondents frequently referred to coalitions' roles in framing the ideas, defining key challenges, holding government accountable to action, mobilizing youth, and educating community members and decision makers on benefits from MCH as most critical in these successes. Members of the coalitions detailed strategies that proved helpful in attaining health policy change – including leveraging champions, mapping stakeholders, and implementing strategic communication. Respondents highlighted strong collaboration within and between coalitions, transparency and trust between stakeholders, long-term commitment of coalitions, and clear collective goals as factors of networks which have contributed to successful MCH advocacy in Nigeria. Respondents noted poor collaboration between health advocacy groups and between health and other sectors, failure to gain community understanding, and insufficient funding as major challenges. Others include poorly defined leadership, roles, and responsibilities within coalitions; limited capacity within coalitions; and lack of political support.

Conclusion: This study demonstrates the value in applying health policy and systems research lens to understanding the role of advocacy in MCH policy processes in Nigeria. It has mapped the stakeholders and identified their roles, while highlighting specific strengths and areas of potential growth for MCH policy advocacy towards achieving UHC in Nigeria.

Keywords: Advocacy; Maternal and child health; Policy; Universal Health Coverage; Nigeria

Health Insurance System Fragmentation and COVID-19 Mortality: Evidence from in Peru

PRESENTER: **Misael Anaya-Montes**, University of York
AUTHOR: Hugh Gravelle

Peru has a fragmented health insurance system in which insureds can only access the providers in their insurer's network. The two largest insurance schemes covered 54% and 30% of the population on 31 December 2019. Some individuals are eligible for both of these schemes and can thereby access a larger set of providers if they choose to join both schemes. We investigate the effect of belonging to both insurance schemes (dual insurance), rather than just one scheme, on COVID-19 mortality from the start of the pandemic in Peru (6 March 2020) to 30 June 2021. We use data on the age, gender, insurance status, district of residence, and COVID-19 mortality of over 25.6 million individuals, who belonged to one or both of these insurance schemes at the start of the pandemic.

We allow for the endogeneity of dual insurance with one instrumental variable the *difference* in the distance to the nearest hospital in the two insurance schemes from the centroid of the individual's district of residence. We also control for the characteristics of the providers (average distances, quality levels, occupancy rates of intensive care beds) in the district of residence, and the local COVID-19 mortality rate in the district of residence. To allow for the small probabilities of COVID-19 mortality (0.55%) and of dual insurance (4.3%) we estimate recursive biprobit as well as 2SLS models.

The estimated average treatment effect of dual insurance from the biprobi models was to reduce COVID-19 mortality by 0.304%.

The Role of a Constitutional Right to Health in Population Health Beyond the Promotion of Universal Health Coverage in Non-Emergency and Emergency Situations

PRESENTER: **Hiroaki Matsuura**, Shoin University

Universal health coverage is an essential component of the right to health, but the scope of this right extends well beyond just healthcare access. There is growing evidence that universal health coverage leads to the improvement of population health outcomes using cross-country data. There is also empirical literature finding that introducing a right to health into national constitutions improves health disparities by protecting the health of the poor, children, and other marginalized populations. However, these two pieces of literature have never crossed. To fill this gap, this paper examines the role of a constitutional right to health in population health beyond the promotion of universal health coverage.

We investigate the relationship between various types of health outcomes (infant and under-five mortality rate as well as natural disaster-related deaths and intrastate battle-related deaths) and the UHC service coverage index over time, at the country (and event) level during 2000 to 2019. For the analysis of child mortality rates, the dependent variables included a log of the under-five mortality rate and the infant mortality rate at a country-year level. Data come from the UN Inter-agency Group for Child Mortality Estimation (UN IGME, 2021). For the analysis of emergency situations, event-level data on the number of natural disaster-related deaths comes from EM-DAT (Guha-Sapir, Below, & Hoyois, 2015), while event-level data on the number of intrastate battle-related deaths comes from the Uppsala Conflict Data Program (UCDP) (Pettersson & Wallensteen, 2015).The main explanatory variables were the UHC service coverage index, the presence of a constitutional right to health, and interactions between the UHC service coverage index and the constitutional right to health. As control variables, we added the level of logged real GDP per capita and the gross enrollment ratio for primary school, all of which may affect infant and child health. The panel data model also included country and year-fixed effects and WHO geographic-region-specific trends (year-fixed effects x WHO regions).

The results show that UHC service coverage index is associated with a reduction in infant and under-five mortality rates in peacetime and intrastate battle-related deaths in emergency. However, such health-improving and health-protection effects are only found in the countries with the presence of a constitutional right to health. These results indicate that constitutional right to health plays a crucial role in translating healthcare access into health outcomes. The paper also finds the relatively large protection effects against intrastate battle-related deaths in emergency. This indicates that the constitutional right to health can potentially play a more crucial role in redressing unsatisfied health needs

when man-made disasters largely disrupt a health system and universal health coverage is no longer in effect. Unlike intrastate battle-related deaths, we do not find any significant health protective effects of the UHC service coverage index against natural-disaster-related deaths with or without the presence of a constitutional right to health.

Fiscal Sustainability of National Health Insurance Program in Taiwan: Challenges and Future Reforms

PRESENTER: **Chyongchiou J Lin**, Ohio State University
AUTHOR: Chee-Ruey Hsieh

Background

Globally, the fiscal sustainability of health systems has been a continuous challenge, given how the growth of health expenditure has often exceeded the growth of the overall economy over the past several decades. Taiwan is no exception in facing this issue as its health system has been pressured frequently by financial deficit since the launch of the National Health Insurance (NHI) program in 1995. Public concerns continue to rise within Taiwan's NHI program regarding how to increase revenues for the health system and how to use them efficiently.

Aim/Research question

The aim of this paper is to address questions surrounding the fiscal sustainability of the universal health care coverage system and examine whether there is a deviation from fiscal sustainability of the NHI program in Taiwan.

Method

We first define the fiscal sustainability of the health system. Adopting the approach developed by Joseph White in his 2015 report to the Organization for Economic Cooperation and Development (OECD), we utilize the share of public financing in total health expenditure to measure the degree of political support for redistribution in the health sector. Based on the above approach, we use the time series data of Taiwan's health sector between 1990 and 2021 to measure the change in political support for redistribution in the health sector over time and examine whether there is a deviation from fiscal sustainability for the NHI program. Next, we use OECD health statistics to empirically estimate the factors that account for the variation in the share of public financing across countries. Finally, we consider sources of viable policy options for restoring the system to achieve the goal of fiscal sustainability.

Results

The results show that there is an increasing deviation from the global path of fiscal sustainability in the NHI Program in Taiwan. Therefore, we propose a hybrid model that combines mixed financing schemes and mixed payment systems to achieve fiscal sustainability. Specifically, the proposed mixed financing schemes indicate that adding general tax revenue into the current revenue pool generated from earmarked payroll tax is an effective approach for increasing the share of public financing in the health system. In summary, to achieve a balance between dynamic and static efficiency in Taiwan's health care market, it will be beneficial to establish a new outcome-based payment system using the general tax revenue in combination with the current input-based payment system, as suggested by the mixed payment system.

Conclusion

Our paper concludes that a viable policy option for Taiwan to achieve fiscal sustainability is a paradigm shift to a new system: move from a single source of revenue to multiple sources, and from a pure input-based payment system to a mix of input and outcome-based payment system. Although our analysis only focuses on Taiwan's NHI program, the results may also present policy implications for other countries who seek to achieve universal coverage and fiscal sustainability.

1:30 PM –3:00 PM   TUESDAY   [Supply And Regulation Of Health Care Services And Products]

Cape Town International Convention Centre | CTICC 1 – Room 2.46
Waiting Lists and Waiting Time

MODERATOR: **Alex van den Heever**, University of the Witwatersrand

Egypt's Initiative to Eliminate Waiting Lists: An Assessment of Its Impact on Health, Economy and Financial Protection of Egyptian Households

PRESENTER: **Ahmed Yehia Khalifa**, World Health Organization
AUTHORS: Ahmad Nader Fasseeh, Amany Ahmed Salem, Asmaa Khairy El Berri, Naeema Hassan Al Gasseer

Background: Waiting time is an indicator to evaluate efficiency of the health system, patient satisfaction, and horizontal equity in providing health care. Despite Egypt's efforts to satisfy patients' needs, waiting time reduction is still one of the ongoing challenges to the Egyptian health care system. Waiting time is when patient experience is more prolonged than medically acceptable for treatment. Such waiting incurs costs not only on patients themselves but also on the economy as a whole.

Methods: This research uses an innovative method to assess the economic and health impact of the presidential initiative to reduce waiting lists. First, the research employs a cost-effectiveness analysis of the initiative based on estimates of marginal costs and marginal outcomes before and after the initiative. The costs are used in updated prices in Egyptian pounds (discounted and undiscounted costs), while outcomes are represented in Quality-adjusted life years (QALYs). Moreover, the research includes a benefit-cost analysis to estimate the return on investment of the initiative, in addition to an affordability assessment to quantify the benefits of the initiative on the financial protection of the Egyptian population due to direct household health spending.

Results: The analysis focuses on five key interventions from the 11 interventions included in the initiative during the period of January 2019 to February 2020. It shows that the initiative added 48,385 QALYs with an incremental cost of around 2 billion EGP, including productivity lost (i.e., societal perspective) and around 3 billion EGP from payer's perspective. This gives an incremental cost-effectiveness ratio of 46,795 EGP, and 56,094 EGP per QALY from societal and payer perspectives, respectively. This value is considered cost-effective compared to the cost-effectiveness threshold in Egypt and global commonly used threshold of one GDP per capita. The overall benefit-cost ratio indicates a return on investment of 1.14 EGP and 1.51 EGP for every 1 EGP spent on the initiative in the discounted and undiscounted scenarios, respectively.

From the financial protection perspective, most surgeries are considered not affordable since they would expose households to catastrophic health expenditure if paid from households out of pocket. In total, for the five selected interventions, only 4.5% of the eligible population can afford the interventions without suffering financial hardship. Furthermore, the selected interventions would drag a significant percentage of the patients to poverty or even extreme poverty. Ophthalmic and cardiac catheterization interventions are the least expensive, leading to additional 35% of the eligible population being dragged into poverty if paid out of pocket, compared to 30% without surgery. On the other hand, cochlear implantation surgeries are the costliest. If paid out of pocket, it can push additional 65% of the eligible population under poverty line.

Conclusion: The Waiting list elimination initiative is a cost-effective public health intervention from both payer and societal perspectives. Moreover, it provides an effective and equitable financial coverage mechanism for the affected population. Therefore, it is recommended to expand the initiative to more curative and preventive services and integrate its resources within the overall Egyptian health reform plans.

Medicaid Expansion Was Associated with Longer Wait Times for Specialty Care

PRESENTER: **Kevin Griffith**, Vanderbilt University
AUTHORS: Daniel Asfaw, Sooyeon Song, Monica Aswani

Since passage of the Affordable Care Act in 2014, 39 U.S. states expanded Medicaid eligibility for low-income adults. Medicaid expansion is associated with increased insurance coverage and health services utilization; however, the potential spillover effects on appointment wait times are not currently known. Using a novel data source from the U.S. Veterans Health Administration (VHA), we assessed changes in waits for specialty care following state Medicaid expansions.

We obtained VHA administrative data for all referrals specialty care during 2011-2021 (N=55,383,301 referrals). The VHA provides care directly to >9 million military veterans, but also contracts with community-based clinicians to serve hundreds of thousands of veterans annually. We focused on new (vs. existing) clinical relationships and excluded states that expanded Medicaid income eligibility prior to the ACA. Our unit of analysis the ZIP code prefix (ZIP3)-quarter. Our primary outcome was the difference (in days) between referral initiation and appointment completion. Secondary outcomes included changes in enrollment and referral volumes that may underlie the observed changes in waits.

Treated ZIP3 codes were categorized based upon states' expansion year (2014, 2015, 2016, 2019, 2020, 2021). Control ZIP3s were in states that never expanded Medicaid. Due to differential treatment timing and non-parallel pre-trends, we employed the synthetic difference-in-differences approach outlined by Arkhangelsky et al. (2021). This allowed us to estimate changes in wait times following state Medicaid expansions, and placebo tests were used to generate corresponding confidence intervals.

In 2013, expansion states experienced mean wait times of 31.2 and 46.3 days for VHA & community care, respectively. Non-expansion states experienced mean wait times of 30.1 and 49.2 days. In synthetic DID models, expansion was associated with minor changes in VHA waits for states that expanded in either 2014 (+1.1 days, 95% CI: 0.7, 1.6) or 2015 (+2.7 days, 95% CI: 1.8, 3.6). Community care waits increased for all waves except one; states that expanded in 2014 experienced the largest increase (+13.5 days, 95% CI 10.3, 16.6), while states that expanded in 2020 experienced no increase (+0.5 days, 95% CI -1.5, 2.5).

Medicaid expansion was associated with lower VHA volumes for the 2014 wave (-271 referrals per ZIP3-quarter, 95% CI -336, -205), driven by surging volumes in non-expansion states. Expansion was associated with decreases in referrals to community-based providers for all waves. States that expanded in 2014 experienced the largest decrease (-880.8 per ZIP3-quarter, 95% CI -1136.0, -625.7) while expanders in 2016 experienced the smallest decrease (-126.9 per ZI3P-quarter, 95% CI -70.1, -183.8). Compared to non-expanders, states that expanded in 2014 also experienced disproportionate enrollment gains.

Our results suggest that improved access without concomitant changes in provider supply may lead to delays in care. Medicaid expansions were associated with fewer VHA referrals to the private sector, which may be attributable to reductions in veterans' reliance on the VHA. Private sector waits increased, which may reflect heightened demand from both veterans and non-veterans. States should consider strategies, such as expanded telehealth and mobile care teams, to ensure adequate supplies of providers to meet Medicaid enrollee's health needs.

Waiting Time Prioritisation for Hip Replacement
PRESENTER: **Peter Sivey**, University of York
AUTHORS: Panos Kasteridis, Luigi Siciliani
Waiting time prioritisation for hip replacement

Background

Waiting times for elective treatments have been slowly increasing in England in the last decade, and increased sharply during the COVID-19 pandemic. One policy to reduce the impact of waiting times on patients' health is to prioritise patients according to need. This study investigates the extent to which patients with higher need, as measured by pre-operative health, are prioritised on the list and wait less than other patients. We also test whether socioeconomic status affects waiting times.

Data

We use inpatient and outpatient data from the Hospital Episodes Statistics database linked with Patients Reported Outcomes Measures data to: identify elective admissions of patients who underwent a hip replacement surgery between April 2015 and March 2021; determine inpatient and referral-to-treatment waiting time; obtain information on pre-operative health of the condition reported prior to surgery and on various patient socioeconomic and clinical characteristics as well as on prior utilisation. Pre-operative health is measured through the Oxford Hip Score, and the EQ-5D.

Methods

We employ linear and log-transformation regression models to estimate the effects of pre-operative health, income deprivation and other factors on waiting times. We run separate models for the pre-pandemic years and the first year of the pandemic to compare the extent to which prioritisation of patients changed during COVID-19. Our models account for hospital fixed effects, allowing us to compare across patients within hospitals.

Results

Our preliminary results provide evidence of inpatient waiting time prioritisation which was amplified by the onset of the pandemic. Patients with better pre-operative health waited significantly longer relative to those with worse pre-operative health. In the pandemic year, the volume of hip replacements fell dramatically, waiting times doubled and the gradient on pre-operative health became significantly steeper. Our results also suggest a deprivation gradient, which became steeper in 2020 with patients in the most deprived quintile waiting more than 21 days longer than those in the least deprived quintile. Our results show less evidence of prioritisation for the initial outpatient appointment (the outpatient waiting time), suggesting general practitioners do not prioritise patients when first referring them to specialist care.

We contribute to the literature in several ways. We analyse the referral-to-treatment waiting time in addition to inpatient waiting time; we compare prioritisation pre- and post- pandemic; and we test whether prioritisation relates to pre-operative health related to the hip or also other domains of general health.

1:30 PM –3:00 PM   TUESDAY   [Health Beyond Health Care Services: Health Behaviors]

Cape Town International Convention Centre | CTICC 1 – Room 1.43
Sex and Fertility

MODERATOR: **Charles C Ezenduka**, University of Nigeria

Comparing the Risky Sex Premium between Women Engaging in Transactional Versus Commercial Sex in Cameroon
PRESENTER: **Rebecca Gathoni Njuguna**, KEMRI-Wellcome Trust Research Programme
AUTHORS: Sandie Szawlowski, Emile Nitcheu, Julienne Noo, Henry Cust, Illiassou Ofoche, Eric Deffo, Fanny Procureur, Stephanie Moyoum, Serge Billong, Ubald Tamoufe, Aurelia Lepine
Background: Women engaging in transactional sex (sex for monetary and non-monetary benefits) and commercial sex in Sub-Saharan Africa are disproportionately affected by HIV due to their frequent engagement in risky sexual behaviours. Research on the economics of sex has made significant contributions towards understanding the motivation behind their involvement in unsafe sex practices and have pointed out financial incentives paid for risky sex services as an important reason. However, these studies have only focused on women engaging in commercial sex. Given the high risk of HIV infection among women in transactional sex and the greater prevalence of transactional sex, it is important to determine whether financial incentives influence decisions of women engaging in transactional sex. We carried out a study to investigate the risky sex premium for women engaging in transactional sex in Cameroon, and how this compares with the premium faced by their counterparts in sex work.

Methods: Three waves of data collected from 755 female sex workers (FSWs) and 753 women engaging in transactional sex in Cameroon, from June 2021 to March 2022, were used the analysis. The data contained detailed information on the sexual services offered to their clients or "sugar daddies". Risky sex premium was estimated by regressing the price paid per sex act by the clients/sugar daddy's on risky sex (unprotected, vaginal, anal and oral sex) controlling for participants' fixed effects as well as other time variant factors such as location, client characteristics and duration of sex acts.

Results: Findings show that women engaging in transactional sex give their sugar daddies a 4% discount (95%CI; -5% to -2%) on the price charged per sex act for their consent to have unprotected sex. This highlights the women's ignorance of the risks involved or their preference for unprotected sex with sugar daddies, which is probably explained by biased risk perception due to the nature of the relationship, perceived as more stable and trustworthy than the relationship that FSWs have with clients. In fact, FSWs charge 16% (95%CI; 14% to 18%) more to provide unprotected sex to their clients. Furthermore, FSWs charge an even higher premium for riskier sex activities. For instance, a 134% premium was charged for anal sex with clients perceived to be at a very high risk of HIV. Additionally, FSWs were willing to provide oral sex for an additional 36% of the price charged.

Conclusion: Findings from this study highlight the HIV awareness knowledge gap of women engaging in transactional sex. To curb this, strategies aimed at reducing HIV infection among key populations should be tailored and extended to women engaging in transactional sex to manage their willingness to engage in risky sexual behaviours.

Further, efforts to lessen the financial instability of FSWs such as providing subsidies and low-interest loans are necessary to cushion them during financial hardships and consequently reduce their likelihood of being incentivised to engage in risky sexual activities. Additionally, to manage clients demand for risky sex, more research is needed to understand client and sugar daddies' preferences.

Protecting Women from Economic Shocks to Fight HIV in Africa: Evidence from the POWER Trial in Cameroon

PRESENTER: **Aurelia Lepine**, University College London
AUTHORS: Sandie Szawlowski, Emile Nitcheu, Julienne Noo, Henry Cust, Illiassou Ofoche, Eric Deffo, Fanny Procureur, Stephanie Moyoum, Serge Billong, Ubald Tamoufe

Background: Young women in Sub-Saharan Africa are disproportionately affected by the HIV epidemic: they are twice as likely to be living with HIV than men of the same age and account for 64% of new HIV infections among young people. Many studies suggest that financial needs, alongside biological susceptibility, are the main causes of the gender disparity in HIV acquisition. While the literature shows limited understanding of the link between poverty and HIV, there is some new robust evidence demonstrating that women adopt risky sexual behaviours as a way to cope with economic shocks. There are a number of reasons why economic shocks could lead to STIs and HIV acquisition. The main reason lies in the fact that the low access to formal well-paid jobs and productive assets make women in Africa prone to use commercial and transactional sex as risk-coping strategies. Such strategies may be attractive given that women can raise money quickly and earn up to three times more compared to other occupations. In addition, there is extensive literature showing a large positive premium for unprotected sex for women engaging in commercial sex. Determining whether economic shock is a missing piece of the HIV puzzle is critical since economic shocks are common and women do not currently have formal risk-coping strategies in Africa.

Method: We recruited 1,506 adolescent girls and young women engaging in transactional or commercial sex in Yaounde, Cameroon using respondent driven sampling women. Half of women were randomly selected to receive a free health insurance for themselves and their economic dependents over 12 months. We followed women over this period and collected behavioural data as well as sexually transmitted infections and HIV biomarkers.

Results: We find that study participants engaging in transactional sex allocated to the treatment group were less likely to be infected with HIV by 3.1 percentage points (p-value<0.01). We show that this impact is explained by a reduction in health shocks that led to a decrease in risky sexual behaviours. Precisely, we show that treated participants were more likely to stop transactional sex as the result of the intervention. In addition, we show that for those remaining in transactional sex, the intervention led to an increase in condom use by 15 percentage points. However, due to low HIV incidence among sex workers, there was no evidence in a reduction of HIV incidence among this group.

Conclusion: The study provides the first evidence of the effectiveness of formal shock-coping strategy against HIV risk. We estimate that in our trial, the cost for each HIV infection averted is US$5,638 among the cohort of women engaging in transactional sex. Policymakers should consider formal shock-coping strategies to prevent HIV among women in Africa.

Assessment and Determinants of Mental Health on a Global Sample of Sexual and Gender Minorities at High Risk of HIV: A Public Health Approach

PRESENTER: **Vincent Leo Leroy, PhD student**, Aix-Marseille University
AUTHORS: Erik Lamontagne, Anna Yakusik, Warren Parker, Sean Howell, Bruno Ventelou

Background: In most countries, sexual and gender minorities face intersecting factors that affect their wellbeing and livelihood. This study adopted a public health approach and examined the role of economic vulnerability, social support networks, HIV, and stigma and discrimination on the different levels of mental health of LGBTQ+ people.

Methods: This study is based on a sample of 108389 transgender women, gay, bisexual and queer men and intersex from 161 countries collected through a cross-sectional internet survey. We developed a multinomial logistic regression for each group to study the intersecting

association of the above factors at each stage of mental distress.

Results: We found that almost a third (30.5%) of the sexual and gender-diverse participants reported suffering from moderate to severe symptoms of anxiety and depression. Higher levels are found for transgender women (39%) and queer people (35.2%). Economic hardship plays a determining role in mental health deterioration for all groups. Compared to those who are HIV-negative, the likelihood of reporting severe symptoms of anxiety and depression is higher for people living with HIV and the highest among those who do not know their HIV status. Transgender women are the most exposed group, with more than 80% higher risk for those living with HIV suffering from severe symptoms of mental unwellness. The survey demonstrated that social support networks provided by family and friends are two essential mediators at each stage of preventing mental unwellness. We found that homophobic and transphobic reactions have a critical effect on the wellbeing of the participants. The relative risk of severe anxiety and depression is 3.66 times higher for transfeminine people facing transphobic reactions than those with no symptoms. We additionally demonstrated the deterrent association between the decision to avoid or delay health consultations for HIV or sexual and reproductive healthcare because of stigma and discrimination at health facility.

Conclusions: This study demonstrates the role of intersecting factors at each stage of mental unwellness of sexual and gender minority people. Decision-makers and practitioners need to pursue and intensify their efforts for LGBT inclusive public health policies that promote wellbeing without discrimination.

1:30 PM –3:00 PM   TUESDAY   [Supply And Regulation Of Health Care Services And Products]

Cape Town International Convention Centre | CTICC 1 – Room 2.43
Provider Workload and Scope of Practice [HEALTH WORKFORCE SIG]

MODERATOR: **Joanne Spetz**, University of California San Francisco

Are Doctors Working to Their Full Scope of Practice? Evidence of the Underuse of Skills of Doctors in Australia
PRESENTER: **Ian Li**, The University of Western Australia
AUTHOR: Anthony Scott

Background

In Australia, the number of medical graduates has doubled over the past two decades and competition in the medical training pipeline has increased. Recent evidence has found that average working hours for Australian doctors have decreased. These have led to emerging concerns about job insecurity and underemployment for Australia's medical workforce. Doctors are typically the most highly educated and trained among the working population with lengthier and more costly training compared to other fields. Ensuring that the substantial investment in skills is not wasted is a key issue in improving patient's health outcomes and access to health care.

Objectives

This study focuses on the issue of skills under-utilisation of Australian doctors using the Medicine in Australia: Balancing Employment and Life longitudinal survey of doctors. Specifically, our study will examine doctors' 'opportunities to use their abilities', termed as ability mismatch, and whether they 'often undertake tasks someone else less qualified could do', termed as task mismatch. Our research aims are to examine the prevalence of ability and task mismatch among Australian doctors (general practitioners (GPs) and non-GP specialists), factors associated with both forms of mismatch and the associations of these mismatches with the outcomes of job satisfaction and earnings.

Findings

The prevalence of ability mismatch was around 10% for both GPs and non-GP specialists in 2008, and steadily declined for both doctor groups over the next decade to 5% and 6%, respectively. Task mismatch was much more prevalent for both doctor groups, starting at around 45% in 2008. While the prevalence of task mismatch held steady for GPs over the following decade, it rose to 50% for non-GP specialists over the same time period. Results from random effects logistic regression models indicated that age, residency status, having dependent children and workplace conditions (such as a strong peer support network and ease of taking time off work) were associated with being mismatched. Mismatch was also found to be associated with sizable reductions in the probability of being satisfied with their jobs for both doctor groups, with ability mismatch associated with reductions in job satisfaction of 21%. Task mismatch was associated with 15% and 56% reductions in job satisfaction for GPs and non-GP specialists, respectively. Finally, we show that ability mismatch was associated with reductions in earnings of around 3% for GPs but was not statistically associated with earnings for non-GPs specialists. Conversely, task mismatch was associated with a 2% reduction in earnings for non-GP specialists but no statistically meaningful effect for GPs was estimated.

Implications

The findings indicate that mismatch is relatively prevalent for Australian doctors and are associated with adverse employment outcomes, particularly job satisfaction. Workplace conditions, relative to work-life balance preferences (demographics and family characteristics), appear to be stronger influences on mismatch status. Efforts to reduce mismatch should be focused on job design and task allocation which could lead to higher job satisfaction, morale, and earnings.

The Effect of Nurse Practitioner Scope of Practice Changes on Health Care Services and Hospitalizations: Evidence from Ontario, Canada

PRESENTER: **Adrian Rohit Dass**, University of Toronto
AUTHORS: Rayna Crawford, Brian Ferguson, Audrey Laporte

The COVID-19 pandemic has had important implications for health care planning internationally. In Canada, there have been reports of staff shortages of nurses and family physicians (FPs), as well as long wait-times in hospital emergency rooms. Previous research suggests that the expansion of scope of practice (SOP) for Nurse Practitioners (NPs) has positive effects on health care services and reductions in ambulatory care sensitive conditions (ACSC) hospitalizations, but this research is primary focused in the U.S. and generally on segments of the population. The purpose of this study is to investigate the impact of changes to NP SOP on health care services and hospitalizations for ACSC conditions in Ontario, Canada. We focus on a 2018 change that authorized NPs to order diagnostic imaging without restrictions. We also investigate the effects of previous NP SOP changes to investigate potential cumulative effects of these changes over time. We use a segmented time series regression model estimated on health care utilization data for the Ontario population (12.5-14.5 million individuals per year) from 2005-2019. Preliminary results suggest that the 2018 NP SOP change had positive effects on NP ordering of diagnostic imaging. We find effects on both targeted (directly affected by policy change) and untargeted diagnostic imaging procedures, as well as potential substitution effects between NPs and General Practitioners (GPs) / FPs. We also find effects on NP and GP/FP prescribing, with a potential shift in the types of patients seen by the care providers. Finally, we find a reduction in ACSC hospitalizations after the implementation of the policy. The results of the analysis suggest that changes to the SOP of existing providers can have effects on how providers work together to produce care. These changes may have important implications for patient access to care as well as potentially unnecessary hospital care. Changes to SOP may therefore be an important tool for policy decision makers facing health workforce shortages and challenges in health care access.

Identifying Typologies of Family Physicians Providing Primary Mental Health and Substance Use Services in British Columbia: A Latent Class Analysis

PRESENTER: **Margaret Jamieson**, University of Toronto

Labour supply of family physicians in British Columbia, Canada has changed over the last 20 years – particularly in the field of mental health and substance use. There has been been a surge in demand for mental health and substance use services as BC endures an ongoing toxic drug supply crisis and increased calls for adequate mental health care provision by family physicians. There is a need to understand exactly how and why primary mental health and substance use service provision has evolved in BC and what's to be expected from the current group of practicing physicians. This research uses latent class analysis of two fiscal years-worth of administrative health data to show how typologies of practice varied between 1996/97 and 2016/17, with a view to uncovering practice styles of family physicians during this time.

Latent class analysis is a supervised learning approach that sorts physicians into clusters (with the number of clusters determined a prioi) based on their class-conditional probability of membership in each category of outcome variable; in our case specifically, these outcomes were their level of mental health and substance use service provision, their propensity to provide substance use services, and a measure of overall continuity of care. For each year we ran a series of analyses with the number of clusters varying from 1-10 and chose the models with the number of clusters that minimized the BIC, with ties favoring the more parsimonious model. We then summarized physician demographic and practice-level information in each cluster, to obtain measures of central tendency and spread to systematically describe the physicians in each cluster. Finally, we aimed to match each category in each year with a similar category from the other year – allowing us to compare, for example, the clusters of low service volume physicians in each year.

Our results reveal that 1996 physicians are optimally sorted into 6 clusters, while 2017 physicians are optimally sorted into 4 clusters. Overall, there are many similarities between the family physician practice in 1996 and 2017 in terms of the relationship between physician characteristics (such as age, gender, practice location and IMG status), and practice patterns such as patient contacts, number of patients seen, and propensity for providing mental health and substance use services. One key difference has been the growth in the female labour force, and the growth in size of the mostly female physician class providing the largest proportion of mental health services. The continued growth of this class may mean greater continuity of care for patients receiving treatment, but also the possibility that total mental health service provision will decline as this class provides generally lower total numbers of services. On the other hand, substance use service provision has increased dramatically over the time period, mostly provided by physicians in later stages of their careers. Future policies should consider the demographic makeup of these classes, their expected career trajectories, and plan for future service provision based both on their current levels of provision, and historical data.

The Effect of Workload on Primary Care Doctors on Referral Rates and Prescription Patterns: Evidence from English NHS

PRESENTER: **Hanifa Pilvar**, Queen Mary University of London
AUTHOR: Toby Watt

In this paper, we investigate the consequences of greater workload on primary care provision. Faced with growing levels of illness, General Practitioner (GP) workload pressures have been rising consistently and there are concerns that understaffing will impact the quality and consistency of primary care provision.

We use a detailed data set of pseudonymized patient level records, from 2016 to 2019, provided by Clinical Practice Research Datalink (CPRD). We use a sample of 50 primary care practices in London, serving around 600,000 patients. Using these data, we can analyse primary

care activity delivered to patients by specific staff and how many staff are active at the practice on a given day. We measure the workload on General Practitioners (GPs) as the number of daily appointments.

Primary care outcomes are situational, multifaceted and complex, in our analysis we focus on referrals and prescriptions to quantify the impacts of physician workload on care delivery. These outcomes are vital functions of primary care, used to manage long term and acute illness.

GPs had an average of 0.28 additional appointments per absent colleague per day in 2016-2019. Workload is endogenously linked to staffing decisions and hiring practices, which are unobserved in the data. We therefore employ instrumental variable methods to manage the endogeneity problem, using staff absences as an instrument.

We find that greater workload leads to fewer referrals being made: a 10% increase in GP workload reduces the probability of referral by 0.06 percentage points, which is equivalent to a 3% reduction. By splitting the sample, we also find that the effect is exacerbated for patients living in deprived areas, patients with more underlying health conditions and for smaller GP practices with fewer assistant and nursing staff. For the impact of staff workload on prescription patterns, the results are mixed. We show that the probability of giving any prescription is reduced by greater workload on average. However, conditional on a prescription occurring, GPs are likely to prescribe a shorter course of antibiotics, while the quantity of opioid drugs per prescription is larger when workload is greater.

3:00 PM –3:30 PM   TUESDAY   [Health Beyond Health Care Services: Social And Related Determinants]

Cape Town International Convention Centre | CTICC 1 – Jasminum conservatory
POSTERS: Field 2. Health Beyond Health Care Services: Social and Related Determinants

2.1 Reducing Legal Barriers to Transgender Transitioning: Impacts on Health and Employment
PRESENTER: **Elisa de Weerd**, Erasmus University Rotterdam
AUTHORS: John Cawley, Hans van Kippersluis

Background: Transgender individuals are defined as those who identify with a different gender than the one they were assigned at birth; for example, a transgender woman is someone registered male at birth but who identifies as a woman. In the United States and the Netherlands, about 0.6% of the adult population identify as transgender (about 1.6 million people in the U.S. and 10,000 in the Netherlands). Research indicates that there is discrimination against transgender individuals, and that many have been victims of violence. There are also debates taking place in many countries about the rights of transgender individuals.

This paper studies the consequences of an important policy change in the Netherlands concerning transgender individuals. Prior to July 2014, changing one's registered sex on all governmental documents required full medical adaptation to the opposite sex, permanent infertility, and a diagnosis of gender incongruence; in addition, the minimum age to undergo the required surgery was 18 years. In July 2014, the Transgender Law was amended to drop the requirements of surgery and permanent infertility, and to decrease the minimum age from 18 to 16. This policy change lowered a barrier for individuals in the Netherlands to legally change their sex.

Objectives: In this paper, we explore whether the number of individuals changing their sex on government records, and the characteristics of persons choosing to do so, change from before to after the July 2014 amendment to the Transgender Law. We also explore how important socioeconomic and health outcomes, such as use of mental health care, employment, and income, vary before and after such legal gender transitions.

Methods and results: We examine individual-level administrative panel data collected by Statistics Netherlands to analyse the impact of the July 2014 amendments to the Transgender Law for Dutch citizens over the period 2009-2021.

We find that the number of legal gender transitions is responsive to policy: the policy change was followed by a quadrupling of the annual number of transitions, which remained relatively constant in the years 2015 to 2022. Those who changed their administrative sex after the policy change were on average almost 10 years younger than those who made the change before 2014, and were more likely to start gender-affirming hormone therapy after their legal transition, rather than before.

Using an event study approach, we find that antidepressant use is generally higher in the years leading up to a legal transition. We find that for FTM (female-to-male), the average employment rate increases before a legal transition, while for MTF (male-to-female) employment decreases both before and after a legal transition.

Discussion: These results contribute to the evidence regarding the effects of transgender policies. Specifically, they indicate that administrative transitions are responsive to the costs of transitions. They also show how the composition of those transitioning changes with policy, and how health care utilization and labor market outcomes vary after such administrative transitions. Future research includes examining how outcomes vary by whether the transition is female-to-male or vice-versa.

2.2 Social Capital and Health: Are the Effects of Trust and Social Networks Conditional on One Another?

PRESENTER: **Carlota Quintal**, University of Coimbra

AUTHORS: Luís Moura Ramos, Pedro Torres

Background/objectives: From a theoretical point of view, the sign of the association between social capital (SC) and health is ambiguous and mixed results have been found in empirical literature. Also, the role of each dimension of SC in shaping health might not be straightforward. For instance, bridging social connections have the potential to increase access to new information, nonetheless, the value of this information is likely dependent on one's trust in the source of the information. In this context, our overall aim is to empirically investigate under which conditions is SC relevant to obtain good/very good self-rated health (SRH), with special emphasis put on the interaction between trust and social networks.

Methods: Data come from the European Social Survey 2018 (47,423 observations; 30 European countries) and fuzzy-set qualitative comparative analysis was adopted (as far as we know, not used before to analyse SC and health). Health is measured by SRH. Six conditions are analysed: generalised trust, informal social connections, old, female wealthy (perceived income), and belonging to a minority group.

Results: Social capital is neither necessary nor sufficient to achieve good/very good SRH but it is part of some solutions (in half of the solutions SC is a core condition). Absence of SC is never a requisite to be healthy. Generalised trust (core condition) combines with: i) not being member of a minority group (peripheral condition); ii) informal social connections and wealthy (both peripheral). 'Informal social connections' further combines with: i) female and not being member of a minority group (all three are core conditions). Not being member of a minority group appears in four solutions (three times as a core condition). Both the absence of 'old' and presence of 'wealthy' appear in some solutions as core conditions, but there are solutions where it is indifferent being old or coping/finding difficult to live on present income.

Conclusions: Neither the presence of SC nor its absence is a necessary condition for good or very good SRH. While not being necessary, SC is part of some solutions. Our results further show that SC alone is not sufficient to be healthy; its relevance is contingent on the presence, or absence, of other conditions. Our study shows that good/very good SRH can be reached from different paths. The simultaneity of both forms of social capital in a single configuration agrees with the idea that the effects of trust and social networks are conditional on one another, but simultaneity is not always a requisite. A robust finding concerns the relevance of not being a 'member of a minority group'. Thus, our findings suggest that the role of this factor might be stronger than what has been hitherto recognised. Some limitations apply: There are health outcomes other than SRH, related with physical or mental health, which could unveil different combinations of conditions leading to good/very good SRH. Regarding the selection of measures of SC, given the complexity of this concept, any measure reflects only a limited aspect of social capital.

2.3 Associations between Birth Weight and Adult Human Capital in Low- and Middle-Income Countries: A Multi-Cohort Study

PRESENTER: **Mark Lambiris**, Swiss Tropical and Public Health Institute

AUTHORS: Christopher Sudfeld, Nandita Perumal, Goodarz Danaei, Guenther Fink

Background and research question

According to the latest global estimates, 18 million infants were born low birth weight (LBW; <2500g) globally in 2010. The primary causes of LBW are prematurity and intrauterine growth restriction (IUGR). LBW infants are at increased risk of infant morbidity, mortality and suboptimal physical and cognitive development across the life course.

The developmental origin of health and disease theory suggests that in utero exposures can increase the risk of adverse health outcomes later in life and across generations. An expansive literature showed that restricted foetal development, as measured by low birth weight, was associated with increased risk of adult hypertension, insulin resistance, obesity and other non-communicable diseases and with adverse immunological, mental health, and reproductive outcomes.

Much less is known regarding the long-term implications of LBW on adult human capital outcomes such as educational attainment, cognitive measures or labour market outcomes such as earnings – as primary measures of socioeconomic well-being. Characterising the long-run human capital effects of adverse birth outcomes is important to estimate their broader societal impact and the potential benefits of interventions and policies to support vulnerable infants. This is particularly relevant in resource-poor settings. In prior reviews we conducted, very few studies from low- or middle-income countries were identified.

To address this gap we assembled a multi-cohort dataset from 13 countries, which will allow us to assess the general relationship between birth weight and adolescent or adult outcomes in low- and middle-income settings.

Data and research methods

We assembled a dataset comprised of birth weight cohorts from Brazil, Ethiopia, Guatemala, Iran, China, Mauritius, India, Peru, Philippines, South Africa, Tanzania, Thailand and Vietnam.

We are quantifying how a standard deviation increase in birth weight (unconditional on early life growth) is associated with long-term economic and human capital outcomes such as adolescent test scores, IQ, educational attainment and adult earnings. We are assessing how

the associations documented in the literature vary with respect to the critical birth weight ranges (are effects constant, or mainly driven by kids in the tails of the distribution?); and how the functional specification of birth weight (e.g. linear vs. logarithmic) as well as the role of confounding impacts results. Where available, we are also analysing twin data.

In addition, where suitable data on early life cognition or child/adolescent human capital exists, we are calculating how important their contribution is to the observed association between birth weight and long-term economic outcomes. This will allow us to make tentative arguments about the importance of competing causal pathways mediating the associations observed. Finally, where data is available, we are assessing whether the observed associations are potentially linked to preterm birth versus slow fetal growth by using the fetal growth rate (birth weight divided by gestational age in weeks) as an alternative exposure to birth weight.

Preliminary findings

Preliminary analysis suggests that birth weight is associated with academic performance in adolescence and earnings in adulthood, in several low- and middle income countries. The associations, however, are not constant across the birth weight distribution.

2.4 The Effect of Juntos CCT Programme on Children's Cognition and Nutrition in Peru: Evidence from a Mediation and Suppression Analysis

PRESENTER: **Neha Batura**, University College London
AUTHORS: Rolando Leiva Granados, Jolene Skordis

Background and Objective:

Juntos is a conditional cash transfer programme targeting poor households in the most disadvantaged municipalities in Peru. Previous evaluations of Juntos have found a positive effect of the programme on children's nutritional outcomes, but small or no effects on their cognitive outcomes (Gaentzsch, 2020; Sanchez et al., 2018). This result is surprising given evidence of the positive association between nutritional improvement and cognitive development of children (Alderman & Fernald, 2017; Andersen et al., 2015).

We argue, instead, that the impact of the programme on child cognition may be mediated or supressed by factors such as nutrition, child time use and parental investments. Further, we draw on evidence from previous research showing that Juntos was associated with higher investments in productive assets (Cirillo & Giovannetti, 2018), and hypothesise that programme participation may be associated with changes in time use that detract from cognition-enhancing activities (such as studying or playing) in favour of potentially cognition-detrimental activities (such as work).

Methods:

We use household and child-level data collected from a cohort of children followed from the age of 5 to 15 years by the Young Lives Study in Peru. We use a statistical mediation/suppression analysis to estimate associations between programme exposure and outcomes for nutritional status, vocabulary development, daily time use, child time poverty and parental investments.

Results:

Our results support previous findings that Juntos was positively associated with nutritional outcomes, but that the overall effect of the programme (e.g., not considering potential mediators or suppressors) on child cognition was non-statistically significant. We found heterogenous effects of the programme on stunting, BMI, time use and parental investments. No association was found between programme participation and child time poverty when this was defined as having little discretionary time for leisure and playing.

However, our statistical mediation model found that the reduction in stunting status due to programme participation had a positive effect on vocabulary development for boys and girls, and a positive effect on mathematical test scores for girls. The reduction of BMI due to programme participation had a negative effect on cognitive outcomes for girls.

Further, time devoted to education activities increased significantly for girls (1.2 hours more per day), but it only had a small positive effect on girls' mathematical scores. Finally, Juntos was also associated with increases in parental investments in the households where the index child was a boy, which had a positive but rather small effect on vocabulary test scores.

Discussion:

We found that, when statistical mediation is considered, the impact of the programme on nutritional outcomes leads to statistically significant effects on child cognition. Further, increases in cognition-enhancing inputs, such as time at school, time studying at home and parental investments, were not sufficient to significantly boost children's cognition.

2.5 Association between Air Pollution and Hospital Admissions for Mental Disorders in Beijing,China

PRESENTER: **Jiawei Zhang**, Peking University
AUTHORS: Zhihu Xu, Peien Han, Li Yang

Background: Mental disorder is one of the leading causes of worldwide Disability-Adjusted Life Years (DALYS) and brings a heavy burden of disease. The state of one's mind can be influenced by a variety of factors, including genetic, lifestyle, socio-economic and environmental factors. Previous studies have shown that air pollution affects the prevalence and hospitalization rates for cardiovascular and respiratory diseases. The relationship between air pollution and mental disorder has attracted attention recently.

Objectives: This study quantified the relationship between air pollution and hospital admissions for mental disorders in Beijing at the individual level with large sample size, to provide evidence for the prevention and control of mental disorders.

Methods: We conducted a time-stratified case-crossover analysis on 44,371 inpatients with mental disorders from 185 hospitals between January 1st, 2016 and December 31st, 2019, comprising the vast majority of inpatients in Beijing. These records contained basic information, such as gender, age, address, date of admission, Chinese inpatient diagnosis and corresponding international disease classification, version 10 (ICD-10) code and expense information. The daily pollutant concentration and meteorological data were obtained from monitoring stations throughout Beijing. Pollutants included SO_2 ($\mu g/m^3$), PM_{10} ($\mu g/m^3$), $PM_{2.5}$ ($\mu g/m^3$), carbon monoxide (CO; mg/m^3) ozone (O_3; $\mu g/m^3$) and nitrogen dioxide (NO_2; $\mu g/m^3$). Meteorological data included relative humidity (%), mean temperature (°C). All analyses were performed in R software(version 4.2.0) using 2-sided tests with an α of 0.05.

Results: The effects of air pollution on hospital admissions for mental disorders were examined in single pollutant models by matching the patient's address with the pollutant data of the nearest monitoring station. Per 10 $\mu g/m^3$ increase in $PM_{2.5}$ and NO_2 on the day of admission corresponded with a 0.48% (95%CI: 0.25–0.71%) and 1.63% (95%CI: 1.07–2.19%) increase in mental disorder admissions, respectively. Per 1 mg/m^3 increase in concentration of CO corresponded with a 3.47% (95% CI: 1.71–5.26%) increase in mental disorder admissions on the day of admission. Mental disorder hospitalizations were significantly increased by 2.05% (95%CI: 0.41–3.72%) per 10 $\mu g/m^3$ increase in SO_2 on lag day 7. PM_{10} concentration was not associated with hospital admissions for mental disorders, suggesting they have no or limited role. Delayed effects of $PM_{2.5}$, NO_2 and CO were significantly associated with mental disorder admissions on multiday lag (lag01and lag02), with the largest effect observed on lag01.

Conclusions: The study demonstrated immediate and robust associations of exposures to air pollution with a higher risk of hospital admissions for mental disorders. The associations were statistically significant for CO, SO_2, NO_2 and $PM_{2.5}$. The risks were generally the strongest in the first day of exposure, attenuated thereafter, and became statistically nonsignificant two days later. Beijing passed air pollution prevention regulations in 2014, with an emphasis on reducing the concentration of fine particulate matter. In recent years, the concentration of fine particulate matter has reduced dramatically, however the impact of environmental gaseous pollutants on the environment remains severe. Beijing must establish a multidimensional, long-term air pollution control strategy in order to protect public health and reduce medical expenses.

2.6 The 'Mediation Effect' of Midlife Cognitive Ability on the Health Return of Educational Decisions

PRESENTER: **Zuoqi Zhang**, University of York
AUTHORS: Andrew Jones, Nigel Rice

Recent literature has shown that early cognitive ability influences the education-health nexus due to the 'selection effect'. In this paper, we investigate whether midlife cognitive ability has a 'mediation effect' in the correlation between three educational decisions and midlife outcomes (weekly income and health) after controlling early cognitive abilities, with data from the British Cohort Study 1970. By adopting a generalised structural equation model (gsem), we construct measurement models to measure latent cognitive abilities, and physical and mental health indicators through several related measures separately. Our results show that people with an undergraduate degree have 0.146 standard deviations higher midlife cognitive ability than those who only completed post-compulsory schooling, while people with a postgraduate degree have 0.182 standard deviations higher midlife cognitive ability than those with an undergraduate degree, which suggests a positive 'treatment effect' of educational decisions on midlife cognition. Next, for two higher educational decisions, we find that the causal effect of education on health is fully mediated by midlife cognitive ability, while the mediation effect of midlife cognitive ability only accounts for about 4% of the total effect of income return to education. There exists a significant 'mediation effect' of midlife cognitive ability on the correlation between two higher education decisions and midlife outcomes. Additionally, both pre-school and post-compulsory school cognitive abilities have a positive selection effect on sequential educational decisions. After decomposing, we find that the selection effect of post-compulsory school cognitive ability accounts for about 30% of the mediation effect of midlife cognition and about 30% of the total effect of educational decisions on midlife income. We suggest that policymakers should pay more attention to cognitive development and its associated determinants to better improve people's achievement in adulthood. Consistent with the existing literature, we do not find a direct causal effect of education on health.

2.7 Socioeconomic Inequalities in the Place of Death Among Europeans Aged 50+

PRESENTER: **Óscar Lourenço**, CeBER/University of Coimbra
AUTHOR: Silvia Portugal

Introduction:

The place of death is considered as an indicator of quality of the end of life and may have consequences for the organization of end-of-life care. Studies analyzing the preferences of the patients regarding the place of death usually find that dying at home ranks high on patients' preferences. However, the place of death may not always correspond to patients' preferences and wishes and socio-economic status (SES)

may play a role. Unfortunately, little is known about the effect of individuals' economic status on the place of death, therefore, the purpose of the current research is to explore the existence of socio-economic related inequalities on the place of death for a cohort of Europeans aged 50+.

Methods:

We use data taken from the waves 6 and 7 of the Survey of Health and Retirement in Europe (SHARE). The end-of-life module of SHARE contains information on respondent's last year of life and the circumstance of death, place of death, etc.. To measure SES, we use quintiles of individual's equivalent income, level of education and the inexistence of assets at the moment of death. In total, and after deleting from the dataset those individuals who dyed due to an accident, the data includes 6.854 observations. The place of death (home, hospital, nursing/residential home, hospice and others) is an unordered nominal variable, hence to study inequalities between place of death and SES we regress place of death on several independent variables, including the SES indicators, using a Multinomial Logit (ML) specification. Results and conclusions are based on relative-risk ratios (rrr) relative the house alternative.

Results:

Italy (50%) and Greece (49%) have the highest proportion of individuals that dye at home, while Luxemburg presents the lowest value (13%). Regarding death at the hospital, Portugal (61%) and Czech Republic (62%) are the countries with the highest prevalence, whereas Denmark (40%) and Estonia (40%) are the countries where is less likely to die at the hospital. The analysis of the rrr show those in the lowest quintile present a lower probability of dying at the hospital, compared to home. Education does not play any role. Those in the highest income quintiles and better educated present a higher probability dying at nursing/residential home, compared to home. Hospice death is a phenomenon more common among better educated.

Discussion:

The results evidence the existence of socio-economic inequalities in the place of death. We can hypothesize that the more educated are able to plan the place death in advance, either at the nursing/residential home as well as at the hospice. End-of-life policies should be developed to help individuals to plan the place of death according their preferences.

2.8 Cardiovascular Diseases and Ageing in India: A Propensity Score Matching Analysis of the Effects of Various Risk Factors

PRESENTER: **Gayathri B**, Indian Institute of Technology, Mandi
AUTHORS: Sujata Sujata, Ramna Thakur

Background: Cardiovascular diseases (CVDs) are one of the major causes of mortality and morbidity worldwide, with a significant burden, especially on older adults. Despite the fact that CVDs were once thought only to affect "affluent" countries, age-specific rates of CVDs have decreased in these areas, while they are rapidly growing in many low- and middle-income countries

Aim: This study aims to estimate the exclusive effects of various risk factors of CVDs such as environmental risk factors (indoor air pollution), behavioural risk factors (smoking habit, alcohol consumption, and physical inactivity), physiological risk factors (diabetes, cholesterol, depression and overweight/obesity), and genetic risk factors (family history) among older adults aged 45 years and above in India.

Methods: This study utilized data on 59,073 individuals aged 45 and above from wave 1 (2017-19) of the Longitudinal Ageing Study in India (LASI). Propensity score matching (PSM) is used in this study to estimate the exposure effect of different risk factors mentioned above, as a group and also independently, on CVDs making it easier to isolate the impact of exposure as propensity scores balance the confounders between individuals who are exposed and unexposed. This analysis has been extended to estimate the exposure effect of these risk factors on different components of CVDs, such as hypertension, heart disease, and stroke, separately. Further, balance diagnostics have been carried out to ensure successful matching between exposed and unexposed individuals.

*Results: R*esults indicate that risk factor groups such as environmental (ATT=0.020), behavioural (ATT=0.016), physiological (ATT=0.212), and genetic (ATT=0.088) have a positive and significant impact on CVDs. In the case of independent risk factor effects, diabetes (ATT=0.175) has the highest effect on CVDs, followed by overweight (ATT=0.149), cholesterol (ATT=0.130), family history (ATT=0.088), alcohol consumption (ATT=0.081), and depression (ATT=0.054). In contrast, indoor smoke exposure (ATT=0.020) and physical inactivity (ATT=0.017) have shown minimal effects. Moreover, ATT is positive and significant for all risk factor groups on different components of CVDs except for environmental risk factors on heart diseases. In the case of independent risk factors, results are positive and significant, except for smoking habit and depression on hypertension, indoor smoke exposure and alcohol consumption on heart disease and overweight on stroke.

Conclusion and policy implications: We conclude that physiological risk factors among older adults are more severe than other factors. The main reason for this could be the food patterns that are adopted by the people in India and also the predominant urbanisation. The sedentary lifestyle of people can also be added to this list of reasons. Household environmental risk factors and behavioural risk factors also pose a threat to older adults to some extent. To reduce indoor air pollution and safeguard public health, it is crucial to increase the use of cleaner technology. In addition to medicines, doctors could prescribe regular exercise, mentioning the duration, intensity, frequency, and time with

regular follow-ups. Further, risk awareness programmes associated with alcohol and tobacco use could be an effective method to curb their use which in turn reduces the probability of getting diagnosed with CVD.

2.9 Do Unconditional Cash Transfers Improve Women's Reproductive Health and Reduce the Risk of Child Stunting in Sub-Saharan Africa (SSA)?

PRESENTER: **Barbra Elsa Kiconco**, Medical Research Council /LSHTM & UVRI Research Unit, Uganda

Introduction: Approximately 70% of Africa's population and about 80% of the continent's extremely deprived populations reside in rural areas**.** Cash transfers have emerged as powerful social protection tools, that low- and middle-income countries (LMICs) have adopted as elements of their poverty reduction programs, that can lead to the realization of Sustainable Development Goals (SDGs) 1 and 3. Under these programs, cash is distributed by the state or non-government organizations (NGOs) to vulnerable households as a financial incentive that is expected to address the immediate needs of extreme poverty and improve health. Conditional cash transfer programs (CCTs) disburse cash to poor households on condition that there is a positive change in the health, education, and nutrition of the recipients. Conversely, unconditional cash transfer programs (UCTs) give cash to poor households with no strings attached or any in-kind transfers tied to positive change in household behavior. Currently, UCTs have been adopted by the governments of SSA countries including Malawi, Kenya, Zambia and South Africa as an essential component of social protection. However, these programs only focus on the reduction of food insecurity for those who are extremely poor, and labor constrained with the exclusion of some poor households.

Objective: To assess the association between the Mchinji social cash transfer and women's reproductive health in addition to child stunting in a rural region of Mchinji, Malawi.

Methods: Three logistic regressions were run for this analysis. Data collected in 2008-2009 from phase one of a randomized controlled study by MaiMwana, was used to perform a cross-sectional analysis to achieve this aim. The analyses included a random sample of 2496 women aged 17-43 across 24 zones in Mchinji District. The anthropometrics of their children aged 0-6 were utilized for the stunting model. The three outcomes of interest were: stunted growth in children, use of family planning and the use of either paid or unpaid natural family planning methods by women.

Results: The odds of stunting for a child who belongs to a household that received UCTs are 0.079 lower than for a child who belongs to a household that did not receive UCTs. The p-value associated with the hatsq value from the linktest that was used to check for specification errors was insignificant. (0.83 > 0.05) at a 5% level of significance. The odds of using family planning methods by a woman who belongs to a household that received UCTs are 0.027 lower than for a woman who belongs to a household that did not receive UCTs. The odds of using paid family planning methods by a woman who belongs to a household that received UCTs are 0.128 lower than for a woman who belongs to a household that did not receive UCTs.

Conclusion: UCT programs to households of marginalized communities have the potential to reduce the risk of stunting in children and provide more financial security to women; reducing their engagement in risky transactional sexual activities like prostitution, that increase the incidence of sexually transmitted diseases which lead to poor reproductive health.

2.10 The Impact of Severe Drought on Mental Health and Labour Market Stability in South Africa

PRESENTER: **Cyprian M Mostert**, AGA KHAN University

Objectives: In 2015-2019, South Africa experience the worse drought in three provinces Eastern Cape (EC), Northern Cape (NC), and Western Cape (WC). This study was design to quantify the impact of the 2015-drought on mental health outcomes of these provinces. The paper also quantifies the spill over effects of the 2015-draught on emigration movement and employments outcomes.

Study Design: This was a panel analysis using secondary data issued by Statistic South Africa-Household survey.

Methods: We exploited the changes in the standardised precipitation index in four South African provinces between 2015-2019. We then build credible control and treatment groups based on drought intensity. Individuals who resided in EC, NC and WC were considered the treatment group. These citizens were subjected to both extremely dry weather conditions and severe dry weather conditions. Individuals from Gauteng (GP) were classified as the control group. These citizens did not experience any drought conditions during the period of 2015-2019. We then used a Two-stage Least Squared Model (2SLS) to quantify the impact of the 2015-drought on depression cases, epilepsy cases and trauma cases in these provinces. We also estimate the impact of the 2015 drought on outward emigration and unemployment outcomes.

Results: The model shows that the 2015-drought worsen depression cases by 8.36%, epilepsy cases by 4.12% and trauma cases by 6.22 % in the drought-stricken provinces. More important, the 2015 drought caused a 5.54 % rises in unemployment and 3.43 % increase in outward migration from these affected provinces.

Conclusions: The 2015-drought worsen mental health outcomes and induced instability in the labour market resulting in rises in outward emigration and unemployment. Climate change finance may be required to stabilise both the health and labour market shocks.

2.11 Perceived Unmet Needs in Healthcare As Inequality Indicators: Evidence from South Africa

PRESENTER: **Abieyuwa Ohonba**, University of Johannesburg
AUTHORS: Frederich Kirsten, Bongiwe Mkhize

Background: Perceived unmet needs are subjective differences between the services deemed necessary to address health problems and the services received. In South Africa, unmet healthcare needs are still a significant concern, with accessibility, availability, and acceptability issues affecting those below the poverty line, rurally located individuals, and Africans. While many studies have attempted to further understand the dynamics and possible solutions behind healthcare inequalities, not much information exists on how individuals perceive their unmet healthcare needs and the factors that could drive these perceptions.

Objectives: This study assesses the dynamics behind perceived unmet healthcare needs among South Africans. Understanding the dynamics behind perceived unmet healthcare needs in this study will provide useful information for policymakers on the perceived accessibility, availability, and acceptability barriers.

Method: This paper uses the International Social Survey Programme (ISSP) data from the 2011 Health and Healthcare module. Perceived unmet needs are measured using a question in the ISSP asking individuals about why they are unable to receive medical treatment in 12 months. These reasons are grouped into three main themes: accessibility, availability, and acceptability. For the empirical analysis, logistical regressions assessed the sociodemographic determinants behind perceived unmet healthcare needs among South Africans. In addition, a component index was constructed based on the three main themes, while three separate logistic regressions were also conducted based on each of the three dimensions.

Results: The key findings from the study show that Africans, females, rural dwellers, and those with low education levels reported higher unmet healthcare needs compared to other social groups. Since individuals in these social groups tend to make up the majority of the most vulnerable in society, the results confirm that perceived unmet needs are disproportionally higher for those most vulnerable. Observing the sub-types of unmet needs shows that availability account for most of the unmet needs in South Africa. This indicates that the most relevant reason for individuals to perceive their healthcare needs were unmet was mainly due to the unavailability of appointments. In addition, the treatment needed was unavailable nearby, or the waiting list was too long. Again, those most vulnerable in society have the highest perception of unmet needs due to availability issues. The results also suggest that acceptability and accessibility are relatively lower contributors to the perceived unmet needs among South Africans than availability barriers. Specifically, inadequate time or payment issues were less compelling for healthcare needs than availability barriers.

Conclusion: These findings highlight the disparities between various socioeconomic groups in South Africa. The key policy implication from this study is that policymakers should intensify their efforts in reducing availability barriers like waiting lists and geographic issues for receiving healthcare, especially among those most vulnerable in the society.

2.12 Born to Run: The Socio-Economic Gradient in the Impact of Physical Activity on Health

PRESENTER: **Francesco Salustri**, University College London
AUTHOR: Paolo Candio

Reducing unfair and unjust health inequalities is a primary objective of public health policy. Strong evidence exists for a socio-economic gradient in health in many countries around the world, with those from the most affluent backgrounds expecting to live up to ten years longer and in good health than those from disadvantaged backgrounds. Local governments are often responsible for public health and to address health inequity have funded proportionate universal, population-level actions to promote healthy behaviours, such as physical activity. Examples of these interventions include building cycleways, renovating public parks and offering free access to public leisure centre-based exercise sessions in deprived city areas. Notwithstanding the potential for these interventions to lead to positive distributional intervention effects (that is, reducing physical activity inequality), whether health inequity gaps will be reduced as a result depends on the relative improvements in health by the socio-economic groups impacted by the intervention and how these effects are modelled.

Our research aims to answer to the following questions: 1) How can we model health equity changes as a result of positive distributional intervention effects? And 2) What is the socio-economic gradient that makes lower socio-economic groups relatively less healthy than their counterparts after a successful physical activity intervention?

To this purpose, we develop a theoretical model where individual health status is a function of individual physical activity, relative deprivation of the neighbourhood where they live, and other individual socio-economic characteristics. Then, we classify different public health intervention scenarios aimed at improving physical activity inequality depending on their effect on health inequality. We test this model using a uniquely rich dataset on biomedical information of around half a million adults living in the UK for the period 2012-2019. We exploit the increase of physical activity at individual level as an endogenous treatment and adopt a fixed effects regression on the treated, a two-way fixed effects, and a difference-in-differences approach with multiple time periods.

Our theoretical model shows that a reduction in physical activity inequality does not necessarily lead to a reduction in health inequality. More specifically, while an intervention on physical activity is progressive (i.e., positive distributional effect), the associated consequences for health inequality may be progressive, flat, or regressive. Assumptions regarding the decay in and generalisability of intervention effects showed to play key roles in determining the direction of health equity impacts. The econometric analysis showed that the effect of improving physical activity is statistically significantly different across socio-economic groups. In planning interventions to reduce health inequities, public health policymakers should carefully consider what levels of distributional effects to target to avoid widening the existing health inequities across socio-economic groups.

2.13 Does Care Dependency Grant Improve the Mental Health and Educational Outcomes of Children with Disabilities? Evidence from South Africa

PRESENTER: **Linda Norah Khakali**, Aga Khan University - Brain and Mind Institute

AUTHOR: Cyprian M Mostert

Abstract

Children with disability are prone to have a high incidence of stress and depression. These mental health conditions have adverse effects on children's academic performance. In South Africa, children with disabilities are eligible to receive the government care dependency grant (CDG) designed to improve children's health and well-being. However, not all disabled children can earn the grant due to stringent eligibility requirements. This study is designed to quantify the impact of CDG on mental health outcomes (healthcare utilization, depression & traumatic stress) and educational outcomes (school attendance, ability to read & ability to write) of disabled children-focusing on both the primary (7-13 years) and secondary phases (14-17 years) of education. The authors focused on children from disadvantaged households nationwide and used a Two-stage Least Squared Model (2SLS) to quantify the impact of CDG on mental health outcomes and educational outcomes in these cohorts. Disabled children who earn the CDG were considered the treatment group. Disabled children who did not earn CDG were considered the control group.

The model shows that CDG improved healthcare utilization (by 5% and 2%, respectively) in the primary and secondary school cohorts compared to the control groups. CDG improved depression outcomes (by 4% and 1%, respectively) in both the primary and secondary school cohorts. CDG improved traumatic experiences (by 5% and 1%, respectively) in both the primary and secondary school cohorts.

CDG improved school attendance (by 3%) only in the primary school cohorts. The CDG is not significant in improving school attendance in the secondary school cohorts. CDG improves the ability to read (by 6% and 1%) in primary and secondary school. CDG improves the ability to write (by 7% and 2%) in primary and secondary school. The impact of the CDG was higher in urban regions than in rural regions. The paper also provides evidence that, for primary education children, the effects of CDG are only significant for girls than boys. The intensity of CDG effects in improving education and mental health outcomes fade away as disabled children grow older. Therefore, the authors provide robust evidence that CDG supports disabled children's mental health and education outcomes. The paper also shows the inequities of CDG by highlighting the cohorts that benefit more from the grant.

2.14 Receipt of Social Protection Is Associated with Lower Rates of Sexual and Reproductive Health Risk Practices and Higher Rates of Education Enrolment in Malawi and Zimbabwe: A Cross-Sectional Study Using Nationally Representative Data

PRESENTER: **William Edward Rudgard**, University of Oxford

AUTHORS: Silinganisiwe Dzumundu, Rachel Yates, Elona Toska, Lucas Hertzog, Lucie Cluver

Background. In sub-Saharan Africa, adolescents are the fastest-growing population subgroup. However, poverty and poor access to services remain highly prevalent and powerful drivers of high rates of adolescent sexual and reproductive health (SRH) risk practices including early sexual debut and early pregnancy. Coverage of social protection across sub-Saharan Africa has grown significantly in recent years. Evidence support its role, particularly cash transfers, for improving education enrolment and reducing early sexual debut. However, evidence for the relationship between social protection and early pregnancy remains limited. We used national survey data to evaluate the impact of household receipt of social protection on early sexual debut, early pregnancy, and school drop-out in Malawi and Zimbabwe.

Methods. We used a representative sample of adolescents aged 15-17 years living in urban and rural settings drawn from the 2019 UNICEF Malawi and Zimbabwe Multiple Indicator Cluster Surveys (MICS). The exposure variable was household receipt of social protection, measured as self-reported receipt of social transfers or school support in the last year. We used multivariable logistic regression to evaluate associations between this exposure and three adolescent outcomes: (1) early sexual debut, (2) early pregnancy, (3) out-of-school. Analyses were stratified by sex, and incorporated survey weights. We controlled for adolescent age (in months), education of household head, urban/rural residence, wealth quintile, and country. Early sexual debut and education enrolment were evaluated in both sexes; and early pregnancy was only evaluated among adolescent girls. We conducted sub-analyses to investigate whether associations between receipt of social protection and study outcomes were modified by household wealth quintile.

Results. The combined sample size was 4,481 adolescents (Girls: 51%). In Malawi and Zimbabwe, 57% and 51% of adolescents received social protection in the last year, respectively. Across the two countries, the prevalence of (1) early sexual debut was 24% among girls, and 14% among boys; (2) early pregnancy was 7% among girls; and (3) out-of-education was 27% among girls, and 26% among boys, respectively. Among girls, social protection was significantly associated with lower odds of early sexual debut (adjusted odds ratio [aOR]=0.43, 95%CIs=0.31-0.59), early pregnancy (aOR=0.40, 95%CIs=0.25-0.64), and out-of-school (aOR=0.25, 95%CIs=0.18-0.35). We found that the association between social protection and girls' education enrolment was moderated by household wealth (p=0.001), with significantly stronger associations observed among poorer households compared to richer households. Among boys, social protection was significantly associated with lower odds of out-of-school (aOR=0.25, 95%CIs=0.14-0.44). We found no evidence that social protection was associated with early sexual debut, or that associations between social protection and boy's early sexual debut or education enrolment were moderated by household wealth.

Conclusion. Investments in social protection are likely to have significant benefits for reducing sexual risk behaviours among older adolescent girls, while simultaneously promoting education enrolment among both sexes in Malawi and Zimbabwe. Among girls, the benefits of social protection are likely to be strongest in the poorest households. These findings highlight the value of addressing the broader social and economic conditions in adolescents' lives for simultaneously improving health and education.

2.15 Assessing Change in Household-Decision Making and Partner Economic Reliance Triggered By the COVID-19 Pandemic Among in-Union Women from Kenya

PRESENTER: **Carolina Cardona**, Johns Hopkins University
AUTHORS: Elizabeth Gummerson, Philip Anglewicz

Background

Women's empowerment is linked to a range of development goals, including maternal health, children's education, and children's health and nutrition. Negative shocks, like conflict, loss of economic productivity, and recessions, can reduce women's bargaining power within the household. As such, there is a risk that the COVID-19 pandemic has reversed recent gains. In this research, we measure change in women's household-decision making and partner economic reliance in Kenya due to COVID-19, and identify characteristics associated with this change.

Data

We used longitudinal data from 3,870 in-union women of reproductive age collected by the Performance Monitoring for Action (PMA) project in Kenya. Wave 1 was collected in November 2019, before the pandemic, and two follow-up rounds (Waves 2 and 3) were collected in June and November 2020.

Methods

At all survey rounds, women were asked to report who makes decisions for daily needs; responses were that they were sole decision-makers, shared the decisions with their partners, or their partners or someone else decided. A woman was defined to be in power if she made the decisions or shared them with her partner, and she was not in power if her partner or someone else made these decisions without her participation. We constructed indicator variables that equaled one if a woman was in power at both interviews in each segment (Wave 1-2 and Wave 1-3) and zero otherwise. For our second outcome, women were asked at Wave 2 whether they were economically reliant on their partner, if so, whether it increased due to COVID-19. We constructed an indicator variable that equaled one if a woman reported an increase in partner economic reliance.

We estimated a set of probit regression models to assess the association of COVID-19 behaviors and beliefs on changes in household decision-making and partner economic reliance. These regressions controlled for socioeconomic and demographic characteristics—such as urban region, parity, age, and education—and women's economic empowerment reported at baseline. We implemented inverse propensity weight to handle attrition.

Main Findings

Between November 2019 and June 2020, 38.8% of in-union women stopped participating in household decisions to purchase daily needs. This proportion was lower between November 2019 and November 2020, 28.0%. Women who would not report a positive COVID-19 case were more likely to maintain power—a 5.0 percent-point difference—and women able to avoid contact with people outside their household had a 4.4 percent-point lower probability of maintaining power.

For our second outcome, 49.3% of in-union women increased their economic reliance on their partner between November 2019 and June 2020. Women able to avoid contact with people outside their household were more likely to increase partner economic reliance—an 8.7 percent-point increase. Experiencing household income loss since COVID-19 restrictions began was associated with a higher likelihood of increasing partner economic reliance—an 8.4 percent-point and 11.1 percent-point increase for complete and partial income loss, respectively.

Working and participating in household decisions—such as large purchases, medical treatment, and buying clothes—prior to the pandemic acted as mitigators for both outcomes.

2.16 Maternal Education and Empowerment, and Its Impact on Vaccination Outcomes

PRESENTER: **Gatien de Broucker**, Johns Hopkins University
AUTHORS: Madhu Gupta, Anita Shet, Elizabeth Ekirapa Kiracho, Anthony Ssebagereka, Rornald Kananura, Joshua Mak, Salin Sriudomporn, Deborah Odihi, Bryan Patenaude
Background

Governments and multilateral organizations – Gavi, UNICEF – can catalyze the allocation of ample vaccine supply in a timely manner to ensure adequate vaccine coverage. However, deficits in equitable coverage will not be resolved by targeting supply-side constraints. Financial, social, and geographic barriers to access limit vaccine uptake and constrain vaccination demand. The mother's educational

achievement is a known factor influencing vaccination status. Yet, little is known on how much maternal education contributes to childhood immunization, whether this contribution is collinear to socioeconomic status, and how lower educational achievements compound with other disadvantages to restrict pediatric visits and vaccine uptake.

Methods

The Vaccine Economics Research for Sustainability and Equity (VERSE) Equity Toolkit produces a composite equity metric that accounts for maternal education level along with wealth (socioeconomic status) and several other known determinants of coverage. We applied it to all available DHS (2000-2022) for 53 countries. We estimated and compared the influence of maternal education over the years, controlling for key demand- and supply-side constraints (socioeconomic status, region, rural residence, health insurance, and the sex of the child), for two vaccines and one vaccination status: diphtheria-tetanus-pertussis and the measles vaccines (first dose), and being fully immunized for age. We follow-up with an in-depth literature review for two countries – India and Uganda – to discuss how inequity in coverage evolved over time to give maternal education a dominant role in vaccine uptake.

Results

Maternal education has a dominant influence on vaccination status in many low- and middle-income countries. However, this influence differed in scale and by vaccination outcome. Overall, maternal education level explained 0% to 56% of the variation in full-immunization, DTP1 and measles coverage. Maternal education is the dominant driver of inequity for 43% and 26% of countries for DTP1 and full immunization, respectively. Wealth is the dominant factor for 40% and 38% of countries, followed by region of residence for 6% and 21%. Results for measles will be updated shortly.

Conclusion

Understanding and quantifying the influence of maternal education on vaccination coverage is a conducive and necessary part of a concerted effort to promote education, reduce the adverse impact of illiteracy, and improve access to healthcare services such as vaccination.

3:00 PM –3:30 PM   TUESDAY   [Health Beyond Health Care Services: Health Behaviors]

Cape Town International Convention Centre | CTICC 1 – Jasminum conservatory
POSTERS: Field 3. Health Beyond Health Care Services: Health Behaviors

3.1 Impact of Medical Insurance Integration on Urban-Rural Health Disparity: Evidence from China
PRESENTER: **Yingqian Tang**, Waseda University

Health disparity among different groups has been a subject with considerable disclosure for both developed and developing countries. Health inequalities are usually socially-produced from unequal distribution of resources and could have negative social externalities. As the biggest developing country in the world, China suffers from severe urban-rural disparities in terms of healthcare services and health status. In order to reduce inequality between urban and rural areas and to improve sustainability and efficiency of the medical insurance program, the Chinese government integrated the medical insurance schemes for urban and rural residents into one single program in 2015. With China Health and Retirement Longitudinal Study (CHARLS), we explored the impact of this integration on health outcomes and the health disparity of urban and rural residents with a triple difference approach. We found that both urban and rural residents benefited from the medical insurance reform and have better health outcomes. Urban residents have better self-reported health while rural residents have improved health in terms of both self-reported health and ADL difficulties but there is no significant impact on the health disparity at the current stage. The impact is wider and more significant on rural residents with a lower socioeconomic status. In addition, we found a larger impact on the less developed regions. Health status improved for both urban and rural residents in these less developed provinces but the urban-rural health disparities in terms of self-reported health and number of ADL difficulties also widened, which indicates the need for further attention to resource allocation.

3.2 An Exploration of Drivers of COVID-19 Vaccine Hesitancy in Kenya
PRESENTER: **Stacey Orangi**, Kemri-Wellcome Trust Research Programme
AUTHORS: Daniel Waweru Mbuthia, Edwine Barasa

Background: COVID-19 vaccination rates have been low among adults in Kenya (36% as of early November 2022) with vaccine hesitancy posing a threat to the COVID-19 vaccination program. This study sought to examine public attitudes and behavioral influences towards COVID-19 vaccine hesitancy.

Methods: We conducted a qualitative cross-sectional study in two purposively selected counties in Kenya. We collected data through 8 focus group discussions with 80 community members and in-depth interviews (n=8) with health care managers and providers. The data was analyzed using a framework approach focusing on determinants of vaccine hesitancy and their influence on psychological constructs.

Results: Reported perceived barriers to COVID-19 vaccine uptake were influenced by individual characteristics (males, younger age, perceived health status, religion, and belief in herbal medicine), contextual influences (the lack of autonomy among women in decision making and cultural beliefs-more predominant in rural settings, lifting of bans, myths), medical mistrust (towards the government and

pharmaceutical companies) and COVID-19 vaccine related factors (fear of unknown consequences, side-effects after first dose, and the lack of understanding of the rationale and number of boosters). These drivers of vaccine hesitancy mainly related to psychological constructs including confidence, complacency and constraints. Respondents also reported strategies that would promote COVID-19 vaccine uptake including their trusted information sources (community health workers and community leaders), preferred messaging content (e.g. transparency on long-term side effects and clarity on number of boosters), preferred delivery strategies (mixed approach, including door-to-door campaigns).

Conclusions: Vaccine hesitancy in Kenya is driven by multiple and interconnected factors. These factors are likely to inform targeted strategies to address vaccine hesitancy. These strategies could include transparent and consistent communication that target fear, misconceptions and information gaps as well as increased individual sensitization through community health workers and community leaders.

3.3 The Effect of Opioid Use on Sick Leave Among Patients with Osteoarthritis, Undergoing Joint Replacement: A Propensity Score Adjustment Approach

PRESENTER: **Johan Liseth Hansen**, University of Oslo
AUTHORS: Thomas Fast, Knut Reidar Wangen

Objectives: Our aim was to describe the association of opioid use to sick leave and healthcare resource use among different groups of patients with low back pain (LBP).

Methods: This was a non-interventional observational study using the Swedish Patient, Prescription Drug and sick leave registers, linked on the individual level. Patients with LBP was included at the first LBP diagnosis in Swedish specialty care between 2011 and 2014, and aged between 18 and 65 at diagnosis. Opioid use was defined as the sum of daily doses of oral morphine equivalents (OMEQ) per month during the two 12 month periods preceding and following diagnosis (trajectory periods). Groups with distinct patterns of opioid use were identified during the two trajectory periods applying a group-based trajectory model (GBTM). The GBTM models with four groups were chosen as the prevailing models to identify distinct patterns in each trajectory period. Opioid use, sick leaves and healthcare resource use was studied for each of the distinct groups in the three years prior to and after diagnosis.

Results:

In total, 137,880 patients were included. The mean age at diagnosis was 45 years of age and 49% were male. The GBTM with the lowest BIC scores for both trajectory periods were the models with six distinct groups, but we chose to continue with the models with four groups for better qualitative intrepretation.

Pre-diagnosis opioid use trajectories could be described as 'Pre - high' (n=9,994, mean age = 48, 43% males), 'Pre - decrease' (n=9,077, mean age = 45, 44% males), 'Pre - increase' (n=16,273, mean age = 46, 49% males) and 'Pre - low' (n=102,536, mean age = 45, 50% males). Similarly, groups post-diagnosis could be described as 'Post - high' (n=13,058, mean age = 47, 45% males), 'Post - moderate' (n=18,884, mean age = 46, 46% males), 'Post - decrease' (n=36,646, mean age = 44, 53% males) and 'Post - low' (n=68,270, mean age = 45, 48% males). The patients in both 'High' groups had lower educational levels and incomes compared to patients in the other groups, and substantially higher sick leaves also outside the trajectory periods.

Conclusions:

Our results show that the association between long-term high use of opioids is associated with higher healthcare resource use and sick leaves, and lower socioeconomic status. Low back pain and other pain diagnoses in general, affect many patients and the results from this study show that it is a heterogeneous patient group in terms of opioid use, healthcare resource use, sick leave and socioeconomic status.

3.4 Synthesising the Economic Evidence on Food System Interventions to Aid Policy Making

PRESENTER: **Irina Pokhilenko**, Maastricht University
AUTHORS: Lin Fu, Richard Smith, Thijs Van Rens, Emma Frew

There is an established relationship between dietary behaviours and health outcomes and evidence shows that with the increasing dominance of ultra-processed foods that are energy-dense, fatty, sugary and salty, this is leading to an increase in obesity and diet-related illnesses. The food system is complex with interconnected links between food production, manufacturing, and transportation, all interwoven with contextual factors such as the economics, governance, sociology, and culture of the whole system. This complex system makes it challenging for policy makers to identify 'effective' interventions that will lead to improvements in population health. This study was a 'review of reviews' with the aim of synthesising the published economics evidence for food system interventions. Specifically, the review was designed to identify the characteristics of the interventions being evaluated; the analytical tools used; the costs and health outcomes measured and modelled; and to identify the evidence gaps. The overall aim was to guide future research and policy implementation.

The review is ongoing and will be completed for presentation in July 2023. Seven databases have been systematically searched: MEDLINE (Ovid); EMBASE (Ovid); CINAHL Plus; EconLit; PsycINFO; Cochrane Library; and Centre for Reviews and Dissemination. Systematic reviews of food system interventions have been included if they focused on (i) interventions targeting whole population; (ii) had an 'economics focus' including methods such as economic evaluations, interrupted time series analysis, macro-economic analysis, and econometric analysis; (iii) high-income countries; (iv) included health-related outcomes; (v) published between 2012-2022; and (vi)

published in English language. Two researchers have independently screened the titles and abstracts of 672 reviews and included 69 for full-text screening.

The study selection process will be summarised using a PRISMA diagram. The data extracted will be analysed using a narrative synthesis approach. Detail on the number of reviews and if possible, the number of relevant primary studies within the reviews will be reported. Where possible, the evidence will be grouped by sector (agriculture, retail, manufacturer, and marketing) and categorised according to whether the interventions are targeting the demand or the supply of food. The quality of the included reviews will be assessed using the AMSTAR 2 tool.

Overall, the review will evaluate the type, strength and diversity of economics evidence for the health effects of food system interventions. The review will determine if economics evidence tends to cluster around particular intervention 'types' or parts of the food system, how costs and health effects are being captured and over what time horizon, if, and how inequalities are incorporated, and determining where in the food system the strength of economics evidence lies to guide policy implementation.

3.5 Impact of Supplementary Private Health Insurance on Preventive Health Behaviors: Evidence from Chinese Middle-Aged and Elderly Adults

PRESENTER: **Danlei Chen**, Xi'an Jiaotong University
AUTHORS: Jingxian Wu, Cong Li

Background:

Private health insurance (PHI) is considered as an essential supplement to the basic social health Insurance (SHI) schemes in China's multi-tiered healthcare system. However, whether the strategy of purchasing PHI as supplementary coverage is effective in protecting population health cannot be determined without identifying the impact of PHI on enrollees' individual preventive efforts, the evidence on which is currently absent in China. In this study, we aimed to explore the influence of having PHI on the preventive health behaviors among Chinese middle-aged and elderly adults, providing such evidence in the Chinese setting.

Methods:

We conducted a cross-sectional analysis using data collected from the 2018 wave of China Health and Retirement Longitudinal Study (CHARLS), a nationally representative sample of Chinese middle-aged and elderly population. A total of 15002 respondents were included in our analysis. Preventive health behaviors consisted of risky (i.e., smoking and excessive alcohol ingestion) and beneficial health behaviors (i.e., active physical exercise participation) at individual level. Using probit and bivariate probit (BVP) with an instrumental variable (IV), we evaluated the effect of supplementary PHI on these preventive health behaviors with respondents' demographic and socioeconomic characteristics controlled.

Results:

As for risky health behaviors, having PHI was associated with a 0.0337 (SE=0.0165, $p<0.05$) lower probability of smoking using probit estimate and a 0.0097 (SE=0.0042, $p<0.05$)lower probability using the BVP estimate. With the receipt of PHI, the probability of excessive alcohol ingestion increased by 0.0320 (SE = 0.0126, $p<0.05$) and 0.0046 (SE=0.007, $p<0.001$) as estimated using probit and BVP models, respectively. As for beneficial health behavior, engaging in PHI was related to a significant higher probability of participating active physical exercise as the estimated increased probabilities were 0.0338 (SE=0.0078, $p<0.001$) and 0.0026 (SE=0.0003, $p<0.001$) based on the probit and BVP models, respectively. The results on the subsamples grouped by socioeconomic status further demonstrated that respondents living in rural areas, having lower income/wealth and educational level were more likely to ingest excessive alcohol and less likely to do physical exercise actively with the purchase of PHI. However, the respondents living in urban areas, having higher income/wealth and educational level presented a lower tendency to smoke and a higher probability in participating active physical exercise after enrolling in PHI.

Conclusion:

Our analyses demonstrated that having supplementary PHI was associated with significant increases in the probabilities of excessive alcohol ingestion and active physical exercise among middle-aged and elderly Chinese adults. Such paradoxical finding was drawn given that the effects of PHI on the preventive health behaviors of people with different economic levels differed: having PHI enhanced people with lower socioeconomic levels to take risky health behaviors while inspired people with higher socioeconomic levels to engage in beneficial health behavior. We suggest that preferential measures should be taken on people with poor socioeconomic status to improve their health literacy and encourage individual preventive efforts with the expansion of PHI in China.

3.6 The Relationship between Different School Closure Policies and Risky Health Behaviors Among Adolescents in Korea during the COVID-19 Pandemic

PRESENTER: **Anna Choi**, Sejong University

During the recent COVID-19 pandemic, many students were not able to attend school in-person or experienced uncertainty with respect to school openings. A review of studies from different countries indicate that short-term school closures during early 2020 was negatively associated with adverse mental and physical health outcomes among children and adolescents (Viner et al., 2022).

In this paper, I examine the relationship between different rules on school openings (by grade levels and metropolitan areas) and adolescent health behaviors in Korea before and during the pandemic. In March of 2020, all students went through the same school closure in Korea with a delay in semester starting date. Thereafter, some students could go to school in-person depending on the grade and whether or not you were going to school in a metropolitan area near Seoul. During the pandemic, students in the last year of high school spent more days in schools than middle school students did on average. Particularly, high school students in metropolitan area (not near Seoul) were able to attend schools for longer than other students in Seoul metropolitan area.

I exploit this plausibly exogenous variation in school attendance during the pandemic and investigate the impact on adolescent risky health behaviors such as drinking, smoking cigarettes and e-cigarettes (initiation and intensity), and suicide ideation and attempts using two different data sets, the KYPS(Korea Youth Panel Survey data) and KYRBS (Korea Youth Risk Behavior Web-based Survey) from 2018 to 2021. KYPS is a panel data set that follows two cohorts of approximately 2,500 students in 4th grade and 7th grade each year from 2018 to 2021. KYRBS is a repeated cross-sectional survey that is conducted online where students answer detailed questions on their health and health behaviors (approximately 55,000 students per year).

I estimate a difference-in-difference analysis using an indicator variable for the pandemic (2020 and 2021) and whether or not you lived in a metropolitan area near Seoul. Results using the KYRBS data show that after controlling for individual characteristics and year fixed effects, students who were going to school in Seoul and Gyunggi province near Seoul were significantly less likely to initiate smoking (cigarettes and e-cigarettes, Heat-not-burn products), drinking alcohol, or contemplating or attempting suicide. However, high school students in Seoul metropolitan area were significantly more likely to report experiencing high stress during the pandemic compared to high school students who spent more days at school. I plan to compare the results from the panel data (KYPS) where I can observe students behavior before and during the pandemic period.

Possibly, because students in Seoul Metropolitan area spent less days in school with their peers compared to those in other Metropolitan areas during the pandemic, potential peer effect on risky health behaviors during this period could be lower than a typical school year. Even though some attended school in-person, having strict guidelines for wearing masks at all times could reduce opportunities and exposure to risky health behaviors when interacting with their peers at school.

3.7 Assessing NHIF Members' Level of Understanding, Experiences, and Factors Influencing Their Choice of NHIF-Contracted Outpatient Facilities in Kenya

PRESENTER: **Jacob Kazungu**, KEMRI Wellcome Trust Research Programme
AUTHORS: Justice Nonvignon, Matthew Quaife, Edwine Barasa

Abstract

Background: Kenya has made a commitment to achieve universal health coverage (UHC) by 2030 and has initiated reforms to the National Hospital Insurance Fund (NHIF) to accelerate progress towards achieving this goal. Key to the reforms was to increase the health benefits package by introducing the outpatient cover in 2015 before which, the NHIF only included inpatient cover. The introduction of the outpatient cover also allowed NHIF members to choose an outpatient facility of their choice with an option to change every quarter (three months). However, no study has examined NHIF members' level of understanding of the outpatient facility selection process and most importantly the factors that influence the choice of a facility. Understanding these factors can support NHIF's contractual arrangements with a focus on including valued factors when contracting healthcare providers.

Objective: To assess NHIF members' level of understanding, experiences, and factors influencing their choice of NHIF-contracted outpatient facilities in Kenya.

Methods: We conducted a cross-sectional qualitative study with NHIF members in two purposefully selected counties – Nyeri and Makueni counties - in Kenya. We collected data through focus group discussions (n=15) with NHIF members. Data was analyzed following a framework analysis approach.

Results: NHIF members from urban areas had a good understanding of the NHIF-contracted outpatient facility selection process and the approaches for choosing and changing providers, unlike their rural counterparts. While NHIF members were required to choose a provider before accessing care, the number of available alternative facilities were perceived to be inadequate. Finally, NHIF members expressed seven factors or attributes they considered important when choosing an NHIF-contracted outpatient provider. Of these attributes, the availability of drugs, distance from the household to the facility and waiting time at the facility until consultation were the most important.

Conclusion: There is a different level of awareness about the facility selection process among NHIF members with a bias towards members living in urban areas. NHIF members revealed seven key attributes that they prioritise when selecting an outpatient health provider in Kenya.

3.8 A Worldwide Ecological Perspective on LGBTI Well-Being: The Role of Homophobia

PRESENTER: **Vincent Leo Leroy, PhD student**, Aix-Marseille University
AUTHORS: Erik Lamontagne, Sylvie Boyer, Bruno Ventelou

Background: Well-being is known to be a determinant of several preventive attitudes that play a role in health and HIV prevention and treatment adherence. Little is known about the economic vulnerability and the well-being of the lesbian, gay, bisexual, transgender and other

sexual and gender minority people (LGBTI) in low- and middle-income countries. This study aimed to fill this gap by assessing the well-being of LGBTI community members worldwide.

Methods: We used data from the Global LGBTI Happiness online survey conducted among 115,000 participants in 195 countries from May 2019 to January 2020. We studied the relationship between the well-being of individuals and different levels of homophobic climate. We applied a socioecological approach to identify three levels of homophobic reactions: family, community, and national. Well-being was assessed using the Cantril ladder of life satisfaction. Self-reported economic hardship was measured by one's capacity to make a living with present income, per tercile. We controlled with well-established socioeconomic variables both at individual and country levels. We developed a multilevel model approach to investigate the correlation between well-being and the different dimensions of homophobia and stratified by income levels to control for economic heterogeneity. In addition, we performed a dominance analysis to assess the relative weight of the three levels of homophobia on well-being.

Results: We obtained a complete map of LGBTI happiness worldwide. We validated the relationship between homophobic climate contexts and LGBTI well-being. We also obtain that the impact of homophobia on well-being is heterogeneous across SES status, with a clear result that the poor are more to register losses in happiness from their contextual homophobia. Coefficients are going from -1.453 (rich), -1.255 (intermediate) to -0.724 (poor), with a p-value<0.01. Among the three levels of homophobia, dominance analysis revealed that homophobia at the family level is the strongest predictor (71%), followed by national (15%) and community (14%) levels.

Conclusions: Our results highlighted the negative and consistent importance of heterosexist stigma and discrimination -or homophobia- on the well-being of sexual and gender minorities. It also emphasised the compounding role of socioeconomic inequalities and homophobia on well-being. Considering the empirical association between well-being and preventive health behaviour, decision-makers need to urgently address the institutional and social homophobia that hamper diversity in public health programmes.

3.9 Impact of Legislation on Alcohol Harmful Consumption in Colombia

PRESENTER: **Nicolas Guzman-Tordecilla**, Nicolas Guzman
AUTHORS: Andres Vecino-Ortiz, Blanca Llorente

Impact of legislation on alcohol harmful consumption in Colombia

Introduction and objective:

Harmful alcohol consumption is one of Colombia's main risk factors for non-communicable diseases. It is also highly related to negative social consequences such as interpersonal violence, drink driving, and disruptive consumption (such as low academic performance, dropouts, and productivity losses). These effects are also strongly associated with health outcomes.

One intervention to face the alcohol consumption problem is fiscal policies. Taxation has the potential to be an effective policy tool to reduce harmful consumption. Starting on January 1st, 2011, the government of Colombia changed the structure of alcohol taxes to increase revenues. For every milliliter of alcoholic beverages with alcohol concentrations up to 35%, 0.051 USD was charged. In contrast, alcoholic beverages higher than 35% were charged 0.084 USD per milliliter. Finally, a Value-Added Tax was implemented for beer beverages at 14%.

While most studies have shown that excise taxes contribute to reducing alcohol consumption in the general population or in specific segments of the distribution of the spectrum of consumption, little is known about the effect of this intervention on the actual harmful behavior at a population level in lower and middle-income countries.

This study aims to evaluate the changes in the prevalence and harmful consumption of alcohol before and after a fiscal policy carried out in 2011 in Colombia. We also assess the effect of the tax on alcohol consumption across socioeconomic status as a proxy for the purchasing power for alcoholic beverages.

Methods:

We used nationally representative cross-sectional data collected in 2008 (29,164) and 2013 (32,605) from the National Survey of Consumption of Psychoactive Substances. Propensity score matching was used to compare individuals across surveys. We obtained the propensity scores from key socio-demographic variables and by matching them through a 'Kernel' estimation. Matching quality tests were performed as well. The outcome variables were alcohol prevalence (Beverages above 35% alcohol, beverages up 35% alcohol, and beer consumption), incidence, disruptive consumption, and alcohol-related injury.

Results:

We found that the consumption of beverages above 35% alcohol decreased by 14% points, whereas beverages up to 35% alcohol and beer consumption increased during the evaluation period. Finally, we identified that disruptive alcohol consumption, alcohol incidence, and alcohol-related injury decreased.

Discussion:

Results suggest that the changes in the alcohol taxes structure in Colombia reduced the prevalence and disruptive alcohol consumption. This is the first study in Latin America that assess the actual impact of a change in tax structure that we are aware of. Policy-makers should find

this data useful to address public health policy in low and middle-income countries as an effective and likely cost-effective approach.

3.10 Weather Shocks and Transactional Sex

PRESENTER: **Henry Cust**, London School of Hygiene & Tropical Medicine (LSHTM)
AUTHORS: Aurelia Lepine, Timothy Powell-Jackson

Background: HIV disproportionately affects young women in low- and middle-income countries with those aged 15-24 twice as likely to be living with HIV than men of the same age. Transactional sex is thought to be one of the key drivers of this disparity and understanding its causes is key in the fight against HIV. Recent literature suggests droughts in the last 10 years explain up to 20% of cross-country variation in HIV prevalence in sub-Saharan Africa. We show transactional sex is a key mechanism by which droughts lead to increased HIV across Africa where climate change is increasing the frequency and severity of drought.

Methods: This paper uses Demographic and Health Survey (DHS) data collected in eight countries since 2015 across sub-Saharan Africa. We study the impact of drought, as a proxy for unanticipated economic shocks, within these countries on transactional sex and sexually transmitted infections. Droughts are constructed using data from the Global Precipitation Climate Centre and University of Delaware monthly precipitation datasets using the Standardised Precipitation Index and percentile methods with drought periods matched to GPS data included in the DHS surveys.

Results: We find respondents in six of eight countries suffered droughts with significant within-country variations in severity and length of the drought. We find that young women (15-25) suffering droughts are approximately twice as likely to engage in transactional sex in the previous 12 months and the last precipitation season compared to those who did not suffer drought in the preceding rainy season. Men of all ages see an equally large increase in engagement in transactional sex following droughts responding to the rise in the supply of transactional sex in the market. We find important differences between countries implying local context, stigma, and the severity and length of drought are essential in the behavioural response on the extensive margin to drought. Mediation analysis shows around 6% of the increase in STIs following drought is due to increases in transactional sex.

Discussion: Transactional sex is a risky behaviour, and whilst improvements have been made in data collection on the topic, particularly in the DHS, it remains a sensitive behaviour subject to social desirability bias. Our primary outcome measure could be more closely capturing commercial sex workers who are more willing to identify as explicitly having sex for money rather than users of transactional sex where the exchange is implicit. The samples chosen to answer transactional sex questions also limit the generalisability of our results.

Conclusion: These results suggest that women experiencing economic shocks due to drought use transactional sex as a coping mechanism, increasing their exposure to HIV in the process since increases in supply are matched by increases in the number of men engaged in transactional sex. This paper helps us to understand the importance of transactional sex as a mechanism from economic shocks to HIV and ways in which to protect those most vulnerable.

3.11 Conditional Cash Transfers in China: Influences on Maternal Health Service Utilization and Maternal Health Belief

PRESENTER: **Min Yu**, Academy of Military Medical Sciences
AUTHOR: Yuxuan Yang

Background: Maternal health is a high priority for global health and promoting health service utilization behavior of pregnant women is critical to improve maternal health. To encourage women's healthy behavior, conditional cash transfer (CCT) projects are implemented in many countries around the world. CCT project is a typical demand side financial incentive project aiming to reward cash that is restricted to be used on children's health and education investment to deprived families. Since 2011, the Government of China and UNICEF have worked together to launch the CCT project for deprived women and children in 15 remote and deprived counties in Yunnan, Gansu, and Sichuan Province. Women who completed pre-set conditions (such as using antenatal care, postnatal care and health education) were rewarded up to 1040-yuan cash. This study aims to assess the influence CCT project made on different maternal health service utilization and CCT participants' health beliefs.

Methods: Survey data (n=996) was collected in Gansu and Yunnan Province, two of the CCT project pilot provinces, by our research team. A multistage, judgment, quota sampling procedure was employed to select the participants of the survey. Trained local health staff formed an interview team to help respondents answer a structured, pre-tested questionnaire based on CCT project details and Health Belief Model. Data collected through interviews were used for descriptive analysis, univariate binary logistic analysis, and Mann-Whitney U test. Participation of CCT project was set as the study variable, while more than 5 antenatal care visits (5+ ANC), more than 8 antenatal care visits (8+ANC), institutional delivery (ID), postnatal visits (PNC), perceived severity (PSE), perceived susceptibility (PSU), perceived barrier (PBA), perceived benefit (PBE), and self-efficacy (SE) were set as outcome variables.

Results: The participation of CCT project increased the chance of higher utilization of 8+ANC (OR: 1.566, 95% CI:1.200-2.044), HE (OR: 12.005, 95% CI: 5.452- 26.434) and PNC (OR: 3.208, 95% CI:1.785-5.767). Participants of CCT projects also had significant higher PBE and PSE, and SE scores, and significantly lower PBE scores.

Discussions: CCT project not only had positive influences on maternal health service utilization, but also improve participants health literacy indirectly. Therefore, such projects are recommended to implement in the future by developing countries with basic medical facilities. However, utilization of health service is also influenced by one's socio-demogrphic characteristics, futhur research should put consideration on socio-demogrphic influencing factors and relate the result to the design on CCT projects.

Keywords: conditional cash transfer, maternal health service utilization, Health Belief Model, antenatal care, institutional delivery, postnatal care

3.12 Optimising the Public Health Benefits of Sex Work Regulation in Senegal: Evidence from a Discrete Choice Experiment and Policy Interviews

PRESENTER: **Sandie Szawlowski**, UCL
AUTHORS: Aurelia Lepine, Fanny Procureur, Carole Treibich, Mylene Lagarde, Pape Alioune Mbaye, Khady Gueye, Cheikh Tidiane Ndour

Background

Senegal is the only African country that regulates sex work. Female sex workers (FSW) must register with police and with a health centre, where files are held for life. Valid registration identification, requiring FSWs to attend monthly sexual health checks, permits FSWs to work legally. Registration of FSWs allows to monitor sexually transmitted infections (STIs) in FSWs and limit spread of HIV/AIDS. However, due to flaws in the current registration policy design, only 20% of FSWs are registered.

Objectives

This study aims to (1) identify registration policy attributes that are attractive or unattractive to FSWs, (2) identify potential policy changes and (3) assess their feasibility in the current socio-political context.

Method

To elicit FSW registration policy preferences, a discrete choice experiment (DCE) was administered to 241 registered and 273 non-registered FSWs. The five key policy attributes (registration file, registration identification, health centre confidentiality, health visit costs, psychological support) presented in the DCE were identified from existing research and four focus groups with registered and non-registered FSWs. DCE data were analysed using conditional logit models. The findings and feasibility of potential policy changes were then discussed in 18 in-depth interviews with the main actors in the registration policy (police, Ministry of Heath, NGOs and sex workers' leaders).

Results

Policy preferences of registered and non-registered FSWs are aligned. According to FSWs, ensuring confidentiality at health centre, replacing the physical registration proof by a QR code, providing psychological support, removing the registration file held by the police and only holding the registration file at the health centre whilst active in sex work would significantly improve the policy. We discussed our DCE findings with relevant policy-makers. While improvements in confidentiality and the provision of psychosocial support service were feasible, replacing the registration identification with a QR code, the removal of police files and the suppression of files held at the health centre would require reform of the law and raised considerable concerns. Given unfavourable social norms toward sex work, a political reform is unlikely to occur any time soon.

Discussion

Several interventions with the potential to increase the registration rate of FSWs and improve their wellbeing can be implemented without overturning the law. Precisely, bettering relationships between FSWs and police officers, improving information, delivering psychosocial counselling in the registration package and integrating mandatory health checks with maternal health services available to all women would increase preferences for registration.

3:00 PM –3:30 PM   TUESDAY   [Social Events]

Cape Town International Convention Centre | CTICC 1 – Clivia, Jasminum & Strelitzia conservatories
Refreshment Break and Poster Viewing

3:00 PM –3:30 PM   TUESDAY   [Health, Its Distribution And Its Valuation]

Cape Town International Convention Centre | CTICC 1 – Jasminum conservatory
POSTERS: Field 1. Health, Its Distribution and Its Valuation

1.1 Monitoring Inequalities in Child Vaccination in Sub-Saharan Africa: Analysis of 25 National Health Surveys

PRESENTER: **Firew Bobo**, Univesity of Technology Sydeny
AUTHORS: Augustine Asante, Mirkuzie Woldie, Angela Dawson, Andrew Hayen
Background: Vaccines have substantially contributed to reducing morbidity and mortality among children, but inequality in coverage continues to persist. In this study, we aimed to examine inequalities in child vaccination coverage in sub-Saharan Africa.

Methods: We analysed Demographic and Health Survey data in 25 sub-Saharan African countries. We defined full vaccination coverage as a child who received one dose of bacille Calmette-Guérin vaccine (BCG), three doses of diphtheria, pertussis, and tetanus vaccine (DTP 3), three oral polio vaccine doses (OPV 3), and one dose of measles vaccine. We used the concentration index (CCI) to measure wealth-related inequality in full vaccination, incomplete vaccination, and zero-dose children within and between countries. We fitted a multilevel regression model to identify predictors of inequality in receipts of full vaccination.

Fundings: Overall, 56.5% (95% CI: 55.7% to 57.3%) of children received full vaccination, 35.1% (34.4% to 35.7%) had incomplete vaccination, while 8.4% (95% CI: 8.0% to 8.8%) of children remained unvaccinated. Full vaccination coverage across the 25 sub-Saharan African countries ranged from 24% in Guinea to 93% in Rwanda. We found pro-rich inequality in full vaccination coverage in 23 countries, except for Gambia and Namibia, where we found pro-poor vaccination coverage. Countries with lower vaccination coverage had higher inequalities suggesting pro-rich coverage, while inequality in unvaccinated children was disproportionately concentrated among disadvantaged subgroups. Four or more antenatal care contracts, childbirth at health facility, improved maternal education, higher household wealth, and frequently listening to the radio increased vaccine uptake.

Interpretation: Continued efforts to improve access to vaccination services are required in sub-Saharan Africa. Improving vaccination coverage and reducing inequalities requires enhancing access to quality services that are accessible, affordable, and acceptable to all. Vaccination programs should target critical social determinants of health and address barriers to better maternal health-seeking behaviour.

1.2 Assessing a Dire Fate. Standard Gamble and Time Trade-Off Utilities for States Worse Than Dead

PRESENTER: **Stefan Lipman**, Erasmus University Rotterdam
AUTHORS: Andrea Pogliano, Jeffrey Chen, Rosalie Duffhues, Michal Jakubczyk

Objective
Health utilities are an important source of input for economic evaluations. In many jurisdictions, the use of EQ-5D instruments is recommended for estimating health utilities. The EQ-5D value sets, which facilitate this estimation, are often constructed from preferences elicited with discrete choice experiment and composite time trade-off (cTTO) methodology. Unfortunately, recent literature identified a set of limitations in the validity of cTTO responses. Specifically, it identified low discriminatory validity for severe health states (also known as worse-than-dead, WTD, in contrast to better-than-dead, BTD). For WTD states, the correlation between their negative utility and severity is poor and as such cTTO may be unable to discriminate between different WTD states. This limitation can have various causes. For example, it may be related to characteristics inherent to the cTTO task (e.g., trading off lifetime), or to the fact that cTTO uses different procedures for eliciting WTD and BTD states. In this study, we investigate two potential solutions to overcome this problem. First, we analysed how variations of the standard gamble (SG) perform for WTD states, to determine if the problem lies with the core characteristics of the cTTO method. Second, we explored whether unified elicitation procedures (i.e., a procedure in which the same method is used for BTD and WTD states) can address this issue, to see if the problem arises from the composite nature of cTTO.

Method
198 individuals completed an online interview facilitated by trained interviewers using Zoom. Each individual valued 6 EQ-5D-5L health states (namely, 22212, 33221, 33333, 55333, 55424 and 43555) in one of four treatment arms. Three arms presented variations of the SG (two composite and one unified one), which differed in the procedure to elicit WTD and BTD states. In the final arm, each state was valued twice, once using standard cTTO and once using lead-time TTO (LT-TTO). LT-TTO presented a unified procedure for BTD and WTD.

Results
Utilities elicited with cTTO are not characterized by a significant and negative correlation with severity for WTD states. The same shortcoming takes place for both composite versions of SG. On the other hand, for both SG and TTO, a unified procedure yields a negative correlation between severity and utility for WTD states. Additionally, LT-TTO increases the number of WTD states and leads to lower utilities compared to the cTTO.

Conclusions
Our results suggest that the absence of discriminatory validity for WTD states may be caused by its' composite nature, i.e. the use of a different procedure for eliciting utilities for WTD and BTD states. Discriminatory validity can be improved by employing a unified method, a result that also extends to variants of SG. For the time trade-off, this means applying LT-TTO to whole spectrum of health states. However, this research shows that using LT-TTO also yields lower utilities and more WTD states. Further research should investigate to what extent this is an artefact of using unified methods or an accurate reflecting of individuals' preferences for health states.

1.3 Anemia Severity and School Attendance Among 251,401 Adolescents Aged 15 - 18 Years: A Nationally Representative Household Fixed-Effects Study in India

PRESENTER: **Rajesh Kumar Rai**, Society for Health and Demographic Surveillance, India
AUTHORS: Jan-Walter De Neve, Omar Karlsson, Santosh Kumar, Sebastian Vollmer

Anemia has been suggested to affect schooling outcomes in India. Less remains known, however, about heterogeneity in the link between anemia and schooling. In this paper, we extract nationally representative data on adolescents aged 15 – 18 years with data on measured

hemoglobin level and schooling outcomes from the India National Family Health Surveys conducted between 2005 and 2021 (*N*=251,401). We compare schooling outcomes between adolescents living in the same household but with varying levels of hemoglobin concentration, while controlling for demographic characteristics and period effects. The proportion of adolescents with any anemia is 55.2% (95% CI: 55.0-55.5) among young women and 31.0% (95% CI: 30.6-31.5) among young men. Using household fixed effects in the pooled sample, we find that having mild anemia has few detectable effects on schooling outcomes; however, adolescents with severe anemia are 3.1 percentage points less likely (95% CI: 1.0-5.3) to be literate and 3.0 percentage points less likely (95% CI: 0.7-5.3) to attain secondary school compared to non-anemic adolescents. The link between anemia and schooling is stronger for young men than women and in states and union territories with lower state-level mean school attendance. Interventions that reduce mild or moderate anemia alone may not be sufficient to improve several schooling outcomes in this low-resource setting, particularly among women.

1.4 How Does the Distribution of Work Tasks Among Home Care Personnel Relate to Workload and Health-Related Quality of Life?

PRESENTER: **Fredrik Norström**, Umeå University
AUTHORS: Magnus Zingmark, Malin Öhrling, Anita Pettersson-Strömbäck, Klas-Göran Sahlén, Karin Bölenius

Background

In recent decades, there have been changes in the distribution of work tasks within Swedish home care. Challenges with sufficient time to complete work tasks have been reported by a high level of the personnel during these years. How work tasks relate to workload and health-related quality of life has not previously been investigated among personnel in Sweden or elsewhere. The aim of our study is to investigate how work tasks are related to workload and health-related quality of life among home care personnel in Sweden. Furthermore, our study aims to contribute to a better understanding of the preferred work distribution, as suggested by the personnel.

Methods

A cross-sectional study was carried out within home care in 16 municipalities in northern Sweden. Personnel answered a 12-page questionnaire including the validated instrument QPSNordic to measure workload and the validated instrument EuroQol 5 dimensions (EQ-5D-3L) to measure health-related quality of life. Analyses were performed both for the different dimensions of EQ-5D-3L and for quality-adjusted life years (QALY) using the United Kingdom tariff. The questionnaire also included questions about current work distribution and the personnel's suggestions for future work distribution for 15 different work tasks. Propensity score weights were used with gender, health education, marital status and tenure in home care as covariates to calculate an absolute risk difference between personnel conducting a work task daily or not.

Results

It was statistically significantly more common with a high workload among those who daily performed the work tasks safety alarm (8.4% more, p=0.002), domestic tasks outside home (14% more, p<0.001), rehabilitation efforts (13% more, p <0.001) and help with bathing (11% more, p<0.001), compared to others. There was a statistically significant worse QALY score for food distribution (0.034, p=0.03) and better QALY for cooking (0.031, p=0.02), for those daily conducting the task compared to others. Similarly, for the EQ-5D pain/discomfort dimension, there were statistically significantly greater problems for food distribution (13%, p=0.002), and less problems for cooking (9.4%, p=0.006). For the EQ-5D anxiety/depression dimension, there were statistically significantly more among the personnel who provided daily support with the work tasks safety alarm (10%, p=0.006), domestic tasks outside home (10%, p=0.002) and help with bathing (7.6%, p=0.02), who had problems.

In general, the personnel wanted to spend less time with the work tasks safety alarm, domestic tasks outside home and domestic tasks at home, while it was common to ask for more time with social support.

Conclusion

We could connect daily performance on two work tasks, food distribution and cooking to a health difference in terms of QALY and pain/discomfort, but not an increased workload. Interestingly safety alarm and domestic tasks outside home, suggested an increased workload leading to more problems with anxiety/depression, while personnel wanted to reduce their time with these tasks. Using health-related quality of life as a health measure has the potential to help in the decisions about the allocation of time for work tasks within Swedish home care.

1.5 Health Poverty and Inequality Among People with Diabetes in Malaysia

PRESENTER: **Fiorella Parra-Mujica**, Erasmus University Rotterdam
AUTHORS: Laurence Roope, Alia Abdul-Aziz, Feisul Mustapha, Chiu Wan Ng, Sanjay Rampal, Lee Ling Lim, Philip Clarke

Objectives: This paper estimates the incidence and intensity of "health poverty" using a measure of premature mortality in people with type 2 diabetes mellitus (T2DM) in Malaysia.

Background: Health poverty measures have recently been proposed to monitor deprivation in the domain of health, for example the risk of early mortality. The main concept behind health poverty is that individuals can be considered to be in 'poor health' if their health status is worse than a threshold which represents a minimally acceptable level of health.

Methods: A total of 932,855 people aged 40-75, with diagnosed T2DM from the Malaysia National Diabetes Registry (2009-2018), were linked to death records. Cox proportional hazards models were used to estimate the 5-year survival probabilities for each patient, stratified by age group and sex. Covariates included comorbidities and indicators such as district-level asset-based indices and night-light luminosity collected from satellite imagery as individual socioeconomic variable. Measures of health poverty, based on the Foster-Greer-Thorbecke (FGT) class of measures, and conceptualized as excessive risk of premature mortality, were constructed. These measures were based on two poverty line thresholds of a 5% and 10% reduction in survival probability compared to age and sex adjusted survival of the general Malaysian population. To investigate how levels of health poverty are associated with factors that may be amenable to policy changes, we conducted counterfactual simulations to estimate the extent to which comorbidities and socio-economic status contribute to our measured levels of health poverty. To measure the distribution of health poverty (as measured by head counts) across socio-economic status, rank dependent indices were constructed using night-light luminosity and asset indices as ranking variables.

Results: At the higher (lower) threshold, 43.5 (8.9) percent of the sample were health poor. Based on our simulations, comorbidities were estimated to contribute 2.9 (5.4) percentage points for males (females) at the higher threshold and 7.4 (3.4) percentage points for males (females) at the lower threshold. If all patients lived in an area of highest night-light luminosity, health poverty would fall by 5.8 (4.6) percentage points for males (females) at the higher threshold and 4.1 (0.8) at the lower threshold. Concentration indices for males (females) were -0.08 (-0.04) with luminosity as ranking variable and -0.10 (-0.04) with asset indices, indicating a higher concentration of health poverty in areas where average socio-economic status is lower. Headcount ratios varied between 15% and 83% at a district level across Malaysia. At a district level, health poverty was strongly correlated with luminosity and asset indices.

Conclusion: In Malaysia, there is a high incidence of health poverty among people with diabetes. Health poverty levels are strongly associated with comorbidities and area-based measures of socioeconomic status. Worldwide, medical datasets often have limited data on measures of socio-economic status, such as income. Night-time luminosity data is globally available, has increasingly been used as a measure of development, and can be easily merged with many existing medical datasets, with a broad potential to be used for risk stratification and measurement of health inequalities.

1.6 Health Utility Among People Who Regularly Use Opioids in Australia: A Cross-Sectional Survey in Three Australian Jurisdictions

PRESENTER: **Anh Dam Tran**, University of New South Wales
AUTHORS: Jason Grebely, Mark Chambers, Louisa Degenhardt, Michael Farrell, Briony Larance

Objectives: Health utility among people who use opioids have mostly been reported among in-treatment populations. We aim to report utility-based quality of life by participant, drug and treatment characteristics and to examine the determinants of health utility among people who use opioids regularly.

Methods: Cross-sectional survey of 402 people who used opioids regularly recruited across New South Wales, Victoria and Tasmania in 2018/19. European Quality of Life (EQ-5D-5L) heath utility scores included health status ratings across five health domains, each with five levels. The nominal range of the EQ-5D-5L utility score is 0 to 1. Given the EQ-5D-5L health utility were non-normally distributed (Shapiro–Wilk test, p,0.05), differences in EQ-ED between socio-demographic subgroups were assessed using non-parametric Kruskal–Wallis test by rank (p-value < 0.05). To address the unique distribution of EQ-5D-5L health utility scores in the current sample (disproportionate ratings of full health and left-skewed ratings among those who did not report full health), a two-part model (TPM) was applied.

Results:

A total of 385 of 402 participants (96%) completed the EQ-5D-5L questionnaire. Most participants were male (63%), reported 10+ years of education (69%), were unemployed (91%), had injected a drug in the last 28 days (88%) and were currently in opioid agonist treatment (OAT) (67%). The mean health utility of the total sample was 0.72 (SD: 0.24). Participants in OAT with no opioid in the last 28 days reported the highest health utility (0.79). Participants who used fentanyl in the last 28 days reported the lowest health utility (0.34). Lower health utilities were associated with being older (adjusted marginal effect (adj ME): -0.09 [95%CI: -0.04 to -0.15]) and having a lower educational attainment (adj ME: -0.08; 95%CI: -0.15 to -0.01). Participants who previously received OAT (adj ME: -0.10; 95%CI: -0.19 to -0.01) and those currently in OAT (adj ME: -0.15; 95%CI: -0.23 to -0.07) reported lower health utility than the 'no OAT' group. Past 28-day use of benzodiazepines (adj ME: -0.08; 95%CI: -0.13 to -0.02), oxycodone (adj ME: -0.09; 95%CI: -0.17 to -0.01)) and fentanyl use in last 28 days (adj ME: -0.21; 95%CI: -0.39 to -0.03) were associated with lower health utility. Participants who used both pharmaceutical opioids and benzodiazepines had lower health utility compared to no pharmaceutical opioids and no benzodiazepines use (adj ME: -0.16; 95%CI: -0.26 to -0.06).

Conclusions: Findings provide important health-related quality of life data for economic evaluations, useful for guiding allocation of resources for treatment strategies among people who use opioids. Lower health utilities among those using benzodiazepines and pharmaceutical opioids suggests interventions targeting these subgroups may be beneficial.

1.7 Instrument Mapping- a Scoping Review Comparing Mapping to Health and Broader Quality of Life Instruments.

PRESENTER: **Akanksha Akanksha**, CHERE, University of Technology Sydney

AUTHORS: Brendan Mulhern, Deborah Street, Rosalie Viney

Background and aim

Cost-utility analysis (CUA) is a common economic evaluation method for allocating scarce healthcare resources. Outcomes in CUA are measured using Quality Adjusted Life Years (QALYs), a metric that combines length and quality of life (QoL). QALYs are often estimated using preference-based measures (PBMs), which usually focus on health-related QoL. There is increasing recognition that a broader definition of QoL is required for many conditions, incorporating social care-related dimensions. This review focuses on current trends in instrument mapping and scopes the progress since the last systematic review of mapping studies (Mukuria et al. 2019). The aim is to explore mapping (or cross-walking) to estimate utility values and review the broader PBMs being mapped compared to the health-focused PBMs.

Methods

The scoping review was conducted using the Arksey and O'Malley framework and aligned with the checklist of Preferred Reporting Items for Systematic Reviews and Meta-Analyses extension for Scoping Reviews (PRISMA-ScR). The electronic databases searched were MEDLINE®, Web of Science and CINHAL, and the utility database searched was the Health Economics Research Centre (HERC) database, version 8.0. The search was conducted to identify studies that mapped from adult QoL instruments to target PBMs using statistical regression techniques. Data extracted from the literature included mapping studies that mapped to one of these PBMs – EQ-5D, SF-6D, AQoL, ASCOT and ICECAP. The Mapping onto the Preference-based measures Reporting Standards (MAPS) checklist was used to guide the assessment of the mapping studies.

Results

In total, 1217 studies were screened, and 1167 studies were excluded. Data extraction was undertaken for the remaining 50 studies. Most of the studies had EQ-5D (3L/5L) as one of the target PBMs (n= 41), while the other target PBMs in the studies were SF-6D (n=6), AQoL (n=1) and ICECAP (n=3). Source instruments that measure broader QoL were mapped in only two studies. Most of the source instruments were health condition-specific, the most common being EORTC QLQ-C30 (n=9). Studies included in the review had an adult study population with a sample size ranging from 61 to 21,854. Around a quarter of the studies (n=13) stated they followed the MAPS criteria for reporting the mapping study.

There was a total of 143 mapping functions reported across 50 studies. Ordinary least squares (OLS) was the most common (n=39) regression method used for mapping between instruments. The other direct methods reported were tobit (n=21), generalized linear model (GLM) (n=14), generalized estimating equation (GEE) (n=4), censored least absolute deviations (CLAD)(n=8), beta regression model (n=16), MM estimator (n=7), and adjusted limited dependent variable mixture model (ALDVMM) (n=11). Response mapping was used for mapping using ordered logit (n=10), multinomial logit (n=5) and ordered probit (n=6).

Conclusion

Most mapping studies focus on health-related PBMs such as EQ-5D. Limited work looks at mapping to broader measures (e.g. ASCOT and ICECAP) that incorporate social care and wellbeing dimensions. Further research is needed to explore the feasibility of mapping between health-focused PBMs and more comprehensive PBMs. This would add to the knowledge that would aid in extending what QALY measures.

1.8 Is Socioeconomic Inequality in Antenatal Care Coverage Widening or Reducing between- and within- Socioeconomic Groups? A Case of 19 Countries in Sub-Saharan Africa

PRESENTER: **Amarech Obse**, University of Cape Town

AUTHORS: Chijioke Osinachi Nwosu, John Ele-Ojo Ataguba

Background

Maternal health statistics have improved in many countries in sub-Saharan Africa (SSA). Still, progress remains slow in meeting the Sustainable Development Goals (SDG) targets while substantial inequalities exist in access to key maternal health care services in many countries. Accelerating quality antenatal care (ANC) coverage is critical to improving maternal health outcomes. To progress, countries should understand whether to target reducing health disparities between or within-socioeconomic groups, as policies for achieving these may differ. Given that reductions in socioeconomic inequalities in health may occur with widening inequalities among the poor, achieving reductions in socioeconomic inequalities, although necessary, may not be sufficient not to leave anyone behind. This paper contributes to this literature by developing a framework for decomposing changes in socioeconomic inequalities in health into changes in between and within-socioeconomic groups using the concentration index, a popular measure for assessing socioeconomic inequalities in health.

Research Aim

The aim of this research is therefore, to ascertain whether between or within-changes in inequality drives most of the observed changes in inequality in ANC utilization in SSA countries.

Methods and Data

We begin by noting the challenge in decomposing the concentration index into only between and within-group components due to the possibility of an overlap created by overlapping distributions of socioeconomic status between groups. However, using quantiles of socioeconomic status provides a convenient way to decompose the concentration index so that the overlap component disappears. With at least two non-overlapping groups, we compute the within-group component as the weighted group-specific concentration indices of the health variable. On the other hand, the between-group component will be non-zero if the mean of the health variable is different between groups, and it is obtained by computing the concentration index of a distribution where the value of the health variable for every individual in a group is replaced with the group's mean value to eliminate inequalities within groups. In characterising the decomposition, a pro-poor shift occurs when socioeconomic inequality is reduced over time, including between and within-socioeconomic groups, while a pro-rich shift or change occurs conversely. The framework is applied to data from two rounds of the Demographic and Health Surveys of 19 countries in SSA conducted about ten years apart in each country. It assesses changes in socioeconomic inequalities in an indicator of at least four antenatal care visits (ANC4+) and the number of ANC visits (ANC intensity).

Results

The results show that many countries in SSA witnessed significant pro-poor shifts or reductions in socioeconomic inequalities in ANC coverage because pro-rich inequalities in ANC4+ and ANC intensity became less pro-rich. Changes in between-socioeconomic group inequalities drive most of the changes in ANC service coverage inequalities in all countries.

Conclusion and Policy Implications

Policies addressing inequalities between-socioeconomic groups are vital and more important than those targeting within-group disparities in reducing overall disparities in ANC utilization and closing the gap between the rich and the poor, a crucial objective for the SDGs.

1.9 Where to Focus Resources: Doubling Down to Improve American Mortality Outcomes

PRESENTER: **Jawa Issa**, Erasmus University of Rotterdam
AUTHORS: Owen O'Donnell, Pieter van Baal, Tom Van Ourti

Importance In the United States (US), the causes of death that contribute most to increases in life expectancy are different from the causes of death that contribute most to decreases in lifespan inequality.

Objective Our goal is to robustly determine which causes of death would if addressed, lead to better mortality outcomes in terms of both dimensions by using a non-parametric approach capable of trading-off said dimensions.

Method We rely on dominance analysis which utilizes ethical principles such as 'a longer life is preferred to a shorter one' to rank distributions of ages at death. We produce cause-deleted counterfactual life tables where one of eight causes of death in the US has been removed (despair, homicides, accidents, COVID-19, CVD, cancer, infectious and respiratory) and compare the various resulting distributions of ages at deaths within sex and racial/ethnic subgroups (non-Hispanic Whites, non-Hispanic Blacks, Hispanics).

Results Eliminating cancer and CVD has the biggest impact on life expectancy but eliminating deaths of despair has the biggest impact on lifespan inequality. Accepting the ethical principles underlying dominance analysis implies that eliminating deaths of despair is to be preferred over eliminating cancer or CVD for males. As for covid-19, although it was the third largest cause of death in 2021 in the US, removing those deaths does not seem to be preferable to removing most other causes of death included in the analysis.

Conclusion This has important consequences for the prioritization of diseases. We find that policies focusing on drug and alcohol use might generate more improvements in mortality outcomes than those focusing on heart diseases.

1.10 Estimating Intergenerational Health Transmission in Taiwan Using Administrative Health Records

PRESENTER: **Bhashkar Mazumder**, Federal Reserve Bank of Chicago

The degree of equality of opportunity in a society is one of the most salient questions in social science. Recognizing the powerful role that health plays as a measure of welfare, a growing literature has begun to develop new measures of equality of opportunity by estimating intergenerational persistence in broad measures of health. We use population-wide administrative health records from the National Health Insurance system of Taiwan to estimate the degree of intergenerational persistence in health in the nation, providing the first estimates for a middle income country. We proxy for latent health by applying principal components analysis to a battery of indicators for specific conditions (ICD codes) and intensity of general practitioner usage. We estimate the intergenerational rank-rank slope to be around 0.22. We show that health transmission is stronger coming from mothers than from fathers and is stronger to sons than to daughters. In addition, we document an important non-linearity by finding that health persistence is higher at the upper tail of the parent health distribution. Although, there is relatively little geographic dispersion in intergenerational health persistence across Taiwan, some of these differences can be explained by availability of doctors. We also compare persistence in specific health conditions and show that the differences that exist do not appear to be driven by those conditions which are more genetically determined (as proxied by twin correlations). Persistence estimates

that use medical expenditures or in-patient measures are lower than our main estimates. Taken in combination with previous studies in other countries including Australia, Denmark, Germany, the UK, and the US, there is mounting evidence that the rate of intergenerational persistence in health is lower than for other forms of socioeconomic status such as income. These new set of descriptive facts should inform future research that seeks to understand the role of families in producing health disparities.

1.11 Current Status and Contributors of the Health Disparity Among the Social Pensioner in Korea, Focusing on Socioeconomic and Demographic Characteristics of Older Adults

PRESENTER: **Inuk Hwang**, Graduate School of Public Health, Seoul National University
AUTHOR: Tae-Jin Lee

Korea is one of the fastest ageing society in the world. Despite the unprecedented challenge, the government-mandated contributory pension programs were fully implemented only in 1999, with limited coverage and benefit level, exposing most older adults to risk of poverty. Korean government introduced a social pension program in 2008 to alleviate old age poverty and well-being and it has now become the most prominent old age income system. Although the social pensioners in Korea are very heterogenous group that comprise nearly 70% of older adults aged 65 and over, the distribution of health of the group has not been studied. Additionally, empirical evidence on key contributors to health of the group are still not available.

Using the latest population representative Korean Longitudinal Study on Ageing (KLoSA) data in Korea between 2016 and 2020, this study aimed to fill this gap by investigating the health disparity among the social pension beneficiary and the effect of labor participation and health behaviors on comprehensive measures of health outcomes.

First, we computed descriptive statistics (mean and distribution) for comprehensive health and health behavior outcomes – mean values for healthcare expenditure, grip strength, and K-MMSE score (Korean Mini Mental State Exam score) and distribution of self-rated health, disability, limitations on Activities of Daily Living (ADL), depression (CES-D10), smokers, drinkers, obesity, and regular exercisers – by socioeconomics and demographic characteristics, including sex, age, marital status, education level, labor force participation, and public pension beneficiary status, to examine the health gradient among the social pensioners in Korea. The descriptive analyses suggested that there was clear gradient for nearly all health measures, by socioeconomic and demographic characteristics. Specifically, grip strength, cognitive ability (K-MMSE score), and monthly healthcare expenditure were higher among lower age group, married persons, higher education, labor force participants, and public pensioners. Number of chronic diseases was higher among female, higher age group, persons who are not married, lower education, and labor force nonparticipants. Distributions of self-rated health, disability, limitations on ADL, depression, smokers, drinkers, obesity, and regular exercisers suggested similar results. For instance, depression was more prevalent among female, higher age group, individuals who were not married, lower education, labor force nonparticipant, and public pension non-beneficiary.

Second, we implemented OLS fixed effect panel regression analysis using KLoSA data between 2016 and 2020 to estimate the effect of labor force participation and health behaviors on the health outcomes, including grip strength, cognitive ability, self-rated health, depression, and obesity. Standard errors were clustered at individual level. The regression results suggested that labor force participation significantly improved grip strength, cognitive ability, and self-rated health at p<0.05 significance level. Additionally, not drinking and exercising regularly improved self-rated health. And regular exercise improved depression. Further analysis is needed to investigate the bias caused by possible reverse causality.

To the best of authors' knowledge, this is the first study to investigate the health gradient among the social pensioners in Korea using comprehensive health measures and the effect of the important health determinants for older adults' health.

1.12 Exploring the Transition between the EQ-5D-Y and EQ-5D Descriptive Systems in a Group of Adolescents

PRESENTER: **Janine Verstraete**, University of Cape Town
AUTHORS: Paul Kind, Bas Janssen, Zhihao Yang, Elly Stolk, Abraham Gebregziabiher

Objectives:

To investigate whether the same health state results in the same distribution of responses on the EuroQol (EQ) youth and adult descriptive systems (Y-3L v 3L and 5L, and Y-5L v 5L)

Methods:

Adolescents with and without a health condition were recruited from South Africa (SA) (3L, Y-3L and 5L) and Ethiopia (5L and Y-5L). The order of questionnaires was randomised and separated by a cognitive task. Adult and youth descriptive systems were compared by analysing differences in unique health states, redistribution of dimension responses, inconsistencies, discriminative power by Shannon index (H'), agreement of dimension scores with Gwet's AC, and known-group validity on the level sum score (LSS).

Results:

Data from paired adult and youth EQ versions from 592 SA (3L, Y-3L and 5L) and 693 Ethiopian (5L and Y-5L) respondents were analysed. There were slightly more unique health states reported on 3L (n=64) compared to Y-3L (n=61) (X^2=0.097, p=0.755). Conversely Y-5L (n=133) had more unique health states than 5L (n=120 (X^2= 0.696, p=0.040). There were 10.5% inconsistent responses between SA

3L versions, 35.1% between Y-3L and 5L and 12.3% between Ethiopian 5L versions. The highest % inconsistencies were reported between pain/discomfort and anxiety/depression. In those with a health condition the ceiling (percentage 11111) was lower on Y-3L (37.2%) than 3L (45.0%) (X^2=3.67, p=0.056) whereas Y-5L (43.2%) was slightly higher than 5L (42.3%) (X^2=0.055, p=0.815). In SA discriminatory power was higher for Y-3L compared to 3L for pain/discomfort (Δ H'=0.11) and anxiety/depression (Δ H'=0.04) and across all dimensions for Y-3L compared to 5L with the largest differences for usual activities (ΔH'=0.32) and anxiety/depression (Δ H'=0.38). Similarly, in Ethiopia discriminatory power was higher across all dimensions for Y-5L compared to 5L (Δ H' range 0.05-0.09). Gwet's AC showed very good agreement across all paired (SA) 3L and (Ethiopian) 5L dimensions except for anxiety/depression on 3L which showed good agreement [0.68 (0.63, 0.73)]. The LSS of all versions were able to differentiate between known disease groups (school, cardiac, diabetes, functional disability, HIV and respiratory disease). The SA Y-3L had a significantly higher mean (SD) LSS than the 3L for school [0.1 (0.04)], HIV [0.1 (0.090] and respiratory groups [0.4 (0.1)]. The SA 5L had a significantly higher mean LSS than the Y-3L for school [0.7 (0.007)] and HIV groups [0.1 (0.13)]. The Ethiopian Y-5L had a significantly higher LSS for school [0.2 (0.06)], cardiac [0.5(0.16)] and functional disability [0.8 (0.27)].

Conclusion:

Despite the generally mild self-reported health state of the sample, both the Y-3L and Y-5L showed a more severe health state compared to the corresponding adult descriptive systems under the same conditions. The differences were most notable for pain/discomfort and anxiety/depression. When comparing the transition between the Y-3L and 5L versions there is a high percentage of inconsistencies, particularly in anxiety/depression. The difference in dimension headings and level qualifiers between the EQ adult and youth versions yielded different results. These differences in the descriptive systems need to be taken into consideration for descriptive analysis and comparison of preference-weighted scores.

1.13 Long-Run Effects of Measles Vaccination on Educational Attainment and Cognitive Impairment

PRESENTER: **Nicole L Hair**, University of South Carolina

There is growing scientific evidence that childhood infectious diseases, including measles, can adversely affect health, human capital accumulation, and economic well-being over the long run. Prior to the availability of a vaccine, 50% of U.S. children contracted measles by age 6 and 95% by age 16. The benefits of a national vaccination program implemented in 1963 were not shared equally; higher income and white communities were initially much more likely to be protected by the measles vaccine. With an eye toward improving overall vaccination rates and addressing persistent gaps in coverage, state legislatures began enacting or amending compulsory immunization laws to require that all children be immunized against measles prior to enrolling in school for the first time. By 1972, 28 states had passed laws requiring proof of measles immunization as a prerequisite for school enrollment.

The overall goal of our research is to advance scientific understanding of the long-run and likely underestimated benefits of public policies aimed at preventing the spread of infectious disease. This project contributes rigorous, quasi-experimental estimates of the long-run effects of measles vaccine mandates implemented in the 1960s and early 1970s on older adults' cognitive function (Aim 1). We further test whether the effects of mandates vary by race (Aim 2).

We accomplished our aims using data from the Health and Retirement Study (HRS), a longitudinal panel study that surveys a nationally representative sample of U.S. residents over age 50. The HRS is well suited to addressing our study aims as it offers a large, geographically diverse sample; oversamples of racial minorities; validated cognitive measures; and geographic identifiers that allow us to link HRS data to state policies in effect when the respondent was in school. We restricted our sample to non-Hispanic Black and White respondents who were born between 1948 and 1965 (and expected to have enrolled in school between 1954 and 1971) and completed a cognitive assessment between ages 50-61.

Leveraging the staggered implementation of state-level policies, our difference-in-differences (DD) strategy compares outcomes across states, i.e., individuals born in the same year who went to school in a state with or without a measles vaccine mandate, and across birth cohorts, i.e., individuals who went to school in the same state and who enrolled in school before or after a measles vaccine mandate went into effect.

Adjusting for a range of individual and contextual factors, we find that school-entry vaccination requirements had long-lasting effects on non-Hispanic Black students' cognitive outcomes. For example, compared to peers who were not subject to a school-entry measles vaccination requirement, non-Hispanic Black students who attended primary school in a state with a measles vaccine mandate scored, on average, 1 point higher (equivalent to about 0.25 SD) on the Telephone Interview for Cognitive Status (TICS-M) assessment of cognitive function at midlife. We find no statistically significant effects for non-Hispanic White students. Our findings provide insight into the long-run benefits of public policies aimed at preventing the spread of infectious diseases and advance our understanding of well-documented disparities in cognitive health.

Cape Town International Convention Centre | CTICC 2 – Nerina
New Insights in Measuring Financial Protection [FINANCING FOR UHC SIG]

MODERATOR: **Karen Grepin**, The University of Hong Kong

Understanding Out-of-Pocket Spending and Financial Hardship Among Patients Who Succumb to Cancer and Their Caregivers

PRESENTER: **Aviad Tur-Sinai**, Max Stern Yezreel Valley College

In most countries, including those with national health insurance or comprehensive public insurance, some expenses for cancer treatment are borne by the ill and their families. This study aims to identify the areas of out-of-pocket (OOP) spending in the last half-year of the lives of cancer patients and examine the extent of that spending; to examine the probability of OOP spending according to patients' characteristics; and to examine the financial burden on patients' families.

491 first-degree relatives of cancer patients (average age: 70) who died 3–6 months before the study were interviewed by telephone. They were asked about their OOP payments during the last-half year of the patient's life, the nature of each payment, and whether it had imposed a financial burden on them. A logistic regression and ordered logit models were used to estimate the probability of OOP expenditure and the probability of financial burden, respectively.

Some 84% of cancer patients and their relatives incurred OOP expenses during the last half-year of the patient's life. The average levels of expenditure were US$ 5,800 on medicines, $8,000 on private caregivers, and $2,800 on private nurses. The probability of paying OOP for medication was significantly higher among patients who were unable to remain alone at home and those who were less able to make ends meet. The probability of spending OOP on a private caregiver or private nurse was significantly higher among those who were incapacitated, unable to remain alone, had neither medical nor nursing-care insurance, and were older. The probability of a financial burden due to OOP was higher among those unable to remain alone, the incapacitated, and those without insurance, and lower among those with above-average income, those with better education, and patients who died at home.

The study yields three main insights. First, it is crucial that oncology services provide cancer patients with detailed information about their entitlements and refer them to the National Insurance Institute so that they can exercise those rights. Second, oncologists should relate to the financial burden associated with OOP care at end of life. Finally, it is important to sustain the annual increase in budgeting for technologies and pharmaceuticals in Israel and to allocate a significant proportion of those funds to the addition new cancer treatments to the benefits package; this can alleviate the financial burden on patients who need such treatments and their families.

Evolution and Factors Associated with Impoverishment and Catastrophic Health Expenditures in Sao Paulo Municipality, Brazil, 2003-2015

PRESENTER: **Flavia Mori Sarti**, University of Sao Paulo
AUTHORS: Lucas Akio Iza Trindade, Jaqueline Lopes Pereira, Jean Michel Rocha Sampaio Leite, Marcelo Macedo Rogero, Regina Mara Fisberg

The current configuration of the Brazilian health system includes supply of healthcare in public and private facilities with diverse financing schemes. Healthcare is provided free of charge within the public sector (Brazilian Unified Health System, SUS) with government funding; however, previous studies indicate that substantial proportion of the population uses public and private healthcare simultaneously. Thus, healthcare costs may represent substantial financial burden for individuals with chronic diseases, especially without health insurance coverage. Recent evidence shows that higher physical activity levels reduce the probability of occurrence of chronic diseases, whilst sedentarism presents the inverse effect. Yet, there is lack of evidence regarding associations of catastrophic health expenditures (CHE) in relation to private voluntary health insurance (PVHI) coverage and lifestyle choices regarding physical activity and sedentarism. Thus, the objective of the study was to investigate the evolution and associations of CHE in relation to PVHI coverage, physical activity level and sedentarism among individuals living in Sao Paulo municipality, Brazil. The empirical strategy adopted in the study was based on quantitative analysis of cross-sectional data from the Sao Paulo Health Survey (ISA-Capital) performed in 2003, 2008 and 2015. ISA-Capital sample selection was based on probabilistic stratified sampling process of households in the urban area of Sao Paulo municipality, being representative at population level. Logistic regression models, marginal effects, and sensitivity analysis (E-values) were estimated using demographic, socioeconomic, and health characteristics of individuals, including control variables for year of the survey. Analyses were performed using Stata, version 14.2, considering complex survey design with statistical significance of 5% ($p<0.05$). CHE was defined through budget share approach, adopting income thresholds at 10%, 25% and 40%. Variables of interest included PVHI coverage, and mean physical activity level and sedentarism among household residents. The results indicated higher risk for CHE among households with residents presenting lower physical activity level and higher sedentarism. PVHI coverage showed absence of significance in relation to the occurrence of CHE. Physical activity level among household residents was significantly associated with lower probability of CHE considering 10% threshold (OR 0.60 [95%CI: 0.39-0.91]), 25% threshold (OR 0.48 [95%CI 0.31-0.76]), and 40% threshold (OR 0.52 [95%CI 0.32-0.85]). Sedentarism was significantly associated with higher probability of CHE considering 10% threshold (OR 1.01 [95%CI: 1.00-1.02]), and 25% threshold (OR 1.02 [95%CI 1.00-1.04]). However, the sensitivity analysis using E-values and marginal effects indicated low effects of sedentarism on CHE. Financial protection in health comprises a challenge within the Brazilian health

system, considering that lower income households reporting higher utilization of health services presented higher odds of exposure to CHE. In addition, PVHI coverage was unable to ensure protection against CHE among household residents in Sao Paulo municipality. Health promotion strategies in primary health care, particularly linked to physical activity, may decrease the need for high complexity interventions due to reduction in the prevalence of chronic diseases, guaranteeing higher quality of life for the population and lower healthcare costs in the SUS. In addition, further investigation is required on the role of PVHI ownership regarding financial protection in Brazil.

How Does DR Congo's Flat-Rate Pricing Policy Reduce out of Pocket Expense and Where Does It Fail?

PRESENTER: **Sophie Faye**, Abt Associates
AUTHORS: Dosithee Ngo bebe, Freddy Tshamala Mbwebwe, Melinda Fenn

Background: Since 2008 the Democratic Republic of Congo's (DRC) national health accounts studies have shown that over 90 percent of health expenditures borne by households are paid out-of-pocket at the facility level. Within the framework of Universal Health Coverage in DRC, several approaches are being implemented to increase health service use and financial protection simultaneously, including a flat-rate pricing for health services. Under this policy the patient pays a flat rate at the point of service for a care (for example one payment for visit + drugs + some complementary lab analysis) which is set lower than paying for each service separately. An assessment of the Belgian development aid agency's reforms in the Kisantu district between 2008 and 2011 showed that this payment method reduced out-of-pocket costs and significantly increases the use of health services1. However, a flat-rate pricing policy requires certain prerequisites to work sustainably: an estimation of the real production costs of services provided at facilities, assessment of the household capacity to pay and of the mechanisms to cover the part of the cost not supported by the patient, and other determinants for success at a system level, including good public financial management.

Objective: The DRC Ministry of Health and the Kinshasa School of Public Health, supported by the USAID-funded Local Health Systems Sustainability (LHSS) project will collaborate on a study to assess the policy implementation, and identify a set of promising practices, and recommendations for policy scale-up.

Methods: Qualitative and quantitative approaches will be used to collect and analyze primary and secondary facility data in 5 selected provinces. Facility selection will focus on facilities where the policy is still continuously implemented. Data will include financial data, operating costs, activity volume, etc. and, exit interviews will capture patient perspectives on this policy and estimate their out-of-pocket expenditures. The study team will also conduct key informant interviews with stakeholders at the national and sub-national level to better understand the process of implementing the policy and remaining challenges from the policymakers' perspective.

Discussion: Results from this assessment will allow for an increased understanding of the system level and facility level determinants of a successful implementation. In a resources constraints setting such as in DRC, and in the absence of a national prepayment scheme that can protect patients from out-of-pocket expenditures, it is particularly important to minimize out-of-pocket payments. The flat rate policy pricing, if implemented with the required prerequisites, can help achieve that goal. However, with a context of decentralization in DRC, facility level revenues should not be negatively affected by this policy to ensure its sustainability. The DRC government and its partners have an important role to play in supporting financial management at facility level hence, successful implementation and scale of this policy. Results of this study will provide them with the evidence to make policy decisions.

Incidence of Catastrophic Health Spending in Indonesia: Insights from a Household Panel Study 2018-2019

PRESENTER: **Qinglu Cheng**
AUTHORS: Rifqi Abdul Fattah, Hasbullah Thabrany, Dwidjo Susilo, Aryana Satrya, Manon Haemmerli, Soewarta Kosen, Danty Novitasari, Gemala Chairunnisa Puteri, Eviati Adawiyah, Andrew Hayen, Lucy Gilson, Anne Mills, Viroj Tangcharoensathien, Stephen Jan, Augustine Asante, Virginia Wiseman

Background

Indonesia implemented one of the world's largest single-payer national health insurance schemes (the Jaminan Kesehatan Nasional or JKN) in 2014. This study aims to assess the incidence of catastrophic health spending (CHS) and its determinants and trend between 2018 and 2019 by which time JKN enrolment coverage exceeded 80%.

Methods

This study analysed data collected from a two-round cross-sectional household survey conducted in ten provinces of Indonesia in February–April 2018 and August–October 2019. The incidence of CHS was defined as the proportion of household out-of-pocket (OOP) health spending exceeding 10% of household consumption expenditure. Regression models were used to investigate factors associated with incurring CHS and the trend over time.

Results

The overall incidence of CHS fell from 7.9% in 2018 to 4.4% in 2019. Households with JKN membership experience significantly lower incidence of CHS compared to households with private health insurance and households without insurance coverage in both years. Households that spent least on non-food and food consumption were more likely to experience CHS. Households that visited private health facilities were more likely to incur CHS.

Conclusion

This study demonstrated that the overall incidence of CHS decreased in Indonesia between 2018 and 2019. OOP payments for health care and the risk of CHS still loom high among JKN members and among the lowest income households. More needs to be done to further contain OOP payments and further research is needed to investigate whether CHS pushes households below the poverty line.

3:30 PM –5:00 PM   TUESDAY   [Health, Its Distribution And Its Valuation]

Cape Town International Convention Centre | CTICC 1 – Room 1.44

Preferences and Values across the Life Course: Discrete Choice Experiment and Willingness to Pay Applications [HEALTH PREFERENCE RESEARCH SIG]

MODERATOR: **Fern Terris-Prestholt**, London School of Hygiene and Tropical Medicine

Preferences and Values for a Collaborative Multidisciplinary Care Model for Children with Congenital Colorectal Conditions: A Discrete Choice Experiment

PRESENTER: **Tianxin Pan**, University of Melbourne
AUTHORS: Misel Trajanovska, Yan Meng, Stephanie Best, Sebastian King, Ilias Goranitis

Congenital colorectal conditions, including anorectal malformations and Hirschsprung disease, occur in 1 in 5000 births worldwide. Children born with these conditions often have associated urologic, gynaecologic, gastrointestinal, spinal, and orthopaedic anomalies. Due to these anomalies, patients require a well-coordinated multidisciplinary team of health specialties over the course of their lifetime. However, evidence on the value of a multidisciplinary service is lacking. This information is key for an optimal implementation into healthcare systems.

Two discrete choice experiments (DCE) were conducted to both understand the value and to optimise the design of a multidisciplinary service for children with colorectal and pelvic conditions. Four online focus groups were undertaken to identify attributes and levels. In the first DCE, five attributes were selected to quantify the value of benefits associated with the multidisciplinary service: *Multidisciplinary team composition; Responsibility for care coordination; Duration of access to the service; Provision of additional educational information to parents; and Cost for accessing the service*. For the second DCE, five further attributes were selected for the design of the multidisciplinary service: *Building multidisciplinary team; Communication between family and the service team; Mode of ongoing care; Transitional care; and Educational information.*

Bayesian D-efficient design was used and the DCE surveys are being administered to members of the Australian public and families with children affected by colorectal conditions. Data will be analysed using panel error component mixed logit models. Preference heterogeneity will be explored through latent class models. The findings from this work will be used to inform cost–benefit analyses as part of broader healthcare system implementation, and to inform the further design and delivery of the multidisciplinary service.

Is the Intention to Vaccinate Enough? Systematic Variation in the Value of Timely Vaccinations and Preferences for Monetary Vs. Non-Monetary Incentives Among Pregnant Women in Southern Tanzania

PRESENTER: **Nicole L Hair**, University of South Carolina
AUTHORS: Jan Ostermann, Derek S Brown, Joy Noel Baumgartner, Sara Moses, Esther Ngadaya, Sayoki Mfinanga, Lavanya Vasudevan

Background: Childhood vaccinations continue to be among the most cost-effective public health interventions to prevent under-5 mortality. Yet, globally, approximately 20 million children remain under-vaccinated; many more receive delayed vaccinations. Sustained progress towards global vaccination targets requires overcoming, or compensating for, incrementally greater barriers to vaccinating hard-to-reach and hard-to-vaccinate children. We prospectively assessed pregnant women's valuations of routine childhood vaccinations and preferences for alternative incentives to inform interventions aiming to increase vaccination coverage and timeliness in Tanzania.

Methods: Between August and December 2017, 406 women in their last trimester of pregnancy were enrolled from health facilities and communities in the Mtwara region of Tanzania and asked contingent valuation questions in a triple-bounded dichotomous choice format about their willingness to vaccinate their child if they were (a) given an incentive, or (b) facing a cost for each vaccination. Interval censored regressions assessed correlates of women's willingness-to-pay (WTP) for timely vaccinations. Participants were asked to rank monetary and non-monetary incentive options for the timely vaccination of their children.

Findings: All women expected to get their children vaccinated according to the recommended schedule, even without incentives. Nearly all women (393; 96.8%) were willing to pay for vaccinations. The average WTP was Tanzania Shilling (Tsh) 3,066 (95% confidence interval Tsh 2,523–3,610; 1 USD~Tsh 2,200) for each vaccination. WTP varied systematically with socio-economic and access characteristics and with vaccine-related knowledge and attitudes. WTP was significantly lower among women with less education, fewer household assets, women living in rural areas with greater travel time to the nearest health facility, and those with greater vaccine hesitancy. When asked to rank alternative incentives for getting their children vaccinated on time, women tended to prefer non-monetary incentives, such as a birth

certificate, a maternal health check, or, to a lesser extent, a pharmacy voucher, over monetary incentives such as a lottery ticket with a monetary pay-out, a mobile money payment, or mobile phone credit.

Interpretation: To our knowledge, this study is the first to use contingent valuation methods to elicit the value of routine childhood vaccinations to individuals in sub-Saharan Africa. In this setting, women broadly recognized vaccinations as beneficial and, in the absence of barriers, may not need to be incentivized to vaccinate their children on time. Women placed a high value on timely childhood vaccinations, suggesting that unexpected system-level barriers rather than individual-level demand factors are likely to be the primary drivers of missed or delayed vaccinations. Systematic variation in the value of vaccinations across women reflects variation in perceived benefits and opportunity costs and may inform the design and adaptation of interventions that target specific barriers to timely vaccinations. Specifically, our results indicate information deficits among pregnant women and suggest a role for antenatal care visits as means of improving vaccine knowledge and pre-empting vaccine hesitancy. Additionally, non-monetary incentives and other interventions to increase demand and compensate for system-level barriers hold significant potential for improving vaccination coverage and timeliness.

Preferences for Palliative and End-of-Life Care: A Systematic Review of Discrete Choice Experiments

PRESENTER: **Qing Xia**, University of Tasmania
AUTHORS: Mineth Kularatna, Claudia Virdun, Elise Button, Eliana Close, Hannah Carter

Objective: The key to delivering high-quality care is understanding what matters most to patients and their significant others. End-of-life care preferences may be highly heterogenic and variable according to culture, belief, and perspectives of individuals. Discrete choice experiments (DCEs) provide a useful method for quantifying the relative strength of preference for a given attribute, when faced with multiple competing attributes. This systematic review aims to characterise and appraise the evidence from DCEs eliciting preferences for palliative and end-of-life care, with a special focus on attribute development, significance, and relative importance.

Methods: A comprehensive systematic literature search of PubMed, Embase, Web of Science, CINAHL, EconLit, and PsychINFO were undertaken for literature published to August 2022. Two authors independently performed literature screening, data extraction, and quality assessment. Data were collated and synthesised narratively. Thematic analysis was applied to group attributes into categories. The relative frequency, statistical significance and relative importance of attribute categories were analysed. Subgroup analyses were conducted to compare responses between proxies and patient respondents. Study protocol was pre-registered on PROSPERO, number CRD42022302133.

Results: Seventeen studies encompassing 21 separate sample cohorts (81% from high-income countries) between 2005 and 2022 were included. The number of DCE studies in end-of-life care has increased in the last decade, with a large proportion evaluating the perspective from adults with advanced cancer. Studies in high-income countries relied on data from patient respondents as opposed to proxies in low-to-middle-income settings. Most studies included 3 to 7 attributes (Mean: 6.9, Median 6) in the experimental design. A total of 117 individual attributes were extracted and thematically grouped into 21 categories. Length of life and access to care attributes were most common, reported in 10/17 studies. Other commonly reported attributes across studies included cost (8/17), timely information (6/17), quality of life (QoL: 5/17), pain control (5/17), adverse effects (5/17), and place of death (5/17). Attributes in relation to psychosocial support/outcomes were less common. Attributes frequency varied between patients and proxies, with a high attention given to length of life, access to care, cost of care, and QoL by patients, while quality of care and emotional support by proxies. Clinical outcomes including pain control, QoL and length of life attracted high relative importance. Whilst proxy respondents had a strong preference for cost of care attributes, patients held stronger preferences for access to care and the provision of timely information.

Conclusion: DCEs of end-of-life care included a wide variety of attributes, with a clear emphasis on and preference for the clinical outcome attributes. Notably, both patients and proxies expressed strong preferences for pain control and QoL, when compared to additional survival time. This review highlights the increasing interest in DCEs relating to end-of-life care, with substantial evidence gaps existing in non-cancer cohorts, paediatric cohorts, and studies from low-to-middle-income settings. These findings provide important insights into understanding the relative strength of preferences for various aspects of care from multiple perspectives and populations, and developing holistic, person-centred models of care for people nearing the end of life.

A Discrete Choice Experiment to Quantify Health-Related Quality of Life Alterations Due to Prognostic Information on Conversion to Dementia

PRESENTER: **Robin Vermeulen**, 1. Department of Radiology, Radboud Institute for Health Sciences, Radboudumc, Nijmegen, The Netherlands
AUTHORS: Bram Roudijk, Tim Govers, Maroeska Rovers, Marcel Olde Rikkert, Ben Wijnen

BACKGROUND

Mild Cognitive Impairment (MCI) is a condition that is associated with an increased risk of dementia, with approximately 40% of the cases progressing within 5 years. Multiple prediction models are developed which aim to predict the individual risk of conversion from MCI to dementia. The H2020 funded AI-Mind project is an example of a project that aims to develop an accurate prediction tool for this purpose. To assess the potential value of this tool, an early cost-effectiveness analysis is part of the project. Prognostic information on conversion risk to dementia could have a high impact on the perceived Quality of Life (QoL) of the people involved and therewith on the potential value of the tool. However, information about impact on QoL is lacking. Therefore, this study aimed to quantify the impact of dementia risk predictions on perceived QoL and to evaluate the preferences of people for receiving a dementia risk prediction.

METHODS

A combined Discrete Choice Experiment (DCE) and Time Trade-Off (TTO) study was performed. Questions involved hypothetical scenarios that varied along two attributes: 1) "dementia risk prediction" with levels: low, moderate or high predicted risk, or no personalized prediction; and 2) "therapy", with levels: no therapy, medication, or lifestyle interventions. The DCE survey comprised 12 choice tasks in which respondents had to choose between two hypothetical scenarios, while imagining that they suffered from MCI. To be able to anchor DCE preferences on the health utility scale, with dead equalling 0 and full health equalling 1, a TTO study was performed. During an interview, a separate participant sample completed five conventional TTO tasks, including four scenario's that were also included in the DCE. DCE data were analysed with a mixed logit model and anchored to the health state utility scale using the mean observed TTO values.

RESULTS

296 respondents completed the DCE, and 42 respondents completed the TTO. Both samples were representative for the Dutch population aged 60-75 years. 55.5% and 85.4% of participants in the DCE and TTO, respectively, indicated that they wished to receive information on risk of conversion to dementia in case of MCI. In terms of health state utility, MCI without a personalized risk prediction was assigned a utility value of 0.75. MCI with low predicted conversion risk was valued best with an utility value of 0.81, whereas MCI with high predicted risk was valued worst with an utility value of 0.57. MCI with moderate predicted risk was assigned a utility value of 0.70. The availability of medication or lifestyle interventions resulted in an increase of the utility values.

CONCLUSION

These results show that more than half of the participants indicate that they would like to receive information on the risk of conversion to dementia if they would have MCI. However, the results also indicate that prognostic information on conversion risk to dementia is associated with considerable changes in perceived QoL. This information on preferences and perceived QoL provides valuable information to be used in (health economic) evaluations of dementia risk prediction models.

3:30 PM –5:00 PM   TUESDAY   [Cross-Cutting Themes And Other Issues]

Cape Town International Convention Centre | CTICC 1 – Auditorium 2
Nutrition, Taxes, Interventions and Impacts [ECONOMICS OF RISKY HEALTH BEHAVIORS SIG]

MODERATOR: **Olufunke Alaba**, University of Cape Town

An Assessment of the Underlying Mechanisms of South Africa's Health Promotion Levy: Considering Production and Consumer Responses to Sugar Taxes

PRESENTER: **Juan Carlos Salgado Hernandez**, INSP and UNC-Chapel Hill
AUTHORS: Nicholas Stacey, Shu Wen Ng

South Africa (ZA) was among the first countries to adopt a sugar-based tax on sugar-sweetened beverages (SSB) to tackle the increasing obesity prevalence. Implemented in April 2018, a tax of 0.021 South African rand (ZAR) per gram of sugar above 4 sugar grams/100 ml was applied to SSBs and published evidence shows that reformulation and reductions in purchases occurred. What is unknown is the strategic responses by firms and how these might have evolved if the tax had been higher. Based on a demand-and-supply structural model, we assess the tax effect on SSB purchases (in terms of volume and sugar) and prices through the following mechanisms: tax burden, production cost adjustments, and products' nutritional attributes after product reformulation. For the empirical application of our model, we used household purchase Kantar data for March 2016-March 2019. Additionally, given policy considerations that the ZA National Treasury have indicated, we simulate the effect of higher tax rates (i.e., 0.031 ZAR and 0.041 ZAR) under different assumptions around reformulation.

Compared to our preferred counterfactual scenario (i.e., no tax burden, no reformulation, and no production-cost adjustment), the current sugar tax led to price increases by 1.59 ZAR per SSB liter, purchase reductions by 49% across SSB subject to the tax, and sugar purchased reductions by 53.7% across all relevant beverages. We found sugar reductions ranged between 63% and 83% when the tax rate was higher. Under all reformulation scenarios, reductions in SSB purchases in terms of sugar are higher than the equivalent measure in terms of volume.

This study contributes to the literature on SSB taxes by estimating the simulated effects of the SSB tax in ZA (i.e., the only country to tax sugar in SSB per gram) and disentangling its effect through different mechanisms. Moreover, we provide ex-ante results of the effect of higher tax rates. This evidence can inform future efforts to reduce SSB consumption to a larger extent in ZA.

Economic Evaluation of the National School Food Standards across Secondary Schools in Midlands (the FUEL study): Undertaking Health Economics Research within Non-Health Settings

PRESENTER: **Irina Pokhilenko**, Maastricht University
AUTHORS: Marie Murphy, Miranda Pallan, Peymane Adab, Emma Frew

Background. Unhealthy diet is a major risk factor for developing obesity. Schools have been identified as one of the settings to promote healthy eating. The UK government introduced national school food standards (SFS), that prescribe what food needs to be served in schools. SFS were proven to be effective in reducing sugar intake among primary school pupils; however, no such evaluation exists in secondary schools. Furthermore, there is no evidence on the economic impact of SFS. This study will present the economic evaluation conducted alongside the UK Food provision, cUlture and Environment in secondary schooLs (FUEL) study, and offer a discussion on the methodological challenges of undertaking health economics research in non-health settings.

Methods. FUEL was a natural experiment with schools mandated to adhere to the SFS (SFS schools) compared to schools that were not mandated (non-SFS schools). The economic analysis comprised a micro-costing, cost-consequence, and an exploratory cost-utility analyses, from a public sector perspective. Costs of food provision and the SFS were collected from schools; costs of school-based food purchasing were collected from pupils. The outcomes included health-related quality of life (HRQoL), nutritional intake, dental health, and educational performance. Additionally, public data on catering expenditure was incorporated.

Results. Data were collected from 36 schools and 2543 pupils. SFS schools spend slightly less on food provision compared to non-SFS schools. Pupils attending SFS schools had slightly higher HRQoL, marginally better dental health, and slightly worse nutritional intake. SFS schools performed worse according to the educational outcomes. However, there were no clear trends, and the results of the exploratory cost-utility analysis were largely uncertain. There were large amounts of missing cost data despite repeated collection attempts.

Discussion. Overall, the study did not find clear evidence of the economic impact of SFS in secondary schools. Furthermore, the difficulty of collecting cost data in schools was a major challenge which affected the accuracy of the results. This presentation will offer insights into the appropriateness of using primary data collection methods for complex interventions in non-healthcare settings. It will discuss the trade-off between information accuracy and the resources required to collect that information.

Fruit and Vegetable Consumption and Happiness in the United Kingdom, Australia, and South Africa: A Fixed Effect Instrumental Variable Analysis

PRESENTER: **Li-Wei Chao**, University of Pennsylvania
AUTHORS: Rui Leite, Ana Rita Farias, Shandir Ramlagan, Karl Peltzer

BACKGROUND:

Fruit and vegetable (FV) consumption has been linked to better physical health. Recent studies also link FV consumption to better mental health. The World Health Organization (WHO) has recommended consuming at least five servings of FV per day, but recent statistics find most populations (in both developed and developing countries) achieve far below the target, despite knowing "FV is good for health". Two recent studies using large survey data from Australia and from the U.K. using fixed effect (FE) regression found significant and large positive associations between FV consumption and life satisfaction; the authors caution that fixed effect regression cannot show causality.

METHOD AND RESULTS:

Using data from the U.K., Australia, and South Africa, we apply FE and instrumental variables (IV) regressions to show that the effect of FV on life satisfaction is plausibly causal. We use the consumer price index (CPI) of FV as the instrument (F statistic > 16). We test whether controlling for individual time invariant effects was necessary, by using correlated random effects as control functions; we find that controlling for time invariant effects is not necessary for the relationship between FV and life satisfaction. We further test whether the FV variable is endogenous after controlling for FE; we find FV remains endogenous even with FE. We calculate the elasticities of FV's effect on life satisfaction and find similar elasticities across the three countries; the increase in life satisfaction from increasing average daily FV intake by one serving would more than offset the negative effect on mental health from becoming unemployed or developing a chronic illness.

To explore whether the large effect size from IV estimates is due to heterogeneous treatment effect, we apply marginal treatment effect (MTE) estimation on WHO's five-a-day recommendation. We find that the MTE curve is downward sloped: Although some may derive large gains in marginal utility by switching from not-meeting to meeting five-a-day, others may derive little gain. Examining the potential outcomes of meeting versus not meeting five-a-day (conditioning on the individual differences in observed and unobserved resistance to meeting WHO's guideline), we find that anyone who meets the five-a-day derives a potential high life satisfaction -- regardless of the level of resistance to eating FV. The key difference lies in the individual differences in the potential outcomes when people consume low amounts of FV. Individuals with high resistance in achieving five-a-day still have relatively high life satisfaction despite not consuming five-a-day. However, individuals with low resistance in meeting five-a-day derive very low life satisfaction had they not consumed enough FV.

DISCUSSION:

A public information campaign to "educate" that people will be "happy" with more FV will likely be ineffective. This is because those who derive greater happiness with more FV consumption already have low resistance to treatment and thus already consume their five-a-day. Those who do not consume five-a-day also know they are just as happy eating versus not eating five FV servings a day, so the campaign to them is irrelevant.

Cost-Effectiveness of a Public Health Policy Intervention to Reduce Eating Disorders Among Youth

PRESENTER: **Masami Tabata-Kelly**, The Heller School for Social Policy and Management, Brandeis University
AUTHORS: Cynthia A Tschampl, Mary R Lee, Upanita Barman, Amanda Raffoul, Bryn Austin

Background:

Eating disorders account for over 10,000 deaths, 33,000 hospital admissions, and $64 billion in healthcare costs annually in the United States. Eating disorders are health conditions that substantially impact individuals' health-related quality of life. Given that more than half receive their first diagnosis of eating disorders by the age of 18 years, early prevention plays a critical role in curbing the growth of eating disorders and their associated economic costs. Use of over the counter (OTC) diet pills is a common unhealthy weight management behavior among youth. It often sets youth on a pathway to eating disorders. Furthermore, lack of regulatory oversight in the dietary supplements market puts youth at risk of unknowingly consuming toxic ingredients which can cause detrimental health consequences. Restricting access to these harmful products through public health policy therefore has the potential to stop the upward trend in eating disorders among youth. Several states including Massachusetts have proposed an age restriction bill to prohibit the sales of OTC diet pills to minors under 18 years of age. The aim of this study was to analyze the cost-effectiveness of this prevention policy.

Methods:

We modeled two closed cohorts of males and females aged 0-17 years in Massachusetts using data from the existing literature and public data sources. The cost-effectiveness analysis (CEA) was performed from a societal perspective with a time horizon of thirty years. We calculated the 95% confidence intervals by running Monte Carlo simulations over 10,000 iterations. The Monte Carlo simulations also included a Pert-Beta distribution for the number of persons impacted to deal with uncertainty created by key inputs being focused on youth aged 10-17, while diet pill use can start at younger ages. The primary outcomes were reduction in years lived with eating disorders, QALYs saved, and total costs. We then calculated an incremental cost-effectiveness ratio (ICER).

Results:

The proposed public health policy intervention could prevent 14,415 (95%CI 9,595-19,229) years and 13,794 (95%CI 9,119-18,371) years lived with eating disorders among females and males, respectively. Further, we calculated 2,574 (95%CI 1,713-3,434) QALYs and USD$143 million (95%CI $96M-$192M) saved among females and 2,463 (95%CI 3,281-1,628) QALYs and USD$137 million (95%CI $91M-$184M) saved among males. The overall ICER showed approximately USD$55,900 saved along with each QALY saved. Cost savings were dominated by caregiver and individual opportunity costs.

Conclusions and implications for policy:

The study findings suggest that a proposed public health policy restricting OTC diet pill sales to minors could be cost saving from a societal perspective. These results can facilitate evidence-informed policy making and guide legislative and funding priorities. The next step in this study is to conduct a companion distributional cost-effectiveness analysis (DCEA) to provide stakeholders deeper insights into how these savings and health gains might be distributed among differing racial/ethnic subpopulations.

3:30 PM –5:00 PM   TUESDAY   [Health Care Financing & Expenditures]

Cape Town International Convention Centre | CTICC 1 – Room 1.63
Communicable Disease: Economic Burden and Health Outcomes

MODERATOR: **Susan Powers Sparkes**, WHO

Examining the Relationship between Geographic Disparities in Malaria Outcomes and Disaggregated Spending on Malaria in 106 Countries, 2000 – 2020

PRESENTER: **Nishali K Patel**, Institute for Health Metrics and Evaluation
AUTHORS: Joseph Dieleman, Ian Cogswell, Brendan Lidral-Porter, Golsum Tsakalos, Yingxi Zhao, Angela E Micah

Background: While substantial gains have been made in the fight against malaria over the past twenty years, access to malaria control interventions remains less than universal. The successful elimination of malaria will be determined in part by spending on malaria interventions, and how those investments are allocated. This study aims to both identify potential drivers of malaria outcome inequality and to demonstrate how spending through different mechanisms can lead to greater health equity.

Methods: We utilized state-level estimates of malaria case incidence and mortality rates from 2010 to 2020 to quantify the degree of inequality in malaria burden within countries using the Gini index. Estimates of Gini indices represent within-country distributions of disease burden, with high values corresponding to inequitable distributions of malaria burden within a country. We then used time series analyses to quantify associations of malaria inequality with malaria expenditures, controlling for country socioeconomic and population characteristics.

Results: Between 2010 and 2020, we found high levels of inequality in malaria burden within countries. In 2020, values of the Gini index ranged from 0.14 to 0.99 for incidence, 0.31 to 0.99 for mortality, and 0.002 to 0.82 for case fatality. Spending on health systems strengthening for malaria, maternal education, GDP per capita, and population-weighted mean temperature were associated with reductions in malaria outcomes inequality within countries. In addition, access to quality healthcare was also associated with a reduction in malaria outcome inequality among countries with a high malaria burden.

Interpretation: Given heterogeneity in outcomes in countries currently fighting malaria, and the challenges in increasing both the amount of domestic and international funding allocated to control (and eliminate) malaria, the efficient use of currently available resources should be a priority.

The Fight Against Malaria: A New Index for Quantifying and Assessing Policy Implementation Actions to Reduce Malaria Burden in Sub-Saharan Africa

PRESENTER: **Gustavo A. Marrero**, Universidad de La Laguna
AUTHORS: Carlos Bethencourt, Charlie Y. Ngoudji

In 2019, 229 million people are still suffering from malaria, and 94% of them live in Sub-Saharan Africa (SSA). Limited resources and unfavorable natural conditions have made controlling the parasites causing malaria an extremely difficult task in the region. However, since 2000, the burden of malaria has declined considerably in SSA.

In this paper, we gather information of single antimalarial policies (61 in total) for 44 SSA countries from 1990 to 2017 from the WMRs (2005-2018). We classify them according to the nature of the intervention in 7 categories and 2 pillars: pillar 1 includes 4 categories related to prevention and vectors' control, diagnosis, treatment and case management, and surveillance measures; pillar 2 includes 3 categories related to antimalarial therapies, therapeutic efficacy tests and insecticide susceptibility bioassays. We then aggregate all these policies into a synthetic Malaria Policy Index (MaPI). The MaPI (pillars and categories) allows us tracking policies and explaining big changes in antimalarial policy implementation.

The MaPI is the first attempt to synthesize the available information of antimalarial policies implementation at the country level, using a homogenous dataset, for a long period of time and a large set of SSA countries. Moreover, the considered period (1990-2017) includes more than ten years before and after the aforementioned change of the international strategy to fight against malaria, hence it is useful for policy evaluation experiments.

We observe an increase of convergence in policy implementation in the region, starting in more developed countries and reaching less developed countries from mid-2000s. Convergence on main macroeconomic aggregates (i.e., per capita GDP or the quality of institutions) is not behind MaPI convergence, but it rather coincides with an unprecedented and unevenly distributed increase in international health aid in SSA.

Next, we analyze the association between the antimalarial policy implementation and within-country changes of malaria deaths and prevalence. We explore the existence of common and country-specific effects. Accordingly, we apply a difference-in-difference events study designs and a distributed lag model approach to estimate the effect of antimalarial policy increases on posterior changes in malaria burden within SSA countries.

We find that the implementation of policies in Pillar 1 is the key to reduce the within-country malaria mortality rate in the region. Moreover, results are quantitatively relevant: an increase of 10 p.p. in this pillar generates a significant reduction of mortality after the second year and a cumulative decrease of about 8 p.p. after five years. We distinguish by age groups, and find that results are robust and significant in all cases, but the cumulative effect is higher after five years for the group of children below five years old (9 p.p.). At the same time, we find that changes in the implementation of policies included in Pillar 2 (malaria therapies and tests) presented weak and noisy correlations with posterior changes in the malaria mortality rate. These differences between Pillars 1 and 2 make the MaPI specification results noisy and less significant than those of Pillar 1.

Economic Burden of Infectious Diseases on Indian Households: Estimates from a Nationally Representative Household Survey (2017-18)

PRESENTER: **Habib Farooqui**, Public Health Foundation of India
AUTHORS: Anup Karan, Suhaib Hussain

The long-term evolutionary outcome of COVID-19 is predicted to be an endemic infection with seasonal waves. As a result, low and middle-income (LMI) countries with an already high burden of endemic infections and associated risk factors are at higher risk of disease

transmission and economic losses. The poorer households of LMI countries are particularly at higher risk of economic losses because of the higher probability of infection acquisition, hospitalization and death because of a high prevalence of risk factors in their places of residence and work. The core objective of this research was to answer - what are the economic consequences of infectious diseases on households in terms of out-of-pocket expenditures (OOPE) on treatment and associated productivity losses? And whether there is a differential impact of these health shocks across poor and rich households.

We analysed the Social Consumption: Health (SCH) data from India's National Sample Survey Office (NSSO) 75th round (NSSO 2017-18). The sample included ~ 113,823 households and 555,352 individuals through a multistage stratified sampling process. We estimated i) prevalence of infectious diseases, and healthcare utilisation ii) per episode medical and non-medical OOPE iii) per episode mean workdays and wage loss iv) OOPE and wage loss as a share of household's monthly non-medical consumption expenditure, disaggregated by quintile groups. The SCH survey does not collect information on the wage/earnings of an individual. Hence, for estimating wage loss of individuals reporting infectious diseases, we imputed wage data in the SCH survey disaggregated by types of employment, rural-urban and several other socio-economic predictors using the Periodic Labour Force Survey (PLFS) 2017-18 which is also conducted by the NSSO. We estimated the Mincer earnings function using PLFS 2017-18 to identify the related socio-economic indicators which are potential predictors of an individual's wage.

The prevalence of infectious diseases was 31 per thousand persons and hospitalization rate was 9 per thousand persons for 15-day and 365-day reference periods, respectively. Furthermore, a trend of negative externality - an increasing mean number of infections per household with an increase in household size - was detected. Per-episode average direct medical expenditure was higher in the private sector in comparison to the public sector for both outpatient consultation and hospitalization. However, per-episode average non-medical expenditure (travel, food and accommodation) was lower in the private sector as compared to the public sector. Furthermore, OOPE as a share of non-medical consumption expenditure on hospitalization was considerably higher for poorer households (221%) as compared to the richest households (177 %). The poorest also incurred higher wage loss (33.7% of household's non-medical monthly consumption expenditure)on hospitalization as compared to the richest households (12.6%). Similarly, the proportion of households resorting to the sale of assets and borrowing was higher in the poorest (23%) in comparison to the richest (14%).

The core contribution of this research is integration of infectious disease transmission, OOPE and income losses, and their equity impact on households. We recommend that state-sponsored insurance schemes incorporate wage loss compensation for hospitalization as an integral component of their schemes.

A Budget Impact Analysis of a Pay-for-Performance Model for Tuberculosis Care in Indonesia

PRESENTER: **Sarah Maria Saragih**, Results for Development Institute (R4D)
AUTHORS: Firdaus Hafidz, Aditia Nugroho, Laurel Hatt, Yuli Farianti, Ackhmad Afflazir

Background

Indonesia has the second highest Tuberculosis (TB) burden in the world. TB service provision is overconcentrated at the secondary care level, which creates quality and equity barriers for users and causes economic inefficiencies for Indonesia's National Health Insurance (NHI). In response to this challenge, the Government of Indonesia, with support from U.S. Agency for International Development, designed a strategic purchasing model that modifies payment mechanisms for TB programs to incentivize quality and efficiency of care.

Objective

This study aims to estimate the budget impact of the strategic purchasing model and its implications for overall investments in TB.

Methods

A budget impact analysis (BIA) model was developed based on TB clinical pathways under NHI. We compared two scenarios to estimate the budget impact: 1) the current scenario, under which primary-level providers are paid via capitation, and 2) the "SHP scenario", under which primary-level TB diagnosis services (Xray) would be reimbursed via fee-for-service and incentive for successful treatment would be paid in two installments. Taking the payer's perspective, the model considered direct medical costs related to TB diagnosis and treatment, as well as the cost of outreach to identify missing cases. Payers for TB care were the Ministry of Health's National Tuberculosis Program (NTP), NHI, and donors. The hypothetical population comprised patients with presumptive and confirmed TB enrolled in NHI and sought care from health providers. Cost data were collected from the NTP pricing database, the Indonesian case-based groups database, and market research. The model relied on three main parameters: TB case notification, case referral, and treatment success rate. Data were derived from Indonesia's 2020 sample of NHI claims data, literature review, and expert opinion.

Results

Under the SHP scenario, the BIA model estimated that 95% of TB patients would be retained at the primary level which is initially being referred to a hospital. Moreover, the use of GeneXpert for diagnosis would increase by 15%, as the model encourages providers to use the test as a first-line diagnosis. Applying these parameters, the number of TB patients successfully treated would be higher in the SHP scenario (679,680) compared to the current system (439,165). The total budget spent on TB care would decrease from 152.8 million USD to 125 million USD under SHP. TB is mainly financed by the NHI;under the P4P scenario, NHI expenditure would decrease by 64%, establishing the MOH as the most significant contributor to TB financing (72%). In the SHP scenario, the cost per presumed TB case would

be reduced by 23% (24.5 USD in SHP scenario). However, the cost per treated patient and cost per successfully treated patient would decrease by 45% (165.8 USD) and 47% (183.9 USD), respectively.

Conclusions

Applying strategic purchasing to finance TB care might reduce the total budget and improve efficiency by reducing patient costs and delivering improved treatment completion rates. This study will serve as the basis for piloting strategic purchasing for TB in Indonesia. Political commitment, capacity readiness, and improvements to information systems will also be necessary for the pilot to succeed.

3:30 PM –5:00 PM   TUESDAY   [Health, Its Distribution And Its Valuation]

Cape Town International Convention Centre | CTICC 1 – Room 1.43

Issues in the Measurement, Valuation and Reporting of Child and Caregiver Health and Quality of Life [ECONOMICS OF CHILDREN'S HEALTH AND WELLBEING SIG]

MODERATOR: **Martin Howell**, University of Sydney

ORGANIZER: **Brendan Mulhern**, University of Technology Sydney

A Systematic Review of the Evidence on the Social Value of a Child Health Versus Adult Health

PRESENTER: **Martin Howell**, University of Sydney

Objectives: This systematic review aimed to synthesise current knowledge on the relative social value of child versus adult health, and across children of different ages.

Methods: Empirical studies in English that explored the public's willingness to trade-off between health gain to children compared with adults or prioritise treatments between children and adults were included. Five databases were searched on 8th December 2021. Risk of bias was assessed using a checklist derived from the best-practice recommendations for stated preference studies by Johnston et al (2017). Findings were tabulated by study type and the percentage of these providing evidence in favour of prioritising children considered in total, by type of health gain (length of life or quality-of-life), study methodology (Matching studies, Discrete Choice Experiment (DCE), Willingness to Pay (WTP), Opinion Survey and Qualitative) and respondent characteristics.

Results: 84 studies were included: 9 of which were classified as WTP, 12 as Matching studies, 29 as DCE, 21 as Opinion Surveys and 14 Qualitative studies (with one study including both Qualitative and Opinion Survey components). From these studies, 80 separate quantitative 'findings' were identified; of which 42 supported prioritising children over adults, 12 provide evidence that responders favoured treating adults in preference to children, and the remainder supported equal prioritisation, or found diverse or unclear views. Opinion Surveys show a far lower percentage of findings supporting favouring children (21%) compared to matching studies, WTP and DCE (71%, 82% and 63% respectively).

The evidence was not able to clearly distinguish between the value of life extensions versus improvements in HRQoL for children and adults, nor between the views of different groups of responders. Whilst there was a tendency for parents to give greater weight to children and older respondents less weight this was not tested systematically across different empirical methods. The evidence on the relative value of infants' health relative to the health of older children or adults is limited, but where within-childhood age comparisons were made, slightly more studies found responders were willing to prioritise older children over infants.

The thematic synthesis of qualitative studies identified three preliminary themes with regard to prioritising treatment in children compared to adults: priority setting through fair and legitimate processes, maximising health and social gains, and negotiating moral boundaries.

Conclusions: The balance of evidence included in this review suggests public opinion favours prioritizing children over adults, but this view is not held universally, and findings varied by study methods. Studies which ask about the distribution of a quantifiable, discrete health gain between children and adults (particularly older adults) are more likely to find pro-child preferences than studies asking questions which may imply a more general move towards prioritisation of children. There are outstanding research gaps in understanding the public's views on the value of health gains to infants and the motivation behind the public's views on the relative value of child versus adult health gains.

Understanding the Valuation of Paediatric Health Related Quality-of-Life Using Discrete Choice Experiments: Results from a Qualitative Study with Australian Adults and Adolescents.

PRESENTER: **Alice Yu**, University of Technology Sydney

Background

Value sets for paediatric specific preference-based measures of health related quality-of-life (HRQL) are required for the estimation of quality adjusted life years (QALYs). These can be elicited using discrete choice experiment approaches. However, there are a range of

conceptual and methodological issues in the elicitation of preferences for paediatric HRQL using DCE that impact the characteristics of the value sets elicited. These include whose values should be sought (adults or adolescents) and the extent to which these populations are able to compete the tasks, which preference-based measure should be used, the perspective taken for the valuation (i.e. self or other perspective), the inclusion of duration in the DCE tasks, and including choice tasks with overlapping dimension levels (with the same severity level across dimensions).

Aims

The aim of this qualitative study is to explore the impact of different methodological choices on the decision making process of adults and adolescents when completing DCE valuation tasks.

Methods

An interview protocol was developed using DCE valuation tasks hand designed to test methodological issues. The issues tested were which instrument (EQ-5D-Y-5L, HUI3, CHU-9D, and PedsQL), perspective (own vs. child), adult and adolescent differences, the inclusion of duration in the choice sets, and dimension level overlap. Interviews were conducted virtually via Zoom with an adolescent and adult sample. Respondents aged 11 and older are in the process of being interviewed and recruited (n = 60). In the interview, the respondent were asked to complete a set of DCE tasks while 'thinking aloud'. After completion of the survey, respondents were asked some pre-planned questions in relation to various aspects of the DCE tasks. Interviews were recorded and transcribed, and analysed using a thematic analysis approach.

Results

Data collection is ongoing, and will be completed in early 2023. Preliminary results suggest that increasing the number of dimensions, and including duration, in a choice set increases task difficulty. However, imposing overlap makes the tasks easier to complete. Both adolescents and adults are able to value health states described across different instruments. Varying perspective results in different conceptualisations of, and therefore responses to, the tasks.

Discussion

It is feasible for both adults and adolescents to value health using DCE approaches. The instruments include different dimensions of HRQL, and this impacts how respondents consider and value the health states described. The results of this work will inform the design of a large scale quantitative study to generate value sets for use in health care decision making in Australia.

How Well Does the EQ-HWB-S Perform in Measuring the Quality-of-Life of Caregivers of Children Where Families Experience Adverse Life Events.

PRESENTER: **Cate Bailey**, The University of Melbourne
AUTHOR: Kim Dalziel

Objectives

Reliable quality-of-life measures are essential for economic evaluations of interventions, to aid policy-makers as to when and how to best intervene. Standard Health-related Quality of Life measures such as the EQ-5D are effective and validated in the health sector but may not capture important aspects of the quality-of-life of caregivers. Patient ill health and adversity may have significant impacts on the quality-of-life of caregivers; how best to include this in economic evaluation is of international importance. The EuroQol Health and Wellbeing instrument (EQ-HWB) was developed as a broad generic measure of quality-of-life for use in economic evaluation, applicable across health and social care sectors. The aim of the current study was to investigate the validity and reliability of the experimental short form version of the EQ-HWB in caregivers of children who have experienced adverse life events.

Methods

This mixed-methods study was nested within the Centre of Research Excellence in Childhood Adversity and Mental Health (CRE). Participants in the CRE study were caregivers of children under eight-years attending a health hub in a low socio-economic area of Melbourne. The nested study used baseline data for caregivers from the CRE study. Instruments included the nine-item short-form (EQ-HWB-S), Kessler-6 (K6), Personal Wellbeing Index (PSI), disability status of the participant's child and family adversity.

Performance and feasibility of the EQ-HWB-S were assessed through analysis of item responses and missing data. Convergent validity was assessed against the K6 and PWI using correlations, with *a priori* expectations for items above a Pearson's-r of 0.3. Known groups validity was assessed for EQ-HWB-S total scores (using a simple sum score approach) by groups such as mental illness (K6), child disability status, child social-emotional status, and number of adversities experienced. Sensitivity to change was be measured in reference to change in number of adversities. Test-retest reliability was be measured over two days. Content validity was assessed through semi-structured interviews with participants drawn from the baseline sample.

Results

There were 234 cases at baseline, of which 80.1% women, and with a mean age of 35.8 (SD=6.5). All EQ-HWB-S items had good spread except the first item, mobility, as few caregivers had mobility concerns. There was a low percentage of missing items in the EQ-HWB-S (0 -1.3%), the K6 (0.4 - 1.7%) and the PWI (0 - 1.7%). In tests of convergent validity, the percentage of correlations of over .3 with the EQ-HWB-S was 88.6 for the K6 and 76.3 for the PWI, matching expectations. In the known groups analysis, the EQ-HWB-S total sum score was significantly different between all mental health, disability, and adversity groups. Participants in 12 semi-structured interviews indicated that the questions were relevant and important; the mobility question was not relevant to most participants but should be included. Sensitivity to change and test-retest reliability will be investigated as follow-up data becomes available.

Conclusions

The EQ-HWB-S had good performance and high convergent and known groups validity in a sample of caregivers of children who had experienced adverse life events.

Values for Childhood Health-Related Quality-of-Life: A Checklist for Studies Reporting the Elicitation of Stated Preferences

PRESENTER: **Stavros Petrou**, University of Oxford

Background: A systematic review of childhood health-related quality-of-life (HRQoL) measures and their preference-based value sets (Kwon et al 2022) shows different methods for eliciting and modelling value sets for childhood HRQoL and different characteristics of the resulting value sets. That paper and a review of the methods used for valuing childhood HRQoL (Bailey et al 2022) found poor/incomplete reporting in many studies. Checklists can play an important role in improving reporting standards and in helping users to interpret and assess available values. Existing checklists for studies that elicit health utilities focus on valuation of adult HRQoL instruments, so do not include items addressing issues specific to valuing childhood HRQoL nor items to help users judge the validity of reported values.

Objectives: Our aim was to develop a checklist for studies generating preference-based values for childhood HRQoL. Values used in cost-effectiveness models of paediatric interventions often include values directly elicited for disease-specific states or vignettes as well as those from value sets for childhood measures; our checklist was developed to be applied to either.

Methods: A conceptual model was developed that provides a modular structure for the checklist. Modules are grouped by (i) methods (A-D) and (ii) values (E). A longlist of potential items for each 'method' module was obtained from a review of checklists for adult HRQoL values (Zoratti et al 2021), complemented by additional items specific to childhood HRQoL values extracted from recent reviews of the methods literature. Checklist items relating to the characteristics of the 'values' were based on theoretical papers on external validity of stated preference data (e.g., Lancsar and Swait 2014) and papers reporting methods for examining the distribution of 'theoretical' values in value sets (e.g., Pan et al 2021). A list of items from prior published checklists plus items specifically developed for children's values was reduced by eliminating duplication and overlap and refined to strengthen relevance and clarity via an iterative process. The resulting checklist was tested by applying it to papers selected from those reported in Kwon et al (2022) and Bailey et al (2022).

Results: The resulting checklist contains modules aimed at reporting methods (A-D) and the characteristics of values (E). A long list of 80 items, and a short list of 16 items was produced. Application of the checklist to a selection of papers reporting childhood HRQoL values suggests they are feasible to use.

Conclusions: This is the first checklist for studies reporting childhood preference-based values. Its modular structure means in principle it can be applied to assess value sets as well as values generated from other types of studies eliciting values for childhood health states. Inclusion of items relating to characteristics of values is novel and potentially has broader relevance (e.g., to future checklists for adult utilities). The checklist has the potential to improve completeness in the reporting of childhood values as well as help users compare and assess the characteristics of available value sets. A consultative process to finalise the checklist is planned to improve its usability.

Cape Town International Convention Centre | CTICC 1 – Room 2.44-2.45

Purchasing Models [FINANCING FOR UHC SIG]

MODERATOR: **Klemens Höfer**, University of Duisburg-Essen

To Pool or Not to Pool? National Vs. Global Incentives in Pooled Purchasing

PRESENTER: **Emma Dean**, University of Miami

AUTHOR: Evan Saltzman

Efficient procurement is essential in improving access to vital medications in low- and middle-income countries. In 2009, the Global Fund to Fight AIDS, Tuberculosis and Malaria established a voluntary Pooled Procurement Mechanism (PPM) that enables countries to bargain together with drug manufacturers over prices. The PPM can help countries obtain lower prices, particularly small, low-income countries with little bargaining power. However, large and high-income countries with greater bargaining power may be able to negotiate deeper discounts outside of the pool by aggregating within-country orders. Consequently, these countries may not participate in the PPM, reducing the PPM's bargaining power.

In this paper, we study the impact of country participation in the PPM and evaluate alternative policies for increasing participation. We develop a model of the global pharmaceutical market and estimate it with data from the Global Fund Price and Quality Reporting database. These data include 62,053 purchases of essential medications from 116 countries.

We first use our data to quantify heterogeneity in drug prices and PPM participation across countries. Our estimated instrumental variable and descriptive regressions indicate that smaller countries are more likely to purchase medications through the PPM (69.2% more likely than large countries, p-value: <0.001), and obtain lower prices by purchasing through the PPM (-$7.17 lower as compared to direct from manufacturer purchases, p-value: 0.027). However, larger countries continue to pay less than small countries for identical products (-$6.85, p-value: <0.01) and are significantly less likely to participate in the PPM. We also find wealthier countries are less likely to purchase through the PPM, but pay higher prices than lower-income countries ($13.53, p-value: <0.01).

In order to understand which policies may increase participation in the PPM and improve access to essential medications, we use our data to estimate a structural model of the global pharmaceutical market. Our model endogenizes (1) countries' decisions to participate in the PPM; (2) price negotiations of drug manufacturers with individual countries and the PPM; (3) countries' drug purchase orders; and (4) patient drug choices. Following the literature, we use a Nash-in-Nash bargaining framework to model price negotiations. To model countries' demand for medications, we develop an innovative methodology that combines a standard discrete choice model with the newsvendor model for perishable goods.

In the final part of the paper, we conduct counterfactual simulations using our estimated model. We find increased PPM participation among large countries would substantially reduce prices and increase social welfare in small, low-income countries. Designing mechanisms to promote large country participation in the PPM is therefore a promising path for improving access to medication in low- and middle-income countries.

The Impact of National Volume-Based Procurement on Healthcare Expenditure for Hypertensive Patients in Guangzhou, China

PRESENTER: **Zheng Zhu**, Peking University

AUTHORS: Yan Sun, Jiawei Zhang, Peien Han, Li Yang

Background: In 2019, the Chinese government launched the national volume-based procurement (NVBP), a novel pooled procurement, intending to reduce drug prices and save drug costs through economies of scale. 7 antihypertensive drugs were selected in NVBP. Using individual-level data, this study provided more consistent and stronger evidence of the effects of NVBP on total healthcare expenditure, health insurance funds burden, and patient burden in Guangzhou. In addition, we explored whether health service factors and patient characteristics alter the effect of the intervention and the influencing factors of patients' behavior in selecting NVBP-list medicines

Methods: Using Guangzhou claims data and adopting the interrupted time series (ITS) and difference-in-difference (DID) approach, we evaluated the impacts of the NVBP policy on total healthcare expenditure, health insurance budgets, and patients' financial burden at both the collective level and individual level. We also examined how patients and health facilities' characteristics affected the association.

Results: At the collective level, we found that the introduction of the NVBP policy reduced total healthcare expenditures and health insurance expenditures for outpatient services by 11.40% and 15.63%, respectively (all p<0.01), while it appeared to have no impact on inpatient services. At the individual level, the DID analysis showed that the total healthcare expenditures per visit decreased by 35.40% (p<0.01), among which healthcare insurance expenditures decreased by 36.81% and out-of-pocket expenditures decreased by 24.65% for outpatients treated with NVBP-list drugs. However, we did not detect any changes in healthcare expenditures per admission for inpatients. In subgroup analysis, we found a greater decrease in healthcare expenditure per visit for secondary and tertiary hospitals, as well as patients with Urban and Rural Residents Medical Insurance (URRMI). The results to a certain extent demonstrated that the NVBP policy depended

on trust held by patients in the quality of available generic products. The patients with a higher frequency of office visits were less affected by NVBP policy because of the trust in previously used drugs rather than NVBP-list drugs.

Conclusion: This study provides additional evidence that the NVBP policy was associated with achieving cost-containment, alleviating patients' burdens, and relieving pressure on health insurance funds, which provides important lessons for other countries that are seeking to improve their drug procurement processes. However, the impact of NVBP policy is likely to differ across facilities level and health insurance schemes. The interests, values, and attitudes of some patients have not yet been fully aligned with policymakers. The acceptance of NVBP-list drugs by patients and doctors should be improved to promote NVBP-list drug use when implementing NVBP on a larger scale.

Paying for Health Benefits

PRESENTER: **Luigi Siciliani**, University of York
AUTHORS: James Gaughan, Nils Gutacker, Hugh Gravelle, Martin Chalkley

Objectives

Payments to healthcare providers are mostly based on throughputs with well-known limitations. Payment based on health outcomes, a type of pay for performance, have been advocated as the solution. However, there is a lack of consensus on how the incentive bonus should be set.

This study uses principal-agent (contract) theory, to model pay for performance when: i) health gains are observable to the funder and contractible; ii) health gains are measured by patient reported outcomes (PROMs) as available in the English National Health Service for hip replacement. The main objective is to develop a theoretical model that can be calibrated with real-world data to be able to inform policy.

Methods

Our methodology involves four steps: 1) develop a model of provider behaviour (the agent); this involves specifying a payoff of the hospital which depends on revenues, costs and (intrinsic) motivation, and deriving equilibrium quality and health outcomes; 2) Identify the objective the funder (the principal) would like to achieve in terms of patient health; here, we distinguish between a positive and a normative analysis; the positive analysis assumes that the funder sets a health target which depends on the empirical distribution of health outcomes (e.g. top quartile); the normative analysis sets the target health as the results of the trade-off between patient health gains and provider costs; 3) Set the price for the provider (the agent) that achieves the funder (principal) objective; 4) Identify the key parameters and compute the price, which achieves funder objective (calibration).

Results

Using data from hip and knee replacement in England we calibrate the model for the average provider with respect to two key parameters, provider costs and post-operative health. We then compute the bonus payments that the purchaser would have to make to achieve target levels of post-operative health equivalent to improvements of one or two standard deviations of the health distribution observed across providers. To infer the shape of the cost function for the average provider, we make assumptions related to fixed and variable costs. In our calibration for hip replacement, we find that the price for one unit of health improvement as measured by the Oxford Hip Score to achieve an improvement of 1.13 OHS (equivalent to one standard deviation observed in the empirical distribution) ranges between £45 and £226 under different assumptions related to the cost function. For knee replacement, the price for one unit of health improvement as measured by the Oxford Knee Score to achieve an improvement of 1.06 OKS (equivalent to one standard deviation observed in the empirical distribution) ranges between £72 and £254 under different assumptions related to the cost function. The price doubles for a health target of two, rather than one, standard deviation improvement.

Discussion

The analysis shows how contract theory to can be usefully employed to simulate optimal incentive bonuses that incentivise health gains, and can be replicated in other health contexts.

The Effect of Prospective Payment Scheme (PPS) on Inpatient Expenditure: When Does a Successful PPS Become an Ineffective Cost Containment Policy.

PRESENTER: **Yunji Choi**, Seoul National University

Background: Fee-for-service is a feasible and innovation-promoting payment scheme but it implicitly incentivizes high utilization, inevitably leading to increasing healthcare spending. As a response, many countries have adopted prospective payment scheme (PPS) with the aim of cost containment. Studies find that PPS helps achieve cost containment to some sense but creates responses such as upcoding of severity and crowd-outs to non-PPS services. However, existing research has largely focused on serious and risky medical procedures (e.g. c-section, premature infant care, CABG surgeries) that neither patients nor physicians wish to abuse. That is, those that are not the ones that create "wasteful" expenditure. Thus, this paper examines the effect of PPS when applied to procedures that are often blamed for being a spending burden in universal health insurance.

Objectives: On July 2012 in Korea, there has been a *mandatory FFS-to-PPS switch* for inpatient care of 7 surgical procedures, which are deemed burdensome in terms of expenditure. The main policy goal was cost containment. To examine whether the goal was achieved, this paper asks two research questions: (1) did mandatory FFS-to-PPS switch successfully reduce inpatient expenditure per case of surgery; and (2) was it a successful cost containment policy. The two questions may seem redundant, but I investigate the cases where the answers differ.

Methods: I use an administrative claims data from a nationally representative sample of 1 million individuals.

The FFS-to-PPS switch took place on July 2012 (single timing) and was only applied to clinics and small-scale hospitals. I use a single timing difference-in-differences. Treatment group include the cases of surgeries done at clinics or small-scale hospitals. Control group include matched cases of surgeries done at large-scale hospitals, and are matched using the pre-period propensity scores estimated using demographic and socioeconomic characteristics, chronic diseases, and relevant medical department visits. As a robustness check, I also used procedures that remained under FFS as control group.

Key results: In the short term, I find a rapid, strong and significant reduction in inpatient expenditure due to a mandatory FFS-to-PPS switch. I do not find significant spillovers to screening and outpatient care, or quality trade-offs.

However, if I look at the total expenditure incurred by the surgical procedures, the success of the policy had only a mere, if not meaningless, impact on cost containment. This discrepancy happened because the number of surgeries mushroomed, meaning that cost reduction at intensive margin was completely overwhelmed by the increase of surgeries at extensive margin. The best explanation is that the generous coverage of non-urgent, elective surgeries by private insurance top-ups created insurance-induced utilization. I find no such pattern in urgent surgical procedures or those that are not covered by private insurance.

Conclusions: I investigate situations where a successful FFS-to-PPS switch ended up doing an almost meaningless job as a cost containment policy. If private insurance top-ups focus its coverage on elective and non-urgent surgical procedures, it could create an insurance-induced utilization that lead to healthcare spending so large that it makes any rigorous and effective cost containment policy meaningless.

3:30 PM –5:00 PM   TUESDAY   [Demand & Utilization Of Health Care Services]

Cape Town International Convention Centre | CTICC 1 – Room 2.46
Utilization of Prevention and Screening

MODERATOR: **Manoj Mohanan**, Duke University

The Effect of SMS Reminders on Health Screening Uptake: A Randomized Experiment in Indonesia

PRESENTER: **Maja Marcus**, Brigham and Women's Hospital and Harvard Medical School
AUTHORS: Lisa Rogge, Anna Reuter, Sebastian Vollmer

Promoting the adoption of preventive health behavior is a vital, yet continuously challenging task for health systems. This holds particularly true for cardiovascular diseases (CVD) in LMICs, health conditions that are quickly rising to the leading causes of death in these countries. One major challenge to the health systems is that CVD risk factors such as diabetes or hypertension require a care very different from most infectious diseases: They can be tackled effectively many years before individuals notice symptoms, and before severe complications develop.

Diabetes and hypertension screening can be seen as a special case of preventive health behavior: Its aim is not only to avoid an illness but also to detect a prevalent condition early enough to avoid or postpone complications. Screening is possible at very low costs, and behavioral changes can be sufficient to control these conditions at very early stages. Yet, screening for diabetes and hypertension is underutilized in many LMICs (Geldsetzer et al., 2019; Manne-Goehler et al., 2019), even in settings with a free and easily accessible screening infrastructure, such as Indonesia.

We conducted a randomized controlled trial to test whether a low-cost, light-touch text message intervention can increase the uptake of hypertension and diabetes screening in Indonesia. The treatment group received two sets of three text messages, each sent before one of the monthly village screening dates between January and March 2020. The messages called upon the recipients to attend screening at the specified time and place and gave short information on CVD risk and the benefit of screening. The intervention was targeted at individuals over the age of 40, who are at increased risk to develop diabetes or hypertension and should be screened once a year according to WHO PEN screening guidelines (WHO, 2010). We randomly sampled 2,006 participants from two districts in Aceh province in a two-stage stratified design. Baseline data was collected in November and December 2019 and endline data was collected approximately one month after the last screening date via telephone surveys as the COVID-19 outbreak did not allow for in-person interviews.

We find that the intervention increased the uptake of screening services by 6.6 percentage points from 33% to 40%. For respondents who received at least one full set of messages and could remember any message content, the effect size was 17 percentage points. We do not detect a treatment effect on knowledge, measured as indices on the information provided in the text messages as well as on broader disease knowledge. Respondents who remember receiving our messages mostly recall that the content was on the advice and logistics to get

screened, and one quarter of those remembered the information on higher age being a risk factor. We suspect that the intervention made this information more salient and served as a reminder to get screened. We cannot detect any spillovers to other household members.

We contribute to the literature that seeks to increase the uptake of under-used preventive health actions.

Going Big in Health: Effect of a Large-Scale Preventive Health Policy

PRESENTER: **Adrian Rubli**, ITAM
AUTHORS: Arturo Aguilar, Ricardo Gomez Carrera

Overview. Despite the benefits of preventive healthcare, uptake is typically low. This paper studies how embedding healthcare in a conditional cash transfer program affects utilization by exploiting the roll-out of Progresa in Mexico. We estimate a sizable 12% increase in outpatient visits at public clinics, driven by children and women aged 20-49. This translates into improvements in reproductive healthcare and screenings for chronic diseases. However, these effects are also accompanied by increased congestion, measured with waiting times, and reductions in quality of care. Overall, this suggests that the benefits of this policy lever may carry unintended displacement effects.

Background. The literature has estimated high returns to preventive health. However, uptake of preventive health interventions is typically low and highly sensitive to prices. An alternative mechanism for encouraging preventive healthcare is to embed it as a condition for other desirable (and potentially more salient) benefits, for which the take-up elasticity is lower.

Research question. We study the Progresa conditional cash transfer (CCT) program in Mexico from 2000 to 2003. We pose three questions. First, we verify that the conditionality indeed led to a significant increase in the demand for health services at public clinics and explore the demographic drivers of this increase. Second, we study which health behaviors changed due to the program. Finally, we analyze if the sudden increase in demand - which was unaccompanied by an increase in the supply of public clinics - led to congestion of health services which in turn could be crowding-out other types of healthcare use.

Methods. We employ a regression discontinuity analysis, mostly following Alix-Garcia et al. (2013), by exploiting an administrative rule for the locality-level roll-out.

Results. First, program eligibility increased healthcare utilization at public facilities, with 12% more outpatient care visits relative to comparable non-eligible localities. We also show that this increase in formal, professional healthcare is accompanied by a decline in seeking alternative health services, such as non-Western medicine. This change is driven by both children and women aged 20 to 49, consistent with the program requirements. We then show positive impacts on both access to and utilization of preventive care, such as contraceptives, prenatal doctor visits, and screenings for chronic diseases and cancer. Lastly, we find evidence of an increase in waiting times and a decline in patient satisfaction at public clinics, consistent with a decline in some dimensions of quality of care, although the data does not allow us to identify any potential adverse health impacts stemming from congestion.

Contributions. First, we add to work that has analyzed how changes in administrative rules that impose a healthcare requirement might impact outcomes. Second, we advance the literature on the health impacts from CCT programs. Finally, our paper speaks to work in the CCT literature looking at spillovers.

Alix-Garcia, J., C. McIntosh, K. R. Sims, and J. R. Welch (2013). The ecological footprint of poverty alleviation: Evidence from Mexico's Oportunidades program. *Review of Economics and Statistics* 95(2), 417–435.

Association between Social Health Insurance and Hypertension Control Among Middle-Aged and Elderly Chinese Adults: A Mediation Analysis

PRESENTER: **Jingxian Wu**, Xi'an Jiaotong University

Background: High systolic blood pressure has become the leading risk factor for premature deaths worldwide, especially for people living in low- and middle-income countries. In order to achieving Sustainable Development Goal target 3.4, national or social health insurance has been increasingly favoured by countries that relied heavily on general revenues and out-of-pocket payments to finance their health care systems. A typical example is China. This study aimed to investigate the association between China's social health insurance (SHI) schemes and the control of high blood pressure and to identify the potentially actionable mediators with regard to the use of health care services among middle-aged and elderly adults.

Methods: Based on data from the 2018 China Health and Retirement Longitudinal Study (CHARLS), a total of 7289 middle-aged and elderly adults who had physician-diagnosed hypertension were included. The associations among China's two SHI schemes (i.e., Urban Employees' Basic Medical Insurance [UEBMI] and Urban and Rural Residents' Basic Medical Insurance [URRBMI]), hypertension control, and the use of the health care services were examined through logistic regressions. We considered two aspects of health care services: preventive care and medical treatment services. Preventive care services consisted of regular physical examinations and regular blood pressure checks while medical treatment services consisted of Chinese traditional medicine treatment, modern Western treatments, and other treatments. We further applied the Karlson–Holm–Breen decomposition method to test for mediation using the two aspects of health care services.

Results: Enrolling in either UEBMI or URRBMI was related to a significant increase in the odds of hypertension control (UEBMI: adjusted odds ratio [AOR] = 1.54, p<0.05; URRBMI: AOR = 1.35, p<0.05). Both UEBMI and URRBMI were associated with increased

odds of regular physical examinations (UEBMI: AOR = 2.68, p<0.01; URRBMI: AOR=1.61, p<0.01), and regular physical examinations were significantly associated with an increased probability of hypertension control (AOR=1.24, p<0.01). Only URRBMI was related to increased odds of regular blood pressure checks (AOR=1.59, p<0.01), and regular blood pressure checks were significantly associated with an increased probability of hypertension control (AOR=1.37, p<0.01). Mediation analysis illustrated that regular physical examinations accounted for over 10% and 7% of the total effects of UEBMI and URRBMI, respectively, on hypertension control, while regular blood pressure checks contributed to more than 10% of the total effect of URRBMI on hypertension control. Additionally, the two SHI schemes were associated with increased odds of modern Western treatments (UEBMI: AOR=1.68, p<0.01; URRBMI: AOR=1.49, p<0.01), and modern Western treatments were significantly associated with an increased probability of hypertension control (AOR=1.85, p<0.01). More than 14% and 16% of the total effect of UEBMI and URRBMI on high blood pressure control could be ascribed to modern Western treatments, respectively.

Conclusions: The two SHI schemes increased the likelihood of high blood pressure control partially by enhancing the use of preventive care and medical treatment services among middle-aged and elderly adults living with hypertension, suggesting that introducing chronic disease-targeted SHI policies is effective in managing and controlling hypertension in China.

3:30 PM –5:00 PM   TUESDAY   [Health System Performance]

Cape Town International Convention Centre | CTICC 2 – Daisy
Efficiency at the Health System Level [HEALTH SYSTEMS' EFFICIENCY SIG]

MODERATOR: **Pavitra PAUL**, Independent researcher and development consultant

What Do We Mean By "Efficiency" in Health Care Research? A Scoping Review
PRESENTER: **Golda Lenzin**, ZHAW Zurich University of Applied Sciences
AUTHOR: Mélanie Stamm

Objective: This scoping review analyses the different definitions of economic efficiency used in the scientific literature on various health care settings. As health care costs are rising in many countries, the concepts of efficiency and inefficiency in health care receive growing attention. Because the terms leave much room for interpretation, researchers have different understandings of "economic efficiency" or simply "efficiency". This is problematic as studies might be lacking comparability if they are based on vastly different definitions or understandings of the term. Especially in health care research, comparability over time, over different settings, different regions or countries is of great interest to researchers and policymakers alike.

Data source: The literature search was conducted in five different databases (Medline, EMBASE, CINAHL, Business Source Premier and EconLit) and included results from 1929 to 2022.

Methodology: The topic is addressed in the form of a scoping review, which was conducted in accordance to the Joana Briggs Institute (JBI) methodology for scoping reviews. A medical librarian was consulted for the formulation of the research strategy and adaptation to the different databases. An introductory chapter on the different types of efficiency and inefficiency in economic theory will preceed the results from the scoping review.

Results: Of 1441 papers found in the five databases, 389 were included in the review. Included papers were published between 1974 and 2022. Most papers using the term "efficiency" do not include explicit definitions or explanations of their understanding of "efficiency", meaning readers need to analyse the way efficiency is measured in the papers for this information. The vast majority of papers is interested in productive efficiency (vs. allocative efficiency) and more specifically in technical efficiency, therefore comparing the number of inputs used and outputs produced. While many papers include some elements of quality of care in their discussion, only few include aspects of quality in their measurement of efficiency. In the last 20 years, efficiency research in health care has become strongly focused on applications of Data Envelopment Analysis (DEA) or Stochastic Frontier Analysis (SFA), while the use of efficiency indicators such as "length of stay" have become less frequent.

Discussion: To allow for better comparability and potential policy implications, researchers in health care should use the term "efficiency" more judiciously and state explicitly what they understand by the term and what exactly they are measuring or comparing.

Efficiency of Health Expenditure for Older Adults across French Regions: The Role of Local Health Care Mix
PRESENTER: **Julie Cartailler**, IRDES
AUTHORS: Damien Bricard, Zeynep Or, Anne Penneau

Title

Efficiency of Health Expenditure for Older Adults across French Regions: the role of local health care mix

Background

Ageing of the population increases the healthcare expenditure for older adults in most countries but there are significant variations in healthcare resources used for this population within and across countries. These variations are partly explained by differences in demand for care but also driven by local supply and organization of healthcare. Analyzing variability in efficiency in resource use at local level is of great importance for identifying better care organizations and for guiding health systems grappling with resource constraints. Most studies focused on efficiency of individual care providers or the whole health system while there are significant disparities in local health care contexts.

Objectives

In this paper we aim to calculate (i) the technical efficiency of regional health care expenditures for older adults in France (ii) estimate the determinants of efficiency with a focus on the contribution of local health care supply (level and mix) on efficiency scores.

Methods

The analysis is based on individual level health expenditure data from the National Health Data System (SNDS) between 2010 and 2017. We have healthcare consumption across all settings (inpatient, rehabilitation, outpatient & home visits, prescriptions) of the population aged 65 years and over in 12 regions representing about 65% of the French population. Efficiency scores are calculated at life-area level (*territoire de vie*) which is a geographic unit used in France to study residential area conditions. We first define a stochastic frontier model to calculate regional efficiency scores and a multilevel model to analyze its link with health care organization. We use public health expenditure as the main input and health outcomes (mortality rates) and quality of healthcare for older adults (e.g., inappropriate hospitalization, readmission, emergency visits and polymedication rates) as outputs. We apply Kumbhakar and Heshmati specification (1995) which separate persistent and time-varying efficiency. Then, we specify a multilevel model to estimate the impact of local care supply (accessibility primary care professionals, acute and rehabilitation care facilities, etc.) and continuity of care (home care services and home visits rates) measured at two geographical level (life-area and local authority) to determine the role of health care mix or organization on efficiency.

Preliminary results

Preliminary results suggest that 1) efficiency of health expenditure of older adults varies significantly across life areas (coefficient of variation: 22.2%); 2) local efficiency scores are mainly stable over time (on average, persistent efficiency explains 94% of overall efficiency); 3) in local areas where the accessibility of primary care is high, efficiency is higher, while efficiency scores are lower in areas with high density of post-acute care beds and high prevalence of emergency services.

Conclusion

The analysis provides new evidence on local disparities in health care performance and suggest that there is significant margin for improving efficiency through adoption of local healthcare organization which maximize aggregate efficiency. Final analysis will calculate inefficiency margins and provide insights into most efficient (best practice) areas.

Improving Efficiency and Accountability of Resource Utilization at Health Facility Level to Deliver Primary Healthcare Services in Nigeria's Kano State

PRESENTER: **Ashiru Adamu Abubakar**, Clinton Health Access Initiative

AUTHORS: Glory Ugochi, Amina Bukhari Abubakar, Abubakar Abba, Aminu Farouk Kabara, Eoghan Brady, Briony Pasipanodya, Tijjani Hussaini, Bashir Sunusi, Olufunke Fasawe, Owens Wiwa, Chloe Denavit, Nasir Murtala Umar

Aims: The Kano State government has made strides towards ensuring the provision of Primary Health Care (PHC) for its population, but challenges remain including weak infrastructure and multiple, uncoordinated financing channels from the state contributory healthcare agency, the Basic HealthCare Provision Fund among others. The National Minimum Service Package (MSP) aims to concentrate scarce government resources by establishing minimum standards required to deliver priority interventions. In April 2021, only ~3% of facilities met MSP standards and the state-wide readiness plan was cost-prohibitive. Through a 'Delivery Type' approach, Kano established an MSP Monitoring Team (MSPMT) to optimize the performance of facilities using existing resources. With multi-disciplinary stakeholders down to the community level, they assessed bottlenecks and co-developed plans to improve facility financial, operational, and management efficiencies. The aim of this study was to assess the performance of a program/approach to improve the efficient utilization of facility finances towards strengthening availability, access, and utilization of minimum standards of PHC services

Methods: Facilities' progress towards MSP operationalization was compared between the baseline in April 2021 and January 2023 post the MSPMT rollout. 46 PHC facilities were purposively sampled (out of a sampling frame of 484 apex BHCPF facilities in Kano). Data on implementation indicators- Infrastructures, facility operations, financial management, and service delivery were collected from facility documentation, direct observation, and surveying 46 facility managers using digital questionnaires. Data were cleaned and analyzed and progress was compared between baseline in April 2021 and Endline in January 2023. The Results were presented in simple frequencies, bars, charts, and trends.

Results: As of January 2023, an average of 74% of activities from the improvement plans had been completed with domestic funds, streamlining expenditures towards evidence-based interventions selected to improve allocative efficiency. Interventions to reduce financial inefficiencies included centralizing payments of short-term staff and building financial and operational management capacity for facility managers. Operations were optimized through staff redistribution resulting in skilled health worker availability increasing by 54% on average, and 24-hour service availability grew from 24% to 84% of facilities. Facilities with 90% of tracer drugs increased by 50% on average by introducing and standardizing requisition books and bin card use. Service availability and uptake improved from 30 to 80% of facilities providing at least 90% of the minimum package of primary care services. Overall, there's a 16% increase in skilled birth delivery and under 1-year children fully immunized.

Policy Implications: Kano is utilizing these results from 46 facilities to iteratively develop a roadmap and investment plan to guide expansion to additional facilities in 2023-2025. CHAI and Kano State PHC leadership actively share key learnings from this scale-up to inform and approach for operationally and financial national scale-up. Presently, the approach is replicated in 6 other states, with the aim of improving the utilization of available PHC resources for optimal PHC performance and improved health outcomes.

3:30 PM –5:00 PM   TUESDAY   [Demand & Utilization Of Health Care Services]

Cape Town International Convention Centre | CTICC 1 – Room 2.43
Impact of Economic Shocks on Health Care and Expenditure

MODERATOR: **Sean Sylvia**, University of North Carolina at Chapel Hill

Impact of Income Shocks on Pharmaceutical Resources Utilization of Rural Residents- Evidence from Charls

PRESENTER: **Peizhe Yan**, Wuhan university
AUTHORS: Fenghang Li, Stephen Nicholas, Elizabeth Maitland, Jialong Tan, Chen Chen, Jian Wang
OBJECTIVE

In China, rural residents experience poorer health conditions and a higher disease burden compared to urban residents but have lower healthcare services utilization. Rather than an insurance focus on enhanced healthcare services utilization, we focus on an income shock, in the form of China's New Rural Pension Scheme (NRPS), on outpatient, inpatient and discretionary over-the-counter drug utilization by over 60-year-old rural NRPS residents.

METHODS

Providing a monthly pension of around RMB88(USD12.97), NRPS covered all rural residents over 60 years old. Fuzzy regression discontinuity design (FRDD) was employed to explore the NRPS causal effect on healthcare services utilization, measured by outpatient and inpatient visits and discretionary over-the-counter drug purchases. The nationwide China Health and Retirement Longitudinal Study (CHARLS) 2018 provided the data.

RESULTS

Without significant changes in health status and medication needs, 60-plus-year-old NRPS recipients significantly increased the probability of discretionary drug purchases by 33 percentage points. NRPS had no significant effect on the utilization of outpatient and inpatient utilization. The increase in the probability of discretionary drug purchases from the NRPS income shock was concentrated in healthier and low-income rural residents. Robustness tests confirmed that FRDD was a robust estimation method and our result is robust.

CONCLUSION

NRPS was an exogenous income shock that significantly increased the probability of discretionary over-the-counter drug purchases among over 60-year-old rural residents, but not the utilization of inpatient or outpatient healthcare services. Income remains an important constraint for rural residents to improve their health. We recommend policymakers consider including commonly used over-the-counter drugs in basic health insurance reimbursements for rural residents; provide health advice for rural residents to make discretionary over-the-counter drug purchases; and to mount an information campaign on over-the-counter drug purchasing in order to increase the health awareness of rural residents.

Out-of-Pocket Costs and Exploring Catastrophic Health Expenditure Among Tuberculosis Patients in Private Healthcare Settings in Myanmar

PRESENTER: **Myat Noe Thiri Khaing**, Population Services International Myanmar
AUTHORS: May Me Thet, Su Theingi Aung, Nandi U

Costs related to tuberculosis (TB) can impose a significant burden on patients and their families and create barriers to diagnosis and treatment. The private sector network was often the first point of seeking health care for TB patients and only two studies from Myanmar on TB patient costs focused on patients from public facilities, with only small portion from the private sector. Our study aimed to quantify the out-of-pocket costs incurred by TB patients seeking care in Myanmar's private health sector.

This cross-sectional study recruited 695 adults seeking TB care at private health sector. The private sector providers included international and local non-government organizations, private general practitioners in Kachin, Kayin, Yangon and Ayeyarwady regions, where private providers were concentrated and TB case numbers in Myanmar were known to be high.

TB patient information was obtained via client listing form, from private health care providers and TB Implementing Partners via phone or email 1-2 weeks in advance, and their approval to recruit their clients was requested. A telephone interview was completed with DS-TB and RR-TB patients who were registered at the private sector TB clinics and were currently taking anti-TB within the last three months (1st Jan-1st April 2022).

The interviewed patients reported that they had median 7.9 times of clinic visits for the whole treatment duration, which were mainly accounted by visits before TB treatment and during the continuation phase. However, the number of visits ranged from 1 to 30 times.

Costs were converted to US dollars (US$) and presented as median and (Min-Max) using the current exchange rate of 1 US$= 1,850 Myanmar Kyats (MMK). Of 695 TB patients recruited, the mean age was 43.6 years and 58.4% were male. The median total cost for the whole TB treatment was $53.4 (Min-Max 0- 8651.1). This cost includes medians of 11.8 US$ (Min-Max 0-1909.2) for direct medical and testing costs, as well as 11.6 US$ (Min-Max 0-978.4) for direct non-medical patient expenditure. The total cost breakdown by disease phase, pre-treatment cost was noted as largest proportion compared to post treatment cost. Seeking care prior to TB treatment costed $16.8 per person (Min-Max 0-658.3). Hospitalization, diagnostic tests, and travel costs were predominant.

TB care was almost free during the intensive phase, and it cost $ 3 (Min-Max 0-167.6) for both direct and indirect expenditures during the continuation phase. Out-of-pocket health payments share of household capacity to pay was 11.1%. For 16.1% of these patients, total costs were ≥ 40% of household's capacity to pay.

In the multivariate logistic regression model, TB-affected households with a history of hospitalizations, as well as those from poorer households, older age, and income less than 3 lakhs MMK (142.9 US$) per month, were more likely to incur catastrophic costs (p<0.05).

Despite the country's extensive network of free TB diagnostic and treatment services, patients faced significant out-of-pocket expenses. Beyond providing free TB care, new strategies or policies are required to offset nonmedical and medical costs and ensure TB care is affordable for all TB patients.

Multi-Sectorial Exploration of the Impact of Unemployment and Job Insecurity on Health Care Utilisation

PRESENTER: **Keyi Li**, University College London
AUTHORS: Manuel Gomes, Jenny Shand

Background: The 2010 and 2020 Marmot Reviews on healthcare policy in England highlighted that unemployment and job insecurity contribute significantly to poor health and health inequalities. However, a recent review paper highlighted that the extent to which unemployment and job insecurity affect health care utilisation is not well understood. Firstly, it is unclear the extent to which the negative impact of unemployment on health is translated into material changes (increase) in health care utilisation. Secondly, unemployment may mean more disposable time to seek health care if this is freely available at the point of use. Thirdly, most studies assessing the impact of unemployment on healthcare utilisation tend to focus on a single care setting, typically hospital or primary care. This study aims to address this gap in knowledge by evaluating the impact of unemployment and job insecurity on health care utilisation across five different care settings in England.

Methods: We analysed linked local authority, health, social and community care data of working age individuals (N=3,841) without long-term conditions, living in East London from 2016 to 2020. Unemployed individuals looking for a job (i.e. jobseekers), defined according to the receipt of Jobseeker's Allowance (JSA), were matched to employed individuals, based on age, gender, ethnicity, BMI, smoking status and deprivation status. We adopted a double-robust estimation approach (bias-corrected matching), which combines matching with a two-part regression model to report mean differences, and 95% confidence intervals, in healthcare costs (12 months after JSA receipt) according to employment status across five healthcare settings: primary, hospital, mental health, social and community care. We conducted subgroup analysis by age, gender, ethnicity and deprivation. Sensitivity analysis was performed according to alternative matching and two-part model specifications.

Results: Jobseekers were, on average, associated with higher mean total healthcare costs, £222 (95% CI £194, £250) compared to employed individuals. This was driven by differences in mental health (£51, CI £37 to 65), primary (£42, CI 36, £47) and hospital costs

(£99, CI £83, £115). Our analysis suggests an effect-modification (gradient) by age, with unemployment impact being larger amongst older groups. For example, the mean cost differences for total healthcare are £145 and £198 larger for 50-59 and 60-64 age groups, respectively compared to that of 16-19 year-olds). These findings were robust to the proposed sensitivity analyses. In addition, mean costs differences between jobseekers and employed individuals were similar (£198 with 95% CI £173, £223) when we look at healthcare costs within the same year of claiming JSA.

Conclusion: This study finds that jobseekers were associated with higher health care costs compared to employed individuals, but differences are relatively small. Jobseekers appear to be associated with higher number of GP visits, use of antidepressants and hospital outpatients/specialist services, but it is unclear whether this is related to greater disposable time (being off work) or due to mental health changes. Recent evidence suggested that the impacts of unemployment may closely linked with its duration, and hence further research to establish the long-term impacts of unemployment on healthcare utilisation is needed.

Lifestyle Responses to Partners' Health Shocks
PRESENTER: **Giuliano Masiero**, University of Bergamo
AUTHOR: Beatrice Retali
Objectives:

Chronic diseases are the leading drivers of health care costs in the US and Europe (OECD, 2016; Martin et al., 2020). However, several studies show that healthier lifestyles can extend the individual's lifespan and increase quality of life by preventing or delaying the onset of chronic conditions (e.g. Chow et al., 2012; Bauer et al., 2014). Our research focuses on the understanding of the determinants of health behaviors, sheading lights on the influence of spouses' changes in lifestyles. We investigate the individual's response to partner's diagnosis of chronic illness (cardiovascular diseases, lung problems, cancer, diabetes, and stroke) and whether this response correlates with partner's behaviour.

Methods:

We study family spillovers within couples (9124 males and 8978 female respondents) using data from the longitudinal survey of a representative sample of the US population over 50 (Health Retirement Study). We estimate the causal effect of the individual's health shock on partner's consumption of alcohol, tobacco and the BMI. Our estimation strategy relies on a staggered two-way fixed effects difference-in-differences specification that exploits the random timing of health shocks. As a baseline assumption (parallel trend), changes in health-related behaviors of individuals with and without a partner with a medically diagnosed chronic disease would have evolved similarly in the absence of health shocks. We control for changes in the health status of the respondent and socioeconomic aspects and include time and individual fixed effects. We rely on a similar specification to provide suggestive evidence on the coordination of health behaviors between partners.

Results:

We find no effects of diagnosis of chronic conditions on partner's consumption of alcohol and tobacco (for both the intensive and the extensive margins) and BMI. However, we find evidence of heterogeneity in health behaviors related to cooperation within couples. Individuals with responsive partners are more likely to control "bad habits". This response is independent of the spouse's adjustment in health behavior before or after the medical diagnosis. Our results are robust to many alternative model specifications.

Discussion:

The analysis provides some causal evidence of inertia in changing lifestyles after a life-shaping exogenous event of illness. Our findings suggest that the diagnosis of a chronic condition in partners is often a missed opportunity for fostering changes in individual's lifestyle, especially if not appropriately tailored to individuals or situations. Family-centered approaches in which medical personnel involve patient relatives in the medical treatment and provide information on the importance of health-related behaviors could address this issue.

3:30 PM –5:00 PM   TUESDAY   [Economic Evaluation Of Health And Care Interventions]

Cape Town International Convention Centre | CTICC 1 – Room 1.41
Methodological and Policy Considerations in Health Economics Analyses
MODERATOR: **Syed Afroz Keramat**, The University of Queensland

The Healthcare Provider Cost of Antimicrobial Resistance in a Lower Middle-Income Setting: The Case of Ghana.
PRESENTER: **Evans Otieku**, University of Ghana
AUTHORS: Ama Pokuaa Fenny, Appiah-Korang Labi, Alex Owusu-Ofori, Joergen Kurtzhals, Ulrika Enemark

Background. Antimicrobial resistance (AMR) has been declared by the World Health Organization (WHO) as a top ten public health threat. Among the WHO recommendation to reverse the threat of AMR is to evaluate AMR attributable costs to encourage investment in AMR interventions by governments and to motivate behavioural change to reduce the risk of AMR in the population. Therefore, this study evaluates the attributable healthcare provider costs of AMR in Ghana to provide empirical evidence to make a case for improved AMR preventive strategies in hospitals and the general population.

Methods. The study combines denominator data of patients from a parallel cohort study (PCS) with administrative data from the participating hospitals to evaluate the healthcare provider costs of AMR in Ghana. Data collection for the PCS took place from June to December 2021 at Korle Bu and Komfo Anokye Teaching Hospitals. The outcome measures were the extra length of hospital stay (LOS) and the associated healthcare provider costs. Both aggregated micro-costing and step-down costing approaches were employed, and the endpoint costs were converted into purchasing power parity in international United States Dollars, adjusting for surviving patients and AMR causative pathogens.

Results: The mean extra length of hospital stay due to AMR was 4.2 days [95%CI. 3.7 -4.7] at KATH and 5.5 days [95%CI. 5.1 – 5.9] at KBTH. AMR patients consumed an extra 7hrs and 4hrs of doctor's time at both hospitals, respectively. The estimated mean healthcare provider cost per AMR patient was $823 [95%CI. 812 – 863] at KATH and $946 [95%CI. 929 – 964] at KBTH, both corresponding to a mean annual cost of $653,423. The adjusted result based on causative AMR pathogen indicates that *the* cost varies by AMR causative organism. Similarly, the estimated mean annual healthcare provider cost of AMR, calculated as the cost difference between the AMR and Susceptible cohorts in both hospitals combined, was $188,429 more than the unadjusted costs.

Conclusion: The study shows that AMR significantly increases the length of hospital stay and the associated healthcare provider costs in Ghana and thus calls for infection prevention and control strategies to mitigate the prevalence of AMR.

Drug Copayments, Child Outcomes, and Intra-Family Spillovers

PRESENTER: **Jakub Červený**, Institute for Health Care Analyses, Ministry of Health of the Slovak Republic
AUTHOR: Boriana Miloucheva

Reducing out-of-pocket costs of medication has been shown to lead to higher use initiation rates in childhood. Less is known, however, about the potentially asymmetric effects of increases in such costs, resulting from a loss in insurance coverage. This paper looks at the expiration of prescription drug copay waivers for children in Slovakia to investigate changes in pharmaceutical use resulting from increasing out-of-pocket costs. Leveraging age thresholds for copay waivers, this paper uses regression discontinuity and event study analyses to show that increases in out-of-pocket costs reduce prescription drug use, as well as average spending. Using a dataset capturing the universe of prescriptions filled between 2016 and 2018, we are further able to understand these effects among both chronic and non-chronic users. We trace the effects of these changes in prescription drug use to down-stream health consequences for children, as measured by GP visits and hospitalizations. Linking these data to social security records, we are further able to understand spillovers onto parental health and employment.

Compensating Wage Differentials and Competing Risks

PRESENTER: **Seth Seabury**, University of Southern California

Many estimates of the value of life and health are based on observed tradeoffs between risky activities and economic outcomes, particularly the wage premium demanded by workers to accept jobs with comparatively high mortality risk (commonly referred to as a compensating wage differential). However, these estimates have largely ignored the possibility that individuals vary systematically in non-occupational health risks that could impact the size of the wage premium. This paper develops a simple model of compensating wage differentials in the presence of competing risks and show how this causes the estimated wage premium to understate the implied value of life. Then, using US data on labor market earnings and worker characteristics linked to occupational mortality risk, the paper estimates compensating wage differentials in the presence of competing non-occupational mortality risks. Specifically, a hedonic wage model is estimated in which the wage premium on occupational mortality risk is allowed to differ according to the level of non-occupational health risk faced by workers. The chief sources of variation in non-occupational mortality risks come from geographic variation in fatal automobile accidents and gun-related homicides.

A complicating factor in this analysis is that occupational and non-occupational mortality risk could both be influenced by unobserved heterogeneity in individual risk-taking behaviors and/or local labor market conditions. To address possible confounding labor demand with non-occupational mortality risks, an instrumental variables strategy is adopted predicting local demand for labor in risky jobs by interacting national job-specific growth with baseline differences in local industry composition (an approach commonly referred to as a "Bartik instrument"). A similar approach is used to address the possibility that non-occupational health risks are driven in part by unobserved variation in health-related behaviors (that is, that people engage in risky driving or gun violence because the long-term consequences are muted by the mortality risk from their jobs). Specifically, instruments for traffic fatalities and homicides by interacting national trends with baseline differences in seatbelt use and gun ownership, respectively. (Following past work, gun ownership is proxied using the share of suicides involving a firearm.)

Preliminary findings suggest that, as predicted by the theory, failure to consider competing risks leads to an underestimate of the value of life to workers in risky jobs, potentially by a significant amount. This has important implications for the use of compensating wage differential estimates in economic evaluations of health.

Impact of Autonomous Prior Authorization for Reimbursement on Cross-Provincial Medical Treatment Utilization, Expenditures and Burdens：a Difference in Difference Analysis from China

PRESENTER: **Yang Liu**, Institute of Medical Information, Chinese Academy of Medical Sciences & Peking Union Medical College

AUTHORS: Minjiang Guo, Yang Liu

Background: In 2020, China began to pilot the policy of autonomous prior authorization for reimbursement on cross-provincial medical treatment, which meant the prior authorization was transferred from the approval of the medical insurance administrative organization to the signing of individual commitment by the insured. The authorization will become effective immediately upon submission online. The policy aims to facilitate the prior authorization so that to improve the accessibility of direct reimbursement for cross-provincial medical treatment. Some pilot areas reduce the reimbursement level of temporary off-site insured in order to avoid unnecessary increase in cross-provincial medical treatment.

Methods: Difference-in-differences(DID) analysis was used to assess the impact of the intervention.The study collected the monthly data of direct reimbursement for cross-provincial medical treatment of the insured from Liaoning Province and Jilin Province from January 2019 to June 2021,who were hospitalized in a large-scale general tertiary hospital in Beijing. The outcomes measured include the number of inpatient, total expenses, total expenditure of medical insurance fund, average expenses, the amount and the proportion of individual out-of-pocket(OOP) expenses. The insured from Liaoning Province, which began to implement the autonomous prior authorization policy from July 2020, were taken as the treatment group, while insured from Jilin Province were taken as control group. We used logarithm instead of absolute numbers to avoid heteroscedasticity.

Results: There is no statistical difference in the changes of the number of inpatient, the total expenses, the average expenses and the total expenditure of medical insurance fund pre- and post- the implementation of autonomous prior authorization. However, both of the amount and the proportion of individual OOP expenses increase compared with that before the implementation of the policy, the coefficient is 0.196 (P=0.073) and 0.052 (P=0.015) respectively.

Conclusion: Autonomous prior authorization did not increase the utilization of direct reimbursement for cross-provincial medical treatment and so as to the overall expenditure of medical insurance fund.This may be related to the fact that the policy has not been implemented for a long time and the policy has not been widely implemented and promoted. The quarantine and lockdown caused by COVID-19 pandemic also induced the reduction of cross-provincial medical treatment behaviour. The increase of the amount and the proportion of individual OOP expenses, while the average expenses had no significant change, indicated that the individual burdens of insured aggravated, which should be taken into account. The long-term effects of autonomous prior authorization need to be further studied.

Exploring Data-Driven Challenges in Modelling the Effectiveness of Treatment Sequences in Health Economic Evaluations: A Systematic Review of UK National Institute for Health and Care Excellence (NICE) Technology Appraisals

PRESENTER: **Jen-Yu Amy Chang**, University of Sheffield

AUTHORS: James B Chilcott, Nicholas R Latimer

BACKGROUND:

Comparing the cost-effectiveness of different treatments at a pre-specified line-of-therapy (LOT) has been the standard approach in health technology assessments. However, it has become increasingly crucial for decision makers to also consider the impact of treatment sequences due to rapidly evolving treatment paradigms. Several frameworks have recently been proposed to support the development of treatment-sequencing models in oncology and autoimmune diseases. While sequencing-models can be developed, selecting appropriate effectiveness estimates to populate these models can prove problematic. This is often referred to as "data(-paucity)-driven challenges", and can lead to substantial uncertainties in cost-effectiveness results. To our knowledge, data-driven challenges around treatment sequencing models have not been studied in-depth.

OBJECTIVE:

We aimed to delineate challenges associated with identifying appropriate effectiveness estimates for comparing treatment sequences using a systematic review.

METHODS:

We systematically reviewed 460 UK NICE (The National Institute for Health and Care Excellence) Technology Appraisals (TAs) published before November 2019 and identified a subset that listed at least two treatment sequences as comparators to answer the following questions: (1) What data sources, assumptions, and statistical methods were applied to derive the comparative effectiveness of treatment sequences? (2) What were the challenges and justifications?

RESULTS:

We identified 35 TAs, of which 7, 22 and 6 are in oncology, autoimmune and other diseases, respectively. All TAs combined an array of evidence from different data sources to inform the effectiveness of treatment sequences, including trials, (network)-meta-analysis (NMA/MA) and real-world evidence (RWE).

Most of the autoimmune TAs (77%) applied estimates from NMA/MA results to populate decision models. As NMA/MA results were generally non-LOT specific, the effectiveness of autoimmune treatments was often assumed to remain unchanged regardless of LOT. Some autoimmune TAs applied an effect degradation modifier, while several others conducted subgroup NMA/MA to proxy the later-line effect.

In oncology, the most common approach (43%) was taking progression-free survival (PFS) or time-to-treatment failure from a set of LOT-specific trials to populate patients' accumulative treatment duration (TD) over a series of LOTs. On the other hand, overall survival (OS) was often estimated based upon first-line clinical trials under the assumption that subsequent treatments received in the trial represented those given in local clinical practice (57% oncology TAs) – treatment-switching adjustment methods were considered when subsequent therapies were not representative. Apart from trial-evidence, RWE were often applied to inform LOT-specific effectiveness when trial data were unavailable.

Several major challenges were identified when pooling LOT-specific evidence from different sources: (1) bias from indirect comparisons (same LOT) (2) inconsistent patient population between LOTs within the same treatment sequence (3) Crossing TD and OS curves. For (1) and (2), matching-adjusted indirect comparisons and/or subgroup analysis were considered. (3) appeared to be an oncology-specific issue and is problematic to untangle.

CONCLUSION:

Distinctive challenges were identified for comparing treatment sequences in different diseases. As such, model assumptions should be scrutinized with subject knowledge. Advanced statistical methods and evidence triangulation should be undertaken wherever possible to mitigate the uncertainties arising from lacking evidence of LOT-specific head-to-head comparisons.

The Relative Value of Suicide Prevention in Health Care Priority Setting

PRESENTER: **Daniela Andren**, Örebro University

Background: The need for priority setting in healthcare has been growing steadily in the last decades, as people live longer, and as new treatments are available for many diseases. At the same time, deterioration of population's mental health constitutes a growing problem for the limited healthcare budget. This raises the question of how treatment and prevention of mental health problems should be prioritized vis-à-vis somatic conditions, but little is known about public preferences in this regard.

Objectives: This paper investigates how the Swedish population values a reduction in the number of suicides in relation to other life-saving interventions within the healthcare sector.

Data and methods: During December 2021-January 2022, an online discrete choice experiment (DCE) was conducted among a sample of 1000 Swedish members of the Scandinavian online panel Userneeds.

The aim of our DCE is to elicit the relative importance placed on reducing the number of deaths due to suicide in comparison to deaths due to pancreatic cancer, breast cancer and acute heart attack. The choice set consists of three attributes: number of lives saved, cause of death and age group affected. In each choice set the respondent is asked to choose between two alternative lifesaving interventions within the health care sector.

We take in consideration linear effects of both number of lives saved and age categories, which leaves us with a linear utility model with 12 parameters, excluding a constant term, when all main effects (5) and all second order interaction effects (7) are included. For derivation of a fractional factorial design the differences in age groups and number of lives saved, respectively, between alternatives compared were treated as two-level factors. The four causes of death were split into two factors with two causes each. The four two-level factors give a full factorial design with 16 choice sets. The levels in these treatments were re-coded into the original levels of the variables in the presentations of the choice sets.

Results: Participants valued saving a life from suicide lower than saving a life from pancreatic cancer, breast cancer or acute heart attack. For example, our estimates suggest that to yield the same benefit as saving 4 lives from acute heart attacks, 5.5 and 6.2 lives have to be saved from suicide.

Learning from Doing: The Opportunities and Challenges of Costing in Zimbabwe

PRESENTER: **Mutsawashe Chitando**, University of Cape Town
AUTHORS: Susan Cleary, Lucy Cunnama
Title: Learning from doing: The opportunities and challenges of costing in Zimbabwe

Background

Economic evaluation is increasingly gaining recognition as a useful tool in supporting sound evidence-based decision-making. Unfortunately, in the absence of methodological rigour, the utility of economic evaluation evidence in this supportive role is undermined. It is noteworthy that the uptake of this evidence in policy-making remains higher in high-income countries than in low-middle-income countries (LMICs), despite the latter experiencing more pressing issues of opportunity cost. This discrepancy can be attributed to several factors which include a dearth of reliable data sources in LMICs and gaps in methodological guidance for these settings. This study seeks to narrow this gap by exploring the implications of price fluctuation on costing results based on in-depth experience in Zimbabwe, a setting characterised by triple digit inflation.

Methods

Over a two-year period, we conducted an in-depth review of hospital utilisation and expenditure data at Parirenyatwa Group of Hospitals in Harare, Zimbabwe. We analysed this data in Microsoft Excel to determine the percentage change in inpatient days, overall recurrent expenditure, and that of individual expenditure items collected in 2021 and 2022. We used the average official exchange rate according to the Reserve Bank of Zimbabwe for 2021, 1:89.68 and 2022 1: 420 to convert the local currency to the United States Dollar (USD). We also estimated the average expenditure per patient based on these data. To triangulate our findings, we conducted interviews with representatives from the hospital's finance and records departments.

Results

Between 2021-22, there were fluctuations in both prices and utilisation. There was a 23% (49 808 ; 60 498) increase in utilisation against a 179% (~ZWL 1,274,178,220 ; 3,553,814 537) increase in total recurrent hospital expenditure. The hospital spent an average of ~ZWL 25 582 per patient day equivalent in 2021 which rose to ~ZWL 58 743 in 2022. The expenditure items which had a notable increase in costs during this period were linen and textiles (436%), salaries (426%), and incidental expenses (281%). In both 2021 and 2022, the hospital spent the most money on pharmaceutical expenses (drugs, medical instruments, disposables) (~ZWL364,922,403) and (~ZWL 715,889,732) respectively. Of note, there was a 81% decrease in the money spent on electricity between 2021-22 and a 66% decrease in the money spent on postage during this period.

Conclusion

Costing in Zimbabwe revealed that reporting in both the local and international currencies improves the interpretation and the comparability of results. It also underscored the importance of recording the exchange rate at the time of data collection to reflect the actual cost in the international currency. The rising inflation in countries such as the United Kingdom and the United States of America cements the fact that inflation exists, and it is imperative to account for it when costing.

3:30 PM –5:00 PM   TUESDAY   [Health Beyond Health Care Services: Social And Related Determinants]

Cape Town International Convention Centre | CTICC 1 – Room 2.63
Health Effects of Air Pollution

MODERATOR: **Suja S Rajan**, University of Texas - Health Science Center at Houston

Outdoor Air Pollution and Its Effects on Maternal and Children Health Outcomes in a Megacity in the Americas
PRESENTER: **Fiorella Parra-Mujica**, Erasmus University Rotterdam
AUTHORS: Tom Van Ourti, Igna Bonfrer

This study utilizes an instrumental variable (IV) approach to examine the potential link between thermal inversions and neonatal health outcomes in Peru. Peru presented the highest annual mean concentration of PM2.5 of the Americas in 2016, with Lima being a fast-growing megacity where WHO safety levels of pollution are often exceeded. Using a combination of satellite data and administrative registry data, we find suggestive evidence that thermal inversions are associated with a higher likelihood of neonates having low Apgar scores (below 7) and being born small for gestational age (SGA). These results provide further evidence of the need for policies that mitigate the harmful effects of pollution on vulnerable populations, particularly women and children in LMICs.

The Short Run Healthcare Cost of Particulate Matter Pollution
PRESENTER: **Melisa Williams**, University of Bristol
AUTHORS: Barbara Boggiano, Jesse Matheson, David Jenkins, Marco Rinaldo Oggioni
Background

It is well established that chronic exposure of children and older adults to air pollution results in worsening health conditions such as increased number of respiratory and coronary conditions. This suggests that policies targeted at improving air quality will also improve public health by reducing the healthcare costs of treating the effects of pollution.

Research aim

In this paper we analyse the impact of particulate matter pollution on the contemporaneous cost of public healthcare. Specifically, we look at how local Emergency Department (ED) visits, subsequent hospital admission, and corresponding public health costs, vary with daily PM10 levels across a major UK city. We focus attention on children and older adults as their everyday lives allow us to properly infer their exposure to pollution in addition to being populations that are more severely affected by pollution according to the literature.

Methodology

Our estimation is based on a novel dataset compiled from multiple administrative sources. We use proprietary records reflecting the universe of ED visits for the University Hospitals of Leicester NHS trust from the beginning of 2006 to the end of 2011, (N = 272, 757). We match these data with National Tariff records reflecting the cost of each diagnosis, procedure, and hospitalization. Individual ED visits are aggregated to reflect daily ED use according to the neighbourhood of residence for each record. We add to this information daily PM10 levels, weather conditions, and levels of other pollutants by neighbourhood, collected from monitors placed throughout the city, as well as data reflecting neighbourhood characteristics.

Our primary estimation strategy controls for neighbourhood fixed-effects as well as systematic variation by day of the week and week of the year. As a result, our preferred estimates are based on variation in PM10 levels that reflect deviations from average neighbourhood and time patterns. This is plausibly exogenous variation and as such we interpret our results as the causal effect of an increase in PM10 pollution on the immediate hospital use and costs. We have conducted several robustness checks that support this interpretation.

Results

In our preferred specification we estimate that a standard deviation increase in PM10 increases local ED visits by 2.8% for children and 6.4% for adults over age 60. We find that most of the children are discharged from the ED, but about half of the adults are admitted to hospital. The combination of these results suggests that a higher exposure to PM10 increases healthcare costs because it leads to more emergency department visits and, in the case of older adults, more admissions to hospital. Based on this, we find that a permanent standard deviation increase in PM10 levels for the city will lead to an increase of more than £900,000 in annual healthcare costs.

Conclusion

Our findings quantify the resources that could potentially be reallocated from treating immediate consequences of pollution, to pollution reduction programs while improving residents' health. We shed light on how air pollution affects medical costs, which is in turn critical for crafting efficient environment policies.

Impacts of Low Emission Zones on Maternal and Neonatal Health: evidence from Hospital Episode Statistics

PRESENTER: **Eleonora Fichera**, University of Bath
AUTHOR: Habtamu Beshir

Air pollution is a global concern for its negative externalities on the climate, but also on the healthcare sector and human capital accumulation. Yet, there is scant evidence on the effectiveness of clean air transport policies. In this study we investigate the effects of London's Low Emission Zone (LEZ) and Ultra-Low Emission Zone (ULEZ) on health and wellbeing.

We exploit the temporal and spatial variation of these policies, implemented in Greater London (LEZ) and Central London (ULEZ) in 2008 and 2019, respectively. Using a difference-in-differences approach and linked survey and administrative data, we find LEZ has significantly reduced PM10 by 13.5% of the baseline mean and ULEZ has reduced both NO2 by 18.4%. We also show improvements in health and well-being with LEZ reducing incidence of COPD by 8% and sick leave by 18%; and ULEZ decreasing incidence of poor health by 3% and reducing anxiety by 6%. A back of the envelope cost-benefit analysis indicates savings for £963.7M for the overall population.

Impacts of Low Emission Zones on Population Health: Evidence from Hospital Episode Statistics

PRESENTER: **Habtamu Beshir**, University of Bath
AUTHOR: Eleonora Fichera

Objectives:

The main objective of our study is to investigate the effects of London's Low Emission Zone (LEZ) on hospital (emergency) admissions, as well as looking at the impact of the Ultra-Low Emission Zone (ULEZ) on prescriptions for respiratory diseases. LEZ was launched in 2008 over most of Greater London. ULEZ, implemented in central London since early 2019, is the toughest standard of any city in the world imposing strict emission standards such as: Euro 4 for petrol cars and vans; Euro 6 for diesel cars; Euro 6 for diesel vans; and Euro 6 for lorries, buses, and coaches.

Data and Method:

First, we use postcode level data from Transport for London (TFL) to identify the areas under LEZ and ULEZ. We use three datasets to construct our outcome variables: Hospital Episode Statistics (APC and A&E); ONS mortality data; and NHS GP level prescribing dataset. We focus on respiratory related hospital admissions, deaths, and prescriptions.

Second, we use difference-in-differences (DID) and synthetic difference-in-differences (SDID) estimation strategies. Exploiting the time of introduction of LEZ and ULEZ, we compare exposed areas in Greater London and Central London to comparable unexposed areas in England before and after the policies.

Results:

We find that exposure to LEZ and ULEZ significantly improved population health. Specifically, using Admitted Patient Care (APC) data: LEZ significantly reduced respiratory and acute respiratory admissions. Using A&E data: LEZ significantly reduced hospital admissions due to respiratory conditions. Using ONS mortality data, we show that LEZ decreases respiratory related deaths. More importantly, ULEZ significantly reduced respiratory related prescriptions and their costs.

3:30 PM –5:00 PM   TUESDAY   [Supply And Regulation Of Health Care Services And Products]

Cape Town International Convention Centre | CTICC 1 – Room 2.41-2.42
Discrete Choice Experiment Applications [HEALTH PREFERENCE RESEARCH SIG]

MODERATOR: **Catherine Goodman**, London School of Hygiene & Tropical Medicine (LSHTM)

How Should the Regulation of Medical Insurance Fraud of Beneficiaries be Designed to Enhance Its Deterrence? Evidence from a Discrete Choice Experiment in China

PRESENTER: **Jinsui Zhang**, Fudan University
AUTHORS: Min Hu, Yusheng Jia, Wen Chen

Background

Medical insurance fraud (MIF) is a significant and growing threat worldwide, resulting in great financial loss for medical insurance funds. It is crucial to design proper regulations on basic medical insurance beneficiaries to detect and further impede individual MIF behaviors, yet in China, current regulations are still in development. The design of instruments to deter individual MIF requires a comprehensive understanding of the utility of regulations toward beneficiaries. However, there is limited research focusing on effective components of regulations from the perspective of beneficiaries. This study aimed to explore the regulation components that play a role in inhibiting fraudulent intentions of beneficiaries based on the deterrence theory and analyze whether preference heterogeneity exists among beneficiaries with different characteristics.

Methods

A representative sample of basic medical insurance beneficiaries in Shanghai, China was invited to join the survey based on age, basic medical insurance scheme enrolled, and municipal district of residence. A discrete choice experiment (DCE) study design was applied in this study. Attributes and levels were identified based on deterrence theory, literature review, and expert consultation. Deterrence theory indicates that severity, certainty, and celerity of sanctions can deter illicit behaviors. The conceptual framework in this study extended the framework of deterrence theory and described regulatory schemes with 5 attributes: intensity of economic penalties, restriction of receiving medical insurance benefits, deterioration of social reputation, certainty of penalties, and celerity of penalties. We used a D-efficiency design to construct 24 choice sets that were divided into three blocks, with each choice set comprising two hypothetical regulatory scheme alternatives. Choices data were analyzed using the mixed logit model (MIXL), and the latent-class model (LCM) was used to explore the preference heterogeneity.

Results

A total of 1,393 beneficiaries aged more than 18 completed the online DCE survey and 1,034 (74.22%) respondents who passed the consistency test were included in the analysis (female 60.5%; mean age of 47 years (SD = 17.4)). The MIXL results indicated that factors including higher economic penalties intensity, suspension of partial insurance benefits, inclusion in the list of unfaithful parties in the medical insurance field, higher certainty, and stronger celerity of penalties were significantly associated with a stronger deterrent effect of the regulatory scheme for the beneficiaries ($p<0.01$). The LCM with five latent classes showed a substantial preference heterogeneity between types of beneficiaries. Respondents aged 60 and over were sensitive to economic penalties intensity ($p<0.05$). Those with chronic diseases were more likely concerned about the medical insurance benefits ($p<0.01$). Certainty of penalties was the most important choice determinant for those unemployed ($p<0.05$).

Conclusion

Our research using a DCE study design demonstrated that five attributes played great importance in modifying the regulation utility toward beneficiaries. Economic penalties intensity and restriction of receiving medical insurance benefits were the most two important factors for inhibiting fraudulent intentions. For the beneficiaries with various characteristics, the relative importance of severity, certainty, and celerity of regulation was different in prohibiting MIF behavior. Our findings enable policymakers can leverage a holistic view on regulation design and optimization.

Public Preferences for Genomics Informed Cancer Treatment De-Escalation: A Pan-Canadian Discrete Choice Experiment.

PRESENTER: **Samantha Pollard**, BC Cancer
AUTHOR: Dean A Regier

Introduction: Precision oncology generates extensive amounts of genomic information with varying degrees of evidentiary certainty and clinical actionability. Within specific clinical contexts, genomic risk-stratification assays are being developed with the potential to inform decisions about risk reducing therapeutic interventions and treatment de-escalation. The extent to which patients and members of the public value genomic testing under these conditions has not been comprehensively enumerated. Using a multi-phase, patient driven approach, we developed a discrete choice experiment (DCE) to estimate patient and public willingness to pay for genomic testing under hypothetical, clinically relevant, competing testing scenarios.

Methods: DCE survey development was informed by 4 focus groups with patients and members of the public, a review of the discrete choice literature, clinical consultation, and 17 think aloud interviews. We estimated preference-based utility values for four attirbutes,1) test invasiveness, 2) likelihood of avoiding unnecessary chemotherapy, 3) likelihood that cancer would return, and 4) out of pocket test cost. Following recruitment of 151 members of the public, we conducted interim pilot analysis and revised the survey based on preliminary findings. The final survey was administered to a representative sample of the Canadian public, using the 2016 Canadian census to inform sampling quotas. For analysis of response data, we used a generalized multinomial logit with error components regression, and calculated willingness to pay and probability of test uptake under various clinically relevant policy scenarios.

Results: The survey was administered between April and May 2022. A total of 1,352 surveys were completed. Of 1352 participants, 144 (10.6%) reported a current or previous diagnosis of cancer. We estimate a willingness to pay for a 35% and a reduction in the likelihood of avoiding unnecessary treatment for general population and patient participants of $3,887.94 ($3,468.25, $4,307.64) and $5,161.82 ($3877.36, $6446.27) respectively, with corresponding predicted uptake probabilities of 56.9% (55.7%, 58.2%) and 59.3% (55.8%, 62.7%). Across multiple willingness to pay scenarios, patient participants consistently demonstrated a higher willingness to pay to avoid relapse, and avoid unnecessary treatment.

Conclusion: Our pan-Canadian discrete choice experiment captured a diversity of perspectives to estimate preference-based utilities for emerging genomic technologies. Evidence generated through this work can be used by decision makers to inform the conditions under which the Canadian public would be willing to undergo genetic testing to support decisions related to relapse prevention and treatment de-escalation.

Using Discrete Choice Experiments (DCE) to Understand Key Features for New High-Volume Low-Complexity (HVLC) Post-Covid-19 Outpatient Care Models: The Case of Ophthalmology in England

PRESENTER: **Siyabonga Ndwandwe**, Clinton Health Access Initiative (CHAI)
AUTHORS: Angus IG Ramsay, Naomi J Fulop, Josefine Magnusson, Saheli Gandhi, Steve Napier, Dun Jack Fu, Grant Mills, Dolores Conroy, Peter Scully, Paul Webster, Jonathan Wilson, Sobha Sivaprasad, Hari Jayaram, Paul Foster, Caroline S Clarke, Peng Khaw

Background:

England's National Health Service (NHS) has a backlog of over 1 million ophthalmology appointments due to austerity measures and suspension of non-urgent care during the Covid-19 pandemic. A 2020 NHS report on diagnostics recovery and renewal highlighted need for a new diagnostics model to provide quicker and accessible services whilst reducing health inequalities. In 2021, a new pop-up diagnostic centre was piloted at a London shopping centre to help clear this backlog, providing 38,500 appointment slots/year. We consider how this model supports organisation of other high-volume, low-complexity (HVLC) services by exploring stakeholder preferences. We developed a discrete choice experiment (DCE) to identify key service features stakeholders consider for HVLC services for stable eye conditions and explore what trade-offs they would make among these features.

Methods

First, we surveyed potential respondents to shortlist six important features through weighted and non-weighted ranking of 12 potential features identified from literature, qualitative interviews, and discussions with the multidisciplinary research team including Patient and Public Involvement (PPI) representatives. Second, we identified appropriate attribute levels for the shortlisted features and used a D-optimal factorial approach to optimise the experiment (Stata 17). We examined the impact of discrete vs continuous feature specification and increasing numbers of levels on sample size using Johnson and Orme's rule of thumb. The optimised choice-set was divided into two blocks. Third, we are distributing the optimised DCE nationwide, aiming for 300 respondents (100 patients, 100 healthcare providers, 100 public). We use a conditional logit regression to estimate relationships among features; estimate attribute substitutability using willingness to wait and willingness to travel; and calculate confidence intervals using non-parametric bootstrapping.

Results: We received 39 responses for the initial shortlisting survey and analysed 31 due to duplication and incompletion. The rankings changed slightly when weighted or non-weighted ranking was used; healthcare provider expertise, accessibility of testing site in terms of transport, how results are shared, and appointment delay were consistently ranked top-six regardless of approach. The D-optimal factorial optimisation—with 3, 4, 4, 4 and 2 feature levels—yielded 16 choice-sets instead of 382 had we used a full design. Continuous variable specification and increasing feature levels increased the minimum sample size and the number of choice-sets completed per respondent.

The DCE itself is in progress and will be completed by March 2023. The logistic regression results will highlight which features are important in informing choice of where to get diagnostic tests.

Conclusions:

Previous DCE studies on specialist cancer surgery suggested that respondents were willing to travel further for improvements related to care and health outcomes. We will report on preferences around accessing care closer to home for regular eyecare check-ups and our results will provide evidence for the optimal balance between the skill-mixes available at the HVLC hub and the main hospital site and how these are traded off against other features. Our results will highlight stakeholder priorities and provide valuable evidence to health systems and leaders seeking to optimise reorganisation of HVLC services—balancing provider skill-mix, patient convenience and other features.

3:30 PM –5:00 PM   TUESDAY   [Cross-Cutting Themes And Other Issues]

Cape Town International Convention Centre | CTICC 1 – Room 2.61-2.62
Applied Quantitative Methods

MODERATOR: **Omar Galarraga**, Brown University School of Public Health, Department of Health Services, Policy and Practice

The Effect of the Integrated Urban and Rural Resident Medical Insurance (IURRMI) on the Performance of China's Health System: A Staggered Difference-in-Differences Analysis

PRESENTER: **Yeqing Zhang**, University College London
AUTHORS: Rolando Leiva Granados, Jolene Skordis

Background

Despite almost universal coverage, segmented social health insurance(SHI) schemes in China led to inequities and inefficiencies in the health system(Fu *et al.*, 2014; Meng *et al.*, 2015). Since 2009, China had been working to improve its journey towards universal health coverage by integrating its dualistic SHI schemes for rural and urban residents into a unified scheme called the Integrated Urban and Rural Resident Medical Insurance scheme(IURRMI). The integration was deployed in phases and was not completed until 2020. This article aims to identify the effect of the IURRMI on the performance of China's health system in terms of reducing financial risks, addressing inequity, and improving health outcomes for citizens.

Methods

We employ a Staggered Difference-in Differences model(Callaway and Sant'Anna, 2021) to account for multiple time periods and variation of treatment timing. Using individual data from China Health and Retirement Longitudinal Study in 2012, 2013, 2015 and 2018, we explore the integration's impact on out-of-pocket (OOP) payments, OOP payments as percentage of household consumption, and self-reported health outcomes.

Results

The initial integration in 2013, reduced absolute OOP payments by 58% (CI: 41% - 70%) on average over time. Subsequently, integration in 2015 reduced OOP payments by 75% (CI: 58%-86%). Integration in 2013 caused an average drop of 1.17% (CI: 0.36% - 1.99%) in OOP payments as percentage of household consumption, while integration phases in 2015 and 2018 did not cause significant changes in relative OOP payments. After aggregation to event time, reductions in absolute and relative OOP payments were significant only three and five years after the integration, respectively, which suggests a delay in the effects of the integration. Heterogeneity analyses show that the magnitude of the reduction in absolute and relative OOP payments was similar for the overall sample and the rural sub-sample. Impacts on health outcomes were significant only for the 2013 integration and only during the observation period from 2013 to 2015.

Conclusions

Our results suggest that the integration of the resident SHI schemes into the IURRMI in China improved financial protection for beneficiaries, but it had a limited impact on optimising household consumption structures and reducing inequities. Impacts on health outcomes were significant during the initial integration period. The delay of the integration's effects on reducing financial burdens, probably caused by low administration efficiency, is worth more attention from policymakers. Given the short span of our study period, it is necessary to conduct further research with a longer observation period to fully uncover the integration's impacts.

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Instrumental Variable Estimation in Compositional Regression for Time-Use Surveys in Health and Long-Term Care

PRESENTER: **Andrej Srakar**, Institute for Economic Research

Time use surveys (TUS) are used in many areas of economics, including economics of health and long-term care. TUS is a sample survey focused on data collection on how people spend their time. It is implemented by countries all over the world. Household's members are taking part in survey to provide basic information about household and about yourself. TUS in the health context is the study of health-enhancing and health-compromising behaviours that are assessed across a 24 h day. The central measurement is the use of Time Use Diaries, which capture 24-48 h, typically asking about behaviour in each 15-min period. TUS is used for understanding correlates of health behaviours, and as a form of population surveillance, assessing behavioural trends over time (Bauman et al., 2019). If analyzed in a regression context, time use survey data suffer from the problem of "spurious correlation" (different from the one in time series context), noted in early works of Aitchison (1986). This problem leads to a need for "compositional" perspective and specific regression models used for data on a geometric simplex with sum of vector components restricted to a constant. While compositional data analysis has been subject of intense study for almost 40 years, at present causal perspectives controlling for endogeneity in a regression model context have been seldom if at all studied. We develop an instrumental variable compositional regression model, building on two strands of literature with applications for health economics and economics of long-term care. In an increasing number of empirical studies, the dimensionality (i.e. size of the parameter space) can be very large. In functional data analysis, appropriate setting to analyze such problems is functional linear model in which the covariates belong to Hilbert spaces. Florens and Van Bellegem (2015) extended this to case where covariates are endogenous (functional instrumental variables/FIV). We extend this to compositional (with possible extensions to distributional) data setting where either or both independent and dependent variables are of compositional nature. We show there exist two ways of deriving compositional IV's, one using isometric log-ratio transform and Chesher et al. (2013)'s IV model of multiple discrete choice; and another deriving from the recent literature on compositional functional data in Bayes spaces (Machalova et al., 2021). We show that estimation in second case resembles the original Florens and van Bellegem functional IV setting and leads to an ill-posed inverse problem with a data-dependent operator. We use and extend the notion of instrument strength to compositional setting. We establish appropriate functional CLT's and study the finite sample performance in a Monte Carlo simulation setting. Our application studies the relationship between long term care for older people provision to relatives and paid work, using recent time use survey from Survey of Health, Ageing and Retirement in Europe (SHARE). In conclusion we discuss extensions to other causal inference approaches for compositional data and various applications in the economics of health and long term care.

Advancing Difference-in-Differences Methods for Unpoolable Data

PRESENTER: **Erin Strumpf**, McGill University
AUTHORS: Nichole Austin, Sunny Karim, Matthew Webb

Background: Natural experiments and cross-jurisdictional comparative analyses offer valuable opportunities to better understand what works – and what doesn't – to improve health and health care. Indeed, exploiting natural variation in health policies and health care system structures across jurisdictions is key to health economists' efforts to inform learning health systems and improve population health. One method frequently used to learn from policy variation is difference-in-differences (DiD) estimation, which uses micro-level data over time and across treated and untreated groups to identify causal effects. DiD is an indispensable tool to estimate the effects of health policies and interventions, but data sources are sometimes siloed by jurisdiction: for example, data from treated and control countries or data from different insurers at the subnational level often cannot be combined into one data set for analysis. This is a significant barrier to DiD estimation and no methods or "best practices" currently exist for conducting DiD analyses when data cannot be pooled. We develop DiD innovations to enable cross-jurisdictional comparisons and policy evaluations for siloed data contexts.

Data and Methods: Our team of econometricians, health economists, and health services and policy researchers have used econometric/statistical theory, simulated data, and health survey data to develop and apply new DiD methods for siloed data. We use the Canadian context as our testing ground: provinces and territories each run their own health system and public insurer, resulting in meaningful policy variation across jurisdictions. Administrative health data remain siloed by province, but national health surveys fielded by Statistics Canada are pooled across jurisdictions. We begin with a 2x2 setting (two time periods, two jurisdictions), binary exposures and linear models. We use analytic methods to specify siloed regressions that allow us to recover the effect estimates from a pooled model, with or without covariates. These methods are tested using simulated data and extended to more complex/realistic settings with multiple treated and control units, multiple periods, and various data generating processes. We use the Canadian Community Health Survey to assess our methods using real-world data in pooled and (falsely) siloed settings.

Results: We will present preliminary results of this work-in-progress in order to solicit feedback from the international health economics community. With minor changes to the pooled regression necessary to accommodate the siloed estimation with siloed data, our analytical econometric results show that we can precisely recover pooled estimates with a weighted combination of the siloed estimates and standard errors. We will present results from validation exercises using both simulated data and national health survey data.

Conclusion: Our work to date suggests that extensions to DiD models can be successfully developed to accommodate data that are siloed by treatment and control units. These methods will facilitate international comparisons and impact evaluation analyses when data cannot be combined across countries or other jurisdictional boundaries. Future work will include the development of a software package to implement these extensions, an applied user guide to facilitate their use, and the evaluation of a health services intervention using our methods.

Longitudinal Genetic Matching for Time-Dependent Treatments: A Simulation Study

PRESENTER: **Deirdre Weymann**, BC Cancer
AUTHORS: Brandon Chan, Dean A Regier

Background: When treatments are accessible at multiple time points, patient eligibility and probability of receiving treatment change continuously. For example, in oncology, patients access emerging genomic tests and targeted cancer treatments at different times in their clinical trajectories. Time-dependent confounding threatens the validity of comparative analyses for these treatments. Longitudinal matching can mitigate time-dependent confounding, but these methods require iterative, manual re-specifications to balance covariate histories and meet underlying assumptions.

Purpose: We propose a longitudinal extension of genetic matching, a machine learning approach, to automate balancing of covariate histories. We examine performance in a simulation study comparing the proposed method against baseline propensity score matching and time-dependent propensity score matching.

Methods: To evaluate comparative performance, we developed a Monte Carlo simulation framework that reflects a static treatment assigned at multiple time points. Data generation considers a treatment assignment model, a continuous outcome model, and underlying covariates. In simulation, we generated 1,000 datasets, each consisting of 1,000 subjects, and applied: (1) nearest neighbour matching on time-invariant, baseline propensity scores; (2) sequential risk set matching on time-dependent propensity scores; and (3) longitudinal genetic matching on time-dependent covariates. To measure comparative performance, we estimated covariate balance, efficiency, bias, and root mean squared error (RMSE) of treatment effect estimates. In scenario analysis, we varied underlying assumptions for assumed covariate distributions, correlations, treatment assignment models, and outcome models.

Results: In all scenarios, baseline propensity score matching resulted in biased treatment effect estimation in the presence of time-dependent confounding, with mean bias ranging from 29.7% to 37.2%. In contrast, sequential risk set matching with a time-dependent propensity score and longitudinal genetic matching achieved stronger covariate balance and yielded less biased treatment effect estimates with low RMSE, with mean bias ranging from 0.7% to 13.7%. Across scenarios, longitudinal genetic matching achieved similar or better performance than time-dependent propensity score matching, without requiring manual re-specification of the propensity score model or covariate normality.

Conclusions: While the most appropriate longitudinal matching method will depend on the research question and patterns in underlying data, our study can help guide these decisions. Simulation results demonstrate the reliability of our proposed longitudinal genetic matching approach for informing future comparative assessments of time-dependent treatments.

3:30 PM –5:00 PM   TUESDAY   [Economic Evaluation Of Health And Care Interventions]

Cape Town International Convention Centre | CTICC 1 – Room 1.64

Generating Evidence for Criteria for Prioritizing Health Benefits Packages: Ensuring Balanced Assessment and Appraisal

MODERATOR: **Anna Vassall**, London School of Hygiene & Tropical Medicine (LSHTM)

ORGANIZER: **Cassandra Nemzoff**, London School of Hygiene and Tropical Medicine

DISCUSSANT: **Alemayehu Hailu**, Department of Global Public Health and Primary Care, Bergen Center for Ethics and Priority Setting, University of Bergen; **Rob Baltussen**, Radboudumc

Choosing the Optimal Assessment Approach for Health Benefits Package Prioritization: A Framework

PRESENTER: **Cassandra Nemzoff**, Center for Global Development/London School of Hygiene and Tropical Medicine

Policymakers seeking to achieve universal health coverage (UHC) face constant demand for new health services to be covered in the wake of shifting burdens of disease and availability of new high-tech services. However, no country has unlimited resources. To balance priorities and budgets, many countries have worked to prioritize their HBPs according to a set of locally agreed criteria. Cost-effectiveness is often a central criterion, with the objective of maximizing population health, and is usually considered alongside others such as equity and financial risk protection.

Various institutions including the World Bank, WHO, and academia have developed datasets and tools to support HBP prioritization. These include the World Bank HiP tool; the WHO OneHealth Tool, UHC-Compendium, and forthcoming HBP Selection Interface; the Bergen

Fair Choices tool; the Tufts Cost-Effectiveness Registry; and Disease Control Priorities (DCP-3).

Despite HBP prioritization exercises in several countries, there is a surprising lack of guidance that enables country policy makers to choose which assessment approach is most appropriate for each criterion in their context, and which tools should be used to support the approach. Furthermore, the literature on HBPs often states how the analysis was done but does not detail how and why the choice of that approach was made.

To fill this gap, this paper has two objectives: to identify different approaches to sourcing and estimating different criteria, identifying trade-offs in time, data, and capacity; and to consolidate these approaches to a practical framework which can guide policymakers in choosing and executing on the optimal assessment approach for each criterion. Research for the framework was done with an initial focus on cost-effectiveness, but with a view towards generalizing the framework and adapting it to other criteria.

A systematic search of the literature sought papers on HBPs which specified their analytical approach(es) to cost-effectiveness. From this, tools which support these projects were identified and grey literature was sourced to understand the tools' functionality.

Information from the literature review was synthesized into a proposed conceptual framework which helps to debate the trade-offs between different assessment approaches and how to balance them with appraisal. This is the first framework of its kind with a focus on helping policy makers choose their assessment approach explicitly.

The presentation of this paper will provide an overview of the framework as a means of introducing the session, and a point of reference throughout. It will also provide some reflections on what these choices mean for overall package design, and how and whether the same thinking might be used for incremental cost-effectiveness analyses.

Choosing the Optimal Assessment Approach for Health Benefits Package Prioritization: Case Study in Rwanda

PRESENTER: **Stella Matutina Umuhoza**, University of Rwanda - School of Public Health

Rwanda has a robust community-based health insurance (CBHI) scheme which covers more than 80% of the population. As the burden of disease shifts towards non-communicable diseases, there has been a steady rise in demand for even broader services to be covered by CBHI. To ensure the financial sustainability of CBHI, the Government of Rwanda is working to review and prioritize the services covered under the CBHI health benefits package.

In 2021, the government published a Ministerial Instruction on developing the methods for prioritizing the HBP which set out ten criteria: burden of disease, financial risk protection, effectiveness, cost, cost-effectiveness, feasibility, budget impact, equity, life-threatening conditions, and political acceptability. Soon thereafter, an assessment team comprising local academics and technical assistance partners convened to operationalize these criteria.

A framework was developed to help guide which criteria would be measured quantitatively or qualitatively, based on available time, data, and capacity. Consultative discussions were facilitated with representatives from the Ministries of Health and Finance. Criteria were split into three levels: those measured quantitatively; those measured qualitatively using basic survey techniques and expert judgment; and those assessed solely using expert judgment of the HBP committee and clinical expert reviewers.

Quantitative assessment was undertaken for cost, cost-effectiveness, burden of disease, financial risk protection and budget impact. This used a combination of locally available costing data, international estimates of burden of disease, and the Tufts registry of cost-effectiveness studies. Feasibility was measured qualitatively using survey techniques. And finally, those assessed using expert judgment included effectiveness, life threatening conditions, equity, and priority to vulnerable groups.

The presentation of this paper will provide an overview of how the choice for the assessment of each criterion was made, what the lessons learned were during the assessment, how the criteria influenced (or did not influence) the appraisal recommendations, and considerations for future assessments.

The Use of Evidence to Design an Essential Package of Health Services in Pakistan: A Review and Analysis of Prioritisation Decisions at Different Stages of the Appraisal Process

PRESENTER: **Sergio Torres-Rueda**, London School of Hygiene and Tropical Medicine, Keppel St, London WC1E 7HT, United Kingdom

Pakistan embarked on a process of designing an essential package of health services (EPHS) as a pathway towards universal health coverage. The EPHS design followed an evidence-informed deliberative process; evidence on 170 possible interventions was introduced along multiple stages of the appraisal process engaging different sets of stakeholders whose task was to prioritise interventions for inclusion. In this paper we report on the composition of the package at different stages, analyse trends of prioritised and deprioritised interventions and reflect on the trade-offs made between different decision criteria and intervention characteristics.

Quantitative evidence on cost-effectiveness, budget impact, avoidable burden of diseases, as well as qualitative evidence on feasibility, was presented to stakeholders throughout a series of stages. We recorded which interventions were prioritised and deprioritised at each stage of the appraisal process and carried out three analyses: (1) a review of total number of interventions prioritised at each stage, along with associated costs per capita and DALYs averted, to understand changes in affordability and efficiency in the package, (2) an analysis of

interventions broken down by decision criteria and intervention characteristics to analyse prioritisation trends across different stages, and (3) a description of the trajectory of interventions broken down by current coverage and cost-effectiveness to highlight trade-offs.

We found that value for money generally increased throughout the process, although not uniformly. Stakeholders largely prioritised interventions with low budget impact and those preventing a high burden of disease. Highly cost-effective interventions were also prioritised, but less consistently throughout the stages of the process. The proportion of interventions delivered at the health centre level, and those focusing on reproductive, maternal, neonatal, child and adolescent health, increased throughout the process. Interventions with high current coverage were overwhelmingly prioritised for inclusion.

We conclude that evidence-informed deliberative processes can produce actionable and affordable health benefit packages. While cost-effective interventions are generally preferred, other factors play a role and can limit efficiency. We argue that further research efforts are needed to explore how and why other decision criteria (e.g. feasibility) are traded off against cost-effectiveness.

Revision of the Malawi Health Benefit Package As Part of the Health Sector Strategic Plan (2023-2030)

PRESENTER: **Gerald Manthalu**, Ministry of Health, Malawi

Introduction

Malawi revised its Health Benefits Package (HBP) in 2022, the fourth time the HBP was revised since its introduction in 2004. The process started by building consensus on HBP objectives, defining criteria against the objectives and implementing the criteria for a comprehensive list of interventions.

Methods

The HBP was defined using cost-effectiveness analysis (CEA) and a participatory multi-criteria decision analysis (MCDA) approach. CEA assisted in prioritizing interventions that maximized population health within limited resources. MCDA was employed to consider the other objectives and to assess interventions for which there was no CEA evidence. MCDA was applied to all interventions regardless of whether CEA data were available. Inclusion criteria for MCDA were 1) severity of disease or potential disease, 2) effectiveness of an intervention, 3) poverty reduction, 4) vulnerable populations, and 5) level of care where intervention is delivered. The candidate interventions for the HBP were scored against the MCDA criteria and a final weighted average was calculated. Initial prioritization was done using CEA and then MCDA was applied. A cost-effectiveness threshold of $65 per DALY averted was used. After this, prioritization was iterative, adjusting coverage levels until the package was within the estimated resource envelope.

Results

A list of 305 potential interventions for the HBP at primary and secondary levels was compiled. A review of the literature identified cost-effectiveness data for 145 interventions. Medicines and medical supplies costs from Malawi, epidemiological data, and demand constraints were utilized to estimate the total net health benefit of each intervention. The final primary and secondary HBP included 115 interventions, averting over 31 million DALYs in 2022, based on interventions that had cost-effectiveness data. Of the final interventions assessed, 49 were cost-effective and 76 qualified through the MCDA score threshold, with overlap in interventions between the two methods of prioritization. The prioritization was iterative with some interventions removed due to a low MCDA score despite being cost effective and some interventions included due to a high MCDA score despite not being cost-effective. However, 74% (36/49) of the cost-effective interventions were included by the MCDA score as well.

Conclusion

Malawi used multiple criteria to initially define its health benefits package. Data on cost-effectiveness analysis were very limited so other criteria had to be used to assess interventions without CEA data as well as incorporate other objectives apart from health maximisation. With observed limited growth of CEA evidence, expert opinion and alternative methods remain critical to HBP definition.

3:30 PM –5:00 PM   TUESDAY   [Cross-Cutting Themes And Other Issues]

Cape Town International Convention Centre | CTICC 1 – Room 2.64-2.65

Violence, its outcomes and prevention [ECONOMICS OF RISKY HEALTH BEHAVIORS SIG]

MODERATOR: **Tinna Laufey Asgeirsdottir**, University of Iceland

Assessing the Cost-Effectiveness of Economic Strengthening and Parenting Support for Preventing Violence Against Adolescents in South Africa: An Economic Modelling Study Using Non-Randomized Data

PRESENTER: **Sopuruchukwu Obiesie**, University of Oxford
AUTHORS: William Edward Rudgard, Chris Desmond, Marisa Casale, Lucie Cluver, Hernando Grueso

Title: Assessing the cost-effectiveness of economic strengthening and parenting support for preventing violence against adolescents in Mpumalanga Province, South Africa: an economic modelling study using non-randomized data.

Background: Policymakers in developing countries need economic evidence to inform the prioritization of effective interventions that prevent childhood violence. The different forms of violence that children face often share common mediating factors. Evidence suggests that interventions that target these intermediary factors will likely impact more than one violence outcome. However, economic evaluations of childhood violence prevention interventions in sub-Saharan Africa focus on linear violence outcomes which undervalues the cost-effectiveness of these interventions or use natural units as measures of outcomes which makes comparison across interventions difficult. In this study, we aimed to provide early estimates around the cost-effectiveness of three violence prevention interventions acting on three distinct violence outcomes implemented at the provincial level in South Africa.

Method: We used decision-analytic modelling to estimate the cost-effectiveness of a community child support grant outreach intervention, and a parenting support intervention for preventing emotional, physical, and sexual abuse among adolescents in Mpumalanga province, South Africa, and estimated the cost-effectiveness of integrating these two approaches as a parenting support plus grant linkage intervention. Hence, this integrated approach sought to explore any net economic benefit that simultaneously addressing more than one protective factor would have on multiple violence outcomes. The target population was families with an adolescent (10-19 years) and a monthly household income below the national upper poverty line. Intervention effectiveness was informed by published impact evaluations and national survey data. Cost-effectiveness ratios were expressed per DALY averted and evaluated against a South Africa-specific willingness-to-pay threshold. We varied model parameters to consider real-world versus trial-based costing, and population-average versus high prevalence of violence.

Findings and conclusion: Under routine service costing, ACERs for grant outreach and parenting support intervention scenarios were both below the WTP threshold at a population-average prevalence of violence, costing USD2850 (Lower: USD1840; Upper: USD10,500) and USD2620 (USD1520; USD9800) per DALY averted, respectively; and a high prevalence of violence, costing USD1320 (USD908; USD5180) and USD1340 (USD758; USD4910) per DALY averted, respectively. The incremental cost-effectiveness of adding grant linkage to parenting support was USD462 (USD346; USD1610) and USD225 (USD150; USD811) per DALY averted at population-average and high prevalence of violence, respectively. Under trial-based costing, ACERs for all of the intervention scenarios were above the WTP threshold at a population-average prevalence of violence, and only grant outreach was below the WTP threshold at a high prevalence of violence, costing USD2580 (USD1640; USD9370) per DALY averted. Upper confidence intervals for all ACERs crossed the WTP threshold indicating uncertainty in our findings. Investments in community grant outreach and parenting support interventions are most likely to be cost-effective for reducing adolescent violence if they are provided using routine service costing and they reach adolescents with a high risk of violence victimisation. Adding a grant linkage component to parenting support is likely to enhance their cost-effectiveness and reflects the value of integrated services for preventing violence against children.

"Power to Choose? Examining the Link between Contraceptive Use and Domestic Violence"

PRESENTER: **Karan Babbar**, O P Jindal Global University
AUTHOR: Manini Ojha

Contraceptive usage is a crucial tool that empowers women to control their bodily autonomy and reproductive outcomes. At the same time, intimate partner violence (IPV) remains a pressing public health issue worldwide depleting women's autonomy. With nearly one in three women worldwide experiencing some form of abuse by their husbands or intimate partners in their lifetime, prevalence of IPV is of great concern to policymakers. Evidently, there is a need to combat the negative consequences of IPV (physical injuries, permanent disability, reproductive health issues, mental health problems, and even death). As such, in recent years, numerous papers have examined the causes and channels of IPV. Our study contributes to this growing body of literature by specifically examining the role of a woman's decision-making about the use of contraceptives as a potential determinant of domestic violence.

In theory, a woman's sole decision to use contraceptives could indicate greater control of her bodily autonomy and fertility outcomes implying that she holds greater bargaining power and thus may be able to resist domestic violence. However, her decision to use contraceptives alone and not jointly with her partner may also result in a stronger backlash from her partner. A priori, how the decision to use contraceptives affects IPV is ambiguous and merits empirical investigation. To this end, we study: if a woman chooses to use contraceptives solely, does it have a causal effect on her exposure to IPV? If so, what is the direction and extent of this effect?

We use a nationally representative survey data from the fifth wave of the National Family Health Surveys of India for 2019-21 to estimate our causal effects. The main empirical challenge in identifying the causal effect is that the choice to use contraceptives may be endogenous owing to omitted variables. In addition, domestic violence also affects the decision to use contraceptives leading to simultaneity bias. To address the issue of endogeneity, we employ an Instrumental Variable (IV) approach. We utilize a woman's exposure to family planning methods through mass-media, in particular, radio as our IV for her decision to use contraceptives.

We find robust evidence that choosing to use contraceptives solely puts the woman at a greater risk of IPV, physically, sexually, and emotionally. Using a conditional mixed process estimation, we distinguish correlations with causal effects and find that the likelihood of IPV increases by 11.5 percentage points (pp) if the decision to use contraceptives is the woman's alone. The effects are higher for the incidence of sexual and emotional domestic violence. The marginal effects reveal that a woman is 13.1 pp (23.8 pp) more likely to face sexual (emotional) domestic violence if she decides to use contraceptives. We also find larger effects for younger women, for the rural areas as well as the sub-sample of women whose husbands are employed rather than unemployed.

Access to Abortion and Intimate Partner Violence

PRESENTER: **Mayra Pineda-Torres**, Georgia Institute of Technology

AUTHOR: Aixa Garcia-Ramos

Intimate partner violence (IPV) is one of the most pervasive human rights violations. It is by far the most prevalent form of violence against women globally, affecting around 641 million women. In addition to the negative physiological and physical effects on victims and their children, IPV may deter investment in education and alter the ability to join or remain in the labor force, ultimately reflecting in lifetime income losses. Women experiencing IPV may also have limited autonomy over their fertility choices. In the U.S., for example, 8.6 percent of women have had a partner who tried to get them pregnant against their will or refused to wear a condom. Moreover, women with children might find it more difficult to leave a violent.

Access to legal and safe abortion may allow IPV victims to avoid an unwanted pregnancy, which could reduce IPV and improve a wide range of health and economic outcomes. However, access to abortion might also cause conflict between partners if their fertility preferences differ. Thus, it is not clear, from a theoretical point of view, how legal access to abortion services could affect IPV.

This paper aims to provide some insights into this relevant topic using the case study of Mexico. In April 2007, Mexico City became the first state in Mexico and one of the first regions in Latin America to legalize elective abortion within the first 12 weeks of pregnancy. We exploit this ground-breaking change in a difference-in-differences (DiD) framework using three different sources of variation: state-level variation, metropolitan area-level variation, and the distance between the centroid of the municipality where the woman lives and the closest abortion clinic in Mexico City. To the best of our knowledge, this is one of the first studies attempting to estimate the causal relationship between abortion access and IPV.

We rely on a broad range of datasets, including high-quality individual-level data on IPV, fertility preferences, contraceptive use, and labor market decisions. Additionally, we employ data on retail sales of Misoprostol---a medicament used to induce abortion, intentional homicides, and elections. Furthermore, we also use hand-collected information on the location of the abortion clinics, which includes information about the period in which the abortion service is available.

Our findings indicate that, after the legalization of abortion in Mexico City, IPV declined by 2.4-4.2 percentage points (6-12 percent of the baseline mean) relative to regions where the procedure remained illegal. This finding is driven by women who already have children. We find evidence for several mechanisms driving these results, including a reduction in unwanted births, which is likely to affect women who would not have gotten an abortion in an illegal setting but would do so in a legal one. The legalization of abortion also decreased the demand for Misoprostol, likely explained by a move from self-induced abortion to legal abortion in clinics, where safety is higher and women have more certainty about the completion of the abortion.

Gender-Based Violence and the Wage-Gap in Canada: A Propensity Score Matching Study

PRESENTER: **Beverley Essue**, University of Toronto

Gender-based violence (GBV) is a pervasive human rights violation that threatens the fundamental rights to equality and non-discrimination. It is universal and affects all countries, rich and poor, without exceptions. Canada continues to bear a high burden of GBV with about half of all Canadian women estimated to have experienced at least one incident of physical or sexual violence since the age of 16. Younger women (15-24 years) are about two times more likely to experience GBV than older women. The health and social costs associated with GBV are enormous as are the colossal associated economic cost for the survivor and for society at large. The impacts of violence have serious and long-term impacts on the development and deployment of human capabilities, which can be made visible in differential rates of labour force participation and outcomes of GBV survivors compared with those who do not report a violence exposure. While postulated in the literature, few studies have empirically estimated the impact of exposure to GBV as a 'wedge' that sustains gender wage gaps. This study aims to fill this gap. We estimate the proportion of the gender wage gap in Canada that is attributed to GBV and describe within group differences of GBV-related productivity losses. Using the 2019 Canadian General Social Survey (GSS) that includes linked annual and family income data from the 2018 income tax file for survey respondents, we identified a population sample of all individuals aged 15-65 years who reside in Canada. An exposure to violence was characterized by self-identified exposures to either physical, sexual or psychological violence and a propensity score was estimated to match cases to controls using a probit model. The wage gap analysis examined mean differences in income between women exposed to GBV (partner and non-partner perpetration) with unexposed women and men. The GBV-related productivity losses and attributable wage gap are reported in 2022 CDN. Sensitivity analyses tested the robustness of the model's assumptions. This research extends the propensity score model to study macroeconomic impacts of GBV in a Canadian context. It develops an estimate using the most recent 2019 GSS and linked income tax data, allowing us to estimate the productivity impacts using both income and family income. The findings reflect a more inclusive understanding of GBV in Canada, accounting for both partner and non-partner violence as well as intensity of exposures, and will estimate the macroeconomic impact of GBV by sector. The results highlight the magnitude of the 'wedge' in the gender wage gap that is due to GBV, supporting the case for urgent attention to addressing GBV in Canada, with relevance and application to other settings.

Cape Town International Convention Centre | CTICC 2 – Protea

Improving Health Financing to Improve Health Outcomes

MODERATOR: **Eva Pascoal**, World Health Organization

Do Targeted Intergovernmental Fiscal Transfers Improve Health Outcomes? Evidence from Kenyan Decentralization

PRESENTER: **Bishnu Bahadur Thapa**, Brown University

AUTHORS: Momotazur Rahman, Jon Steingrimsson, Becky L. Genberg, Lawrence Were, Richard Wamai, Omar Galarraga

BACKGROUND

Following a constitutional mandate, Kenya decentralized in March 2013 setting up 47 counties and a corresponding number of local governments. These counties differed in level of development. While counties like Nairobi and Kiambu led in social and economic indicators, others such as Turkana, Mandera, and Wajir were at the bottom of the list.

Keeping the between-county disparities and the need to remedy those disparities in mind, the national government used formula-based criteria to determine counties' eligibility for the receipt of financial resources. Based on the criteria, counties were classified into marginalized and non-marginalized . Marginalized counties were 14 (of the 47) most socially and economically disadvantaged counties and received additional financial resources, or targeted intergovernmental fiscal transfers (i.e., fiscal transfers from the national government to county governments). The purpose of the study was to estimate the impacts of these targeted intergovernmental fiscal transfers (IGFTs) on health outcomes. In doing so, the study addresses the evidence gap on the role of IGFTs on health outcomes, especially in the context of newly decentralized countries.

METHODS

We used differences-in-differences techniques to estimate the impacts of the IGFTs on diarrhea incidence and HIV incidence. Our unit of analysis was county-year. Outcome variables were measured in terms of the number of new cases per 100,000 population. County-level controls included GDP per capita, mean level of maternal education (in years), per capita health spending, ANC visits, urban population share, and DTP3 vaccination coverage rate. We used county-level longitudinal data between 2005 and 2019 (with 2005-2013 as the pre period and 2014-2019 as the post period) available through the Global Burden of Disease Study. included time (i.e., year) and unit (i.e., county) fixed effects as well as robust standard errors.

RESULTS

Our findings suggest that IGFTs had no impact on the incidence of HIV/AIDS but had significant impact on the incidence of diarrhea. Adjusted results suggest that IGFTs led to nearly 5 percent reduction in the incidence of diarrhea. A possible reason for the observed change may have to do with how different health services are delivered in Kenya. As in several other countries, HIV/AIDS service delivery in Kenya has operated mostly as a vertical program. This contrasts with diarrhea-related efforts which have followed a more integrated public health approach. Additionally, the observed change could also be attributed to county-level differences in sectoral prioritization.

CONCLUSION

We found that targeted IGFTs based on marginalization criteria (implemented in the wake of 2013 decentralization) led to a relative decline in the incidence of diarrhea but had no impacts on the incidence of HIV. Putting together, our results imply that targeted intergovernmental fiscal transfers can improve health outcomes.

IMPLICATIONS FOR POLICY & PRACTICE

Our results imply that targeted interventions such as IGFTs may be effective at improving health outcomes in the context of decentralization in low and lower middle-income countries. Further, our results imply that targeted IGFTs may also be effective at improving sub-national health outcomes, and therefore, in reducing within-country health inequalities.

The Effect of Districts' Health Expenditure Towards Maternal Mortality Rate in Indonesia

PRESENTER: **Nirwan Maulana**

AUTHORS: Nadhila Adani, Anooj Pattnaik, Edward Sutanto, Halimah Mardani, Teti Tejayanti, Andhy Syahrial, Dony Suryatmo Priyandono, Lukman Adi Santoso, Iin Afriani, Suparmi Suparmi, Ika Saptarini, Anita Damayanti Putri, Trihono Trihono

Background: Indonesia's Maternal Mortality Rate (MMR) is still high at 305 per 100,000 livebirths in 2015 despite a significant increase in antenatal care (ANC) coverage and more deliveries in healthcare facilities. To finance their maternal and newborn health programs, districts rely on their own health budgets and transfers from the central government, such as the specific allocation fund (SAF) that is earmarked for health. SAF consists of two schemes: an operational fund which pays the costs of deliveries for the poor, and a capital

investment fund which pays for specific infrastructure-related costs, like strengthening obstetric emergency care at public health facilities. This study assesses how these financing schemes affected MMR in Indonesia.

Method: We used secondary data analysis during the period of 2018 – 2021 at the district-level to assess how the absorption of districts' health budget, the operational fund, and the capital investment fund affected MMR. Routine data on MNH were obtained from the Ministry of Health, financing data from the Ministry of Finance, and socio-economic data from Indonesia's National Socio-Economic Survey. A panel fixed-effect regression was conducted to control for time-invariant districts' characteristics. Health expenditure variables were normalized per reproductive age women (RAW) and log-transformed. Control variables include health indicators related to pregnancy (i.e: ANC coverage, delivery in facilities, modern contraceptive prevalence rate) and socio-economic indicators (i.e: poverty rate, percentage of women in formal employment, per capita expenditure, and districts' fiscal capacities).

Results: We observed a significant quadratic effect of districts' health budget to MMR, specifically a U-shaped curve, where it decreases MMR until a certain threshold- Rp 9,500,000 (US$ 617) per RAW -then the effect reverses. The current average is far above the threshold – Rp 25,000,000 (US$ 1,623) per RAW – though current MMR is still far from the national target. This indicates a lack of budget managerial capability, for example spending is unaligned with national priorities to invest in key MNH programs. Furthermore, we found significant evidence that a 10% increase in operational fund per RAW resulted in a 2.9% reduction of MMR, whereas the capital investment fund is found insignificant towards MMR reduction. Lastly, we did not find a quadratic pattern between both SAF schemes to MMR.

Conclusion: This study contributes to the growing literature on the importance of local government allocating their budget effectively towards national-level priorities, specifically the reduction of MMR, and what types of funding mechanisms seem to have the most impact. Districts should improve their budget management by spending a sufficient proportion towards key MNH programs. Moreover, districts seem to rely on the operational fund to finance their MNH activities which may signal a crowding-out effect. The availability of SAF may induce districts to shift their budgets towards other programs that may not align with national priorities like MMR. This hypothesis is justified by the significant effect of operational fund to MMR reduction while the health budget's effect is only until a certain threshold. SAF should be a complement to districts' health budget to accelerate the achievement of MMR target

Does Fiscal Capacity at the District Level Influence Childhood Vaccination Coverage and the Infant Mortality Rate? Findings from Indonesian National Socio-Economic Survey 2019 – 2021

PRESENTER: **Edward Sutanto**, ThinkWell
AUTHORS: Nirwan Maulana, Nadhila Adani, Anooj Pattnaik, Halimah Mardani, Anita Damayanti Putri, Ario Baskoro, Elvina Diah, Trihono Trihono

- **Background:** Childhood vaccination is one of the most cost-effective health interventions to reduce infants' morbidity and mortality. Yet, vaccine inequity, specifically the wealth gap, continues to be one of the main challenges in developing countries; The poorest Indonesian children have the lowest vaccination coverage. While most literature has focused on household wealth, little is known on how the fiscal capacity of the district health office (DHO) may also affect childhood vaccination coverage. We hypothesize that DHOs with higher fiscal capacity have higher childhood vaccination coverage due to their increased capability to set up service provision, which leads to a reduction of infant mortality rate (IMR).
- **Methods:** We quantitatively assessed the effect of DHO fiscal capacity on childhood vaccination coverage and IMR in Indonesia. Fiscal capacity and IMR at the district level were determined via routine data collected by Ministry of Finance and Ministry of Health. Vaccine coverage and other variables related to IMR were obtained from the National Socio-Economic Survey, a nationally representative cross-sectional survey, from 2019 to 2021. This study only included children aged 12-23 months old. Children under 1 year were not included as they are not old enough to receive all basic childhood vaccination schedules; those above were excluded to avoid confusion with the immunization booster schedule. We performed a panel fixed-effect regression to control for time-invariant districts characteristics, adjusting for other variables related with vaccination coverage and IMR (e.g. household wealth and maternal education).
- **Results:** The national and district-level coverage for complete basic childhood vaccination were 45.2% and 0% to 97.8% in 2019, 47% and 0% to 93.3% in 2020, 52.2% and 0% to 100% in 2021. District-level IMR (per 1,000 live births) ranged from 0.1 to 29.0 in 2019, 0.1 to 41.6 in 2020, 0.1 to 31.0 in 2021. DHO fiscal capacity did not have a statistically significant effect on childhood immunization coverage nor IMR. In a sub-group analysis, higher immunization coverage significantly reduced IMR only in high fiscal capacity DHOs (i.e. 10% increase in number of child completing basic childhood vaccination will decrease IMR by 1.5%), however it increased IMR in moderate fiscal capacity DHOs.
- **Conclusion:** Fiscal capacity of DHOs did not seem to influence childhood immunization coverage nor IMR. These null findings suggest that higher fiscal capacity does not necessarily translate to better utilization of healthcare resources for child health. Possible explanations include other potential variables in the causal pathway (e.g. facility quality) and we did not account for DHO commitment and capability (i.e. planning, budgeting, and utilizing their budget successfully). However, the study did point to some connection between coverage and IMR in districts with variable fiscal capacities, which indicates a complex interplay between these 3 variables. In addition to demonstrating that childhood vaccination coverage is context-specific, our study adds to the limited evidence on the connection of local government's fiscal capacity with childhood vaccination coverage and IMR. Future studies could attempt to examine this linkage in different contexts and other outcomes, along with accounting for other variables in the causal pathway.

Do Expenditures on Public Health Reduce Preventable Mortality in the Long Run? Evidence from Canadian Provinces

PRESENTER: **Mehdi Ammi**, Carleton University

AUTHORS: Emmanuelle Arpin, F. Antoine Dedewanou, Sara Allin

Background: Investments in public health – prevention of illnesses, and promotion, surveillance, and protection of population health – represent only a small fraction of total health expenditures. Expenditures on public health may decrease avoidable mortality from preventable causes, however, effects may only be observed over a long period. Despite a large literature on the links between health expenditures and health outcomes, whether such long run relationship exists remains to be further investigated.

Objective: To investigate the potential long-run relationship between expenditures on public health and avoidable mortality from preventable causes.

Methods: We constructed a longitudinal dataset from publicly available data on mortality, health care expenditures and socio-demographic information covering 10 Canadian provinces and years 1979 to 2017. Focusing on Canada allows to obtain high quality data over a long period of time and helps limit unobserved heterogeneity and issues of measurement errors, such as with the definition of expenditures on public health, in ways not possible using international data. Our data is a balanced panel of 380 province-years. After confirming a long-run relationship between expenditures on public health and preventable mortality through a series of cointegration tests, we ran error correction models (ECM) for panel data to disentangle short-run from long-run relationships between expenditures on public health and avoidable mortality from preventable causes. For comparison, we also estimated the relationship between curative expenditures (i.e., physicians, drugs, hospitals) and avoidable mortality from treatable causes in dynamic panel data regression models. We also explore some specific preventable causes of mortality in supplementary analyses.

Results: We find evidence of a long-run relationship between expenditures on public health and avoidable mortality from preventable causes, and no consistent short-run associations between these two variables. Findings suggest that a 1% increase in expenditures on public health could lead to -0.22% decrease in mortality. Preventable mortality reduction appears higher for male (-0.29%) than female (-0.09%). Reduction in lung cancer (males) and breast cancer (females) deaths are among the probable drivers of this decrease. We do not find evidence of a consistent relationship between curative expenditures and avoidable mortality from treatable causes in the long run.

Conclusion: This study supports the argument that the expenditures on public health reap benefit only in the long run, which in this case is a reduction in avoidable mortality from preventable causes. Expenditures on public health have been reduced in several industrialized countries due to fiscal austerity or short-sighted electoral concerns. Our findings imply that these reductions may be detrimental to population health, and that policy makers shall consider protecting public health budgets.

3:30 PM –5:00 PM   TUESDAY   [Economic Evaluation Of Health And Care Interventions]

Cape Town International Convention Centre | CTICC 1 – Room 1.62

How Does Program Context and Vaccination Schedule Influence Costs in Routinized National-Level Immunization Programs? Key Lessons from Human Papillomavirus (HPV) Vaccine Delivery in Six Low- and Middle-Income Countries [IMMUNIZATION ECONOMICS SIG]

MODERATOR: **Frederic Debellut**, PATH

ORGANIZER: **Mercy Mvundura**, PATH

DISCUSSANT: **Sarah Elizabeth Pallas**, US Centers for Disease Control and Prevention

Evaluating the Ongoing Costs of HPV Vaccine Delivery in Mature Programs: Evidence from Six Low- and Middle-Income Countries

PRESENTER: **Mercy Mvundura**, PATH

Perceptions about high vaccine and program costs may be a reason why about 50% of low- and middle-income countries have not yet introduced HPV vaccination nationwide. While studies have estimated the program costs of HPV vaccine delivery to inform country decision-making, most were conducted during demonstration projects or in the initial years of vaccine introduction, which may not reflect the ongoing costs of mature programs. We conducted a multi-country study to estimate the ongoing financial and economic costs of HPV vaccine delivery for mature programs.

Micro-costing methods were used to retrospectively collect data to estimate the annual ongoing financial and economic costs of HPV vaccine delivery in six countries. Stratified random sampling was used to select health facilities providing HPV vaccination services in Ethiopia (n=60), Guyana (n=43), Rwanda (n=42), Senegal (n=56), Sri Lanka (n=30), and Uganda (n=66). Data were also collected at administrative levels (n=5 to 22 per country). Facility staff responsible for HPV vaccination services and program managers at each administrative level were interviewed using structured costing questionnaires. The HPV vaccine program activities evaluated included

program planning and management, social mobilization, routine training, vaccine collection/distribution and storage, service delivery, record keeping, crisis management, supervision, and waste management. Costs estimated included financial costs for per diems, meetings, fuel, and vehicle rental. Opportunity costs were also estimated, including costs of time for health and non-health workers involved in HPV vaccination program activities and costs for capital such as vehicles and vaccine storage equipment. Vaccine dose and session data were extracted from program records at each health facility. The costing was done from the health system perspective with a 2019 reference year for all study countries except for Ethiopia, where the reference years spanned 2019 and 2021. All costs are reported in 2019 USD.

Across the six study countries, financial costs were a relatively small proportion of the total economic costs of HPV vaccine delivery at health facilities. The mean annual financial costs per health facility ranged from $164 to $497 while the economic costs ranged from $1082 to $3190. The opportunity cost of health worker time accounted for the largest share of program costs, with the bulk of the time spent on service delivery. Economic costs per dose ranged from $2.37 to $12.64 in the health facilities in the study. At the national level, financial costs were a sizable share of costs in some countries, such as Uganda. However, in other countries such as Guyana, opportunity costs remained the larger share of economic costs. There was a wide range, within country and across countries, in the cost drivers and the estimated cost per dose, depending on which program activities were done, type of resources used, and other context factors.

When HPV vaccine programs mature, there are relatively low ongoing financial costs compared to nascent programs at the coverage levels currently being achieved. However, additional financial investments may be required to implement activities to increase coverage. Implementing single-dose schedules may further reduce HPV vaccine program costs making it more affordable and sustainable.

Evaluating the Costs for Alternative Immunization Service Delivery Strategies: Evidence from HPV Vaccine Delivery in Six Countries

PRESENTER: **Teddy Naddumba**, PATH

Three location-based strategies are typically used for vaccine delivery in low- and middle-income countries: facility-, school-, and community-based delivery. Program costs differ by delivery location. While service delivery costs have been characterized previously for routine childhood immunization (predominantly facility-based), HPV vaccine delivery costs (predominantly school-based) are less understood. We evaluate how service delivery strategies and HPV vaccination costs differ by delivery strategy across six countries.

Stratified random sampling was used to select the health facilities providing HPV vaccination services in Ethiopia (n=60), Guyana (n=43), Rwanda (n=42), Senegal (n=56), Sri Lanka (n=30), and Uganda (n=66). Micro-costing methods were used to retrospectively collect data from these facilities to estimate the annual ongoing financial and economic costs of HPV vaccination by delivery strategy. Data were collected by interviewing facility staff responsible for providing HPV vaccination services using structured costing questionnaires. The questionnaires were standardized across countries and adapted as needed for the country context. Information on the resources used for each HPV vaccine delivery location by strategy were collected. The resources evaluated included time use by vaccinators, support staff, school staff, and volunteers, as well as transport costs for vaccination teams and per diems. Vaccine dose and session data were extracted from program records in each facility. The costing was done from the health system perspective with a 2019 reference year for all study countries except for Ethiopia where the reference years spanned 2019 and 2021. All costs are reported in 2019 USD.

While school-based delivery was the main strategy used for HPV vaccine delivery by the facilities in the sample across all six countries, there was variation across the study countries on the use of community- and facility-based delivery. In Sri Lanka, no study facilities conducted community-based delivery. In Rwanda, HPV vaccine delivery was predominantly school-based (n=42 facilities) with very few health facilities conducting community- (n=1) or facility-based (n=1) vaccination. In contrast, there was a more diverse service delivery mix in other countries, with some facilities in these countries using multiple strategies. In Uganda, 89% of the health facilities conducted school-based settings, 28% conducted community-based, and less than 10% used facility-based delivery. In Senegal, 80% conducted school-based, 36% conducted community-based, and 61% conducted facility-based delivery. The service delivery costs per dose also differed by delivery setting. For example, the average economic costs per dose for service delivery was $1.40 in school-based and $2.50 in community-based delivery in Uganda. Common cost drivers across the countries were frequency of sessions and number of staff involved in the sessions.

HPV vaccine delivery through school-based settings is sometimes the lowest cost strategy to reach the adolescents targeted for this vaccine, though vaccinating in this setting alone does not reach them all. Community-based delivery strategies to reach out-of-school adolescents or adolescents otherwise missed through school-based vaccination may come with a higher service delivery cost per dose, representing an investment necessary to reach under- and unimmunized adolescents.

Evaluating the Potential Program Cost Savings with a Single-Dose HPV Vaccine Schedule

PRESENTER: **Rose Slavkovsky**, PATH

Nearly 50% of low- and middle-income countries have not yet introduced HPV vaccination nationwide, citing vaccine price and delivery costs as common concerns. Recent evidence indicates that a single-dose schedule, compared to the recommended two doses, offers adequate protection and may improve the feasibility of national programs. Implementing a single-dose schedule may also reduce procurement and delivery costs. We are using data from a six-country study on HPV vaccine cost of delivery and operational context to estimate the potential programmatic impact and cost savings of switching to a single-dose schedule.

A micro-costing study was conducted in Ethiopia, Guyana, Rwanda, Senegal, Sri Lanka, and Uganda. Stratified random sampling was used to select the health facilities included in the study (n=30 to 66 health facilities per country). Data were also collected from national and subnational administrative offices (n=5 to 22 per country). Facility staff responsible for providing HPV vaccination services were interviewed using structured questionnaires to understand the frequency of activities and resources used with the two-dose schedule. The HPV vaccination program activities evaluated included program planning, social mobilization, routine training, vaccine storage and distribution, service delivery, record keeping, crisis management, supervision, and waste management. Costs estimated included opportunity costs for health and non-health staff time, per diems, vaccine procurement costs, costs for meetings, fuel, transport costs, and capital costs for using existing vehicles and vaccine storage equipment. We are using this data to identify the frequency of activities done with the two-dose schedule and what could be eliminated with a single-dose schedule. We plan to adjust the cost estimates and then estimate the potential program cost reductions with a single-dose schedule. All costs are reported in 2019 USD.

With the two-dose schedule, the mean financial costs per dose delivered at health facilities in the study sample ranged from $0.18 to $2.62, while the mean economic cost per dose ranged from $3.26 to $12.95 when excluding the vaccine cost. The largest share of this cost per dose was for service delivery activities, typically done twice per year with the two-dose schedule and could be reduced with a single-dose schedule. While there is potential for other program cost reductions, in some countries, HPV vaccination activities are integrated with other immunization activities or conducted for both doses, so there may not be significant financial or economic cost savings from the switch. The cost of vaccine supply could also be reduced by half with the adoption of a single-dose schedule. Full results for the cost estimates assuming a single-dose schedule will be available in February 2023.

In addition to the estimated cost reductions in vaccine procurement, our preliminary analysis suggests that switching to a single-dose schedule could result in cost savings to the immunization program and donors who subsidize vaccine purchase costs. A better understanding of the magnitude of the expected cost savings and the proportion of savings related to procurement versus vaccine delivery will provide additional evidence to inform budgeting and planning for switching to a single-dose schedule.

Impact of the COVID-19 Pandemic on Immunization Service Delivery and Program Costs: Evidence from HPV Vaccine Delivery in Senegal

PRESENTER: **Frederic Debellut**, PATH
AUTHOR: Abdou Diop

The national cumulative HPV vaccine coverage rate for Senegal in March 2020 before the COVID-19 pandemic was 82%. By June 2020, coverage dropped to 49% mainly due to pandemic-related school closures, as vaccination in schools is the main and most effective delivery approach in Senegal. Leveraging a study evaluating HPV vaccine delivery costs and operational context, we evaluated the potential impact of the pandemic on Senegal's HPV vaccination program by comparing data on program activities and costs for 2019 versus 2020.

We retrospectively collected data on the operational context and ongoing financial and economic costs of HPV vaccine delivery in selected regions of Senegal. Data were collected for the 2019 and 2020 program years to enable an evaluation of the pandemic's potential impact on the program. Stratified random sampling was used to select 56 study facilities in 7 regions. Facility staff responsible for providing HPV vaccination services were interviewed using structured questionnaires. The HPV vaccination program activities evaluated include program planning, social mobilization, routine training, vaccine storage and distribution, service delivery, record keeping, crisis management, supervision and waste management. Staff was asked about the frequency of HPV vaccination program activities and associated resource use in 2019 and to quantify any changes in 2020. Vaccine dose and session data were extracted from program records in each facility for both reference years. Micro-costing methods were used to assess costs from the health system perspective. All costs are reported in 2019 USD.

50 of the 56 (89%) health facilities reported a change in program activities in 2020 compared to 2019. Some of these changes were declines, as seen for service delivery as some of the health facilities in the sample that had conducted school-based delivery in 2019 did not conduct these sessions in 2020. Also, some health facilities increased facility and community-based sessions when comparing 2019 to 2020. Other changes were increased, as seen for social mobilization in certain districts as the program made efforts to compensate for pandemic-related declines in vaccine uptake. As expected, there was a drop in service volume due to the pandemic, despite a sufficient vaccine supply. The number of HPV vaccine sessions per health facility declined from an average of 11 to 8 (27% decrease), and the average total number of doses administered decreased. Average economic costs per facility were lower in 2020 estimated at $2,234 [95% CI: $582-$3,885]) compared to 2019, where they were estimated at $2,772 (95% CI: $1,755-$3,789), a 24% reduction, reflecting the impact of fewer activities and lower resource use. However, the volume-weighted mean economic cost per dose delivered were 15% higher in 2020 than in 2019.

The magnitude of changes in economic costs is modest between the two years and lower than service volume reductions, potentially reflecting the fixed costs of operating the program. As Senegal and other countries work to overcome childhood immunization coverage disruptions caused by the pandemic, additional investments may be needed to recover coverage losses.

Cape Town International Convention Centre | CTICC 1 – Room 1.42

Applying Health Economics Principles to Vaccine Programs [IMMUNIZATION ECONOMICS SIG]

MODERATOR: **David Bishai**, Johns Hopkins University

ORGANIZER: **William Padula**, University of Southern California

DISCUSSANT: **Mark Sculpher**, University of York; **Rena Conti**, Boston University; **R Brett McQueen**, University of Colorado; **Jonathan Campbell**, Institute for Clinical and Economic Review (ICER)

Costing of Routine Immunization Programs and New Vaccines

PRESENTER: **Logan Brenzel**, Bill & Melinda Gates Foundation

Immunization costing is concerned with identify, measuring, and valuing the resources used to deliver immunization services. Resources are defined as the inputs used to vaccinate, such as labor time, vaccines, medical supplies. Immunization services pertain to vaccinations offered through the national immunization program, at a district level, as part of a campaign or other delivery strategy, or through a new vaccine introduction initiative.

It is useful to distinguish primary costing studies from cost modeling exercises. When resources have been (or are being) consumed to deliver an already-implemented immunization service, a primary costing study is carried out to estimate the quantities of resources consumed and their associated monetary value. The study will involve collecting and analyzing primary data on resource use, program output, and other program characteristics. Data sources typically include a mix of sources including financial and other administrative records, surveys, interviews, and—sometimes—direct observation.

In contrast, some costing modeling exercises aim to forecast the cost of implementing a new immunization service, scaling up existing services, or some other change to immunization policy, prior to these changes occurring, in order to set budgets, mobilize resources, or inform decisions about whether or not to move forward with a proposed policy change. These cost modeling exercises typically draw on information regarding the cost of immunization services that have already been implemented, and thus depend, in part, on information from primary costing studies.

This module covers methods for primary costing studies of implemented vaccine programs as well as cost modeling exercises for projecting the resource requirement of (future) new vaccine introduction. The first part motivates the module with an overview of the many uses of cost estimates from primary studies, and helps readers navigate a large set of existing guides, tools, and other technical resources for immunization costing. The second part provides an overview of key concepts and definitions. The third part covers key elements of costing study design. Part four covers the methods for data analysis. Part five illustrates how to apply methods for evaluating new vaccine introduction.

Economic Evaluation of Vaccines and Vaccine Programms

PRESENTER: **Emmanuel Fulgence Drabo**, Johns Hopkins University

Economic evaluation is increasingly used to inform decisionmakers about the value that various interventions deliver to health systems. Sometimes the greatest value in healthcare is achieved not by what is provided to the patient in terms of services and technology, but what is avoided. We know for a fact that prevention of infectious diseases is a win-win for patients, providers and society as a whole. When we invest in the prevention of infectious diseases through vaccines, the relatively small costs of vaccines achieve enormous value. Providers and payers do not have to care for as many patients facing the symptoms of infectious disease. And patients do not have to deal with the personal costs of treatment, or deal with the acute and long-term fall out of infectious disease. We know that many diseases ranging from influenza to polio have impact on well-being in ways that are detrimental to the patient and the productivity of society as a whole. Methods in economic evaluation, measure impacts of these outcomes and their value.

All these aspects of value-added through vaccines might be implicit, but we need to use empirical science in order to quantify value so that decisionmakers can make informed choices about the adoption of vaccines for entire populations of at-risk individuals. These are not small investments. Investments in vaccines that represent whole percentages of a nation's gross domestic product rely on accurate assessments of value to solidify decisions. Approaches in economic evaluation, ranging from cost-effectiveness to budget impact analysis are tools that can be used to inform decisionmakers. The methods to conduct these analyses are not always easy, but we recommend starting with simple, intuitive models to calculate out the resulting measures of value that decisionmakers can rely on.

This module is broken down into several sections: An overview of decision analysis and cost-effectiveness; guidance to defining the scope and study design of a cost-effectiveness analysis; parameter estimation; methods used to measure and evaluate health outcomes; important considerations for reporting and interpreting the results of economic evaluations; and an exercise for constructing a simple decision tree and data parameter inputs.

Assessing Uncertainty in Economic Evaluation of Vaccines and Vaccine Programs

PRESENTER: **Ijeoma Edoka**, PRICELESS SA, University of the Witwatersrand

Economic evaluation has emerged in health as the science of assessing value, to inform the efficient use of scarce health care resources. To meet the objective, it is critical that the information generated by economic evaluation studies be as accurate as possible. This implies that both the structure of the model and data quality meet higher standards than one might find in a simple model with limited parameter inputs. Both data quality and model structure will be explored in greater detail in this section. The World Health Organization (WHO) also provides this valuable resource for additional tips on modeling complex systems of vaccine delivery.

Health economic evaluation models are computer-based simulation models which focus on the population-level impacts of diseases and disease mitigation strategies can help overcome these challenges to the evaluation of policies by combining the best available data (e.g., epidemic, clinical, economic) from multiple sources, to permit comparisons of the current and future epidemiological, clinical, and economic impacts of multiple alternative disease-related interventions or strategies, and for different population subgroups.

Ideally, decisions would be guided by evidence from randomized controlled trials. However, RCTs are not always possible to conduct, and may be impractical for providing economic-specific evidence (e.g., costs and probabilities of some long-term outcomes). For example, as there may be multiple strategies to assess, and given that strategies may vary in "intensity" of implementation or may combine multiple interventions, it is impractical and costly to compare them in a single RCT study. In these cases, modeling techniques such as decision trees can be useful. However, to account for the long-term consequences of various decisions, more complex models are needed. These models can be used to extrapolate results from the observed clinical evidence over a short-time frame to a longer time frame, RCTs are often conducted over a relatively short period of time.

Health economic evaluation models can estimate the distribution of the population or a cohort of individuals targeted or affected by a given vaccination strategy in various health states (e.g., healthy, sick, or dead), at any given point in time. In addition, they quantify how health itself is affected by alternative strategies. By moving from simple decision trees to a more complex and all-encompassing model approach, such as Markov models, economic analysis can begin to better reflect the actual sequelae of infectious diseases. Markov models can also more accurately capture the impact on health that a vaccine could potentially have over time, given that Markov models encapsulate many elements of time-dependency.

This modules draws on a wide range of econometric methods and applications developed specifically for advanced economic modeling in vaccine economics to offer a synopsis of current and emerging methods of modeling approaches for health economic evaluation. The section is organized into four sections which walk the attendee through these advanced vaccine economic modeling techniques and their applications with concrete examples and exercises, starting with simpler Markov models, and moving progressively towards more complex modeling approaches such as transmission models.

Financing and Resource Tracking of Vaccine Programs

PRESENTER: **Gatien de Broucker**, Johns Hopkins University

The ability of national immunization programs to introduce and deliver new vaccines, and reach their target populations, particularly those children and communities that are hard to reach, is related to the resources available to provide services. Sustaining adequate financing is a critical function of immunization programs, and is reflected as one of the pillars of the global Immunization Agenda 2030.

This module focuses in on various dimensions of immunization financing. The first section examines historical immunization spending by governments, development partners and households/private sector for the total program, and split between routine and campaign services, as well as vaccines and delivery. The second section elaborates on the current sources of financing, and how these might be better utilized to improve adequacy and sustainability of the program, particularly as COVID-19 has affected economies and health budgets. Finally, the third section explores the development partner landscape for immunization, particularly focusing on Gavi, the Vaccine Alliance and some of the innovative financing instruments that have been developed. Various resources exist that provide further details on health and immunization financing, and these are provided for attendees.

3:30 PM –5:00 PM   TUESDAY   [Health Care Financing & Expenditures]

Cape Town International Convention Centre | CTICC 2 – Orchid

Voluntary Health Insurance: What Role Does It Play in Health Systems?

MODERATOR: **Tryphine Zulu**, Platinum Health Medical Scheme

Does Supplementary Private Health Insurance Improve Health and Wellbeing?

PRESENTER: **Kushneel Prakash**, The University of Melbourne
AUTHORS: Anthony Scott, Matt Sutton

Several studies have demonstrated that expanding health insurance coverage has positive health and well-being consequences but there is little evidence on the benefits of supplementary private health insurance. In Australia, supplementary private health insurance (PHI) subsidised by the government can be purchased in addition to universal coverage of the population by Medicare. Individuals can use both to access healthcare, with PHI typically offering faster access to private specialists, lower costs of accessing private hospital care, and a higher degree of choice. A key policy question is whether the additional taxpayer subsidies for PHI improves health and wellbeing over and above Medicare. The aim of this research is to examine whether taking up or dropping PHI influences subjective well-being and general health status compared to having access to Medicare.

We examine the effect of supplementary insurance on health and wellbeing using data on 21,106 adults from the Household, Income and Labour Dynamics in Australia (HILDA) survey between 2005 and 2020. We use two-stage least squares, in the context of a panel fixed effects model, to account for endogeneity and, as instruments, use two reforms that stimulated more coverage by increasing the income threshold at which individuals were penalised for not purchasing insurance and one demand shock that reduced coverage because premium increases outstripped wage growth. We also examine the health and well-being of starters and stoppers around the two reforms the demand shock.

The results from the first stage show that the three instruments are jointly statistically significant and that the policy reforms increased demand, whilst the demand shock in 2016 reduced demand for PHI. We find that supplementary insurance is positively associated with well-being and health and starting cover has positive effects while stopping cover has smaller negative effects. The effects are weaker and smaller for physical health compared to more subjective measures of mental health, general health, and life satisfaction.

These results show reasonably strong evidence that having private health insurance, over and above Medicare, has positive effects on life satisfaction and measures of mental, physical and general health. We provide the first evidence for Australia that private health insurance increases life satisfaction and health status compared to Medicare. We also examine the asymmetric effects of starting and dropping PHI cover and find that starting PHI cover has a larger positive effect on life satisfaction and health status than the negative effects of stopping PHI cover. We show relatively large increases in life satisfaction and health status (between 4 and 8 per cent) yet it remains unknown if the $6 billion-dollar annual government subsidy for PHI could have generated greater health benefits and improved equity of access if invested in Medicare or in public hospitals.

Can Micro Health Insurance Reduce out-of-Pocket Expense for Accessing Formal Healthcare? Results from a Cross Sectional Study.

PRESENTER: **Shehrin Shaila Mahmood**, International Centre for Diarrhoeal Disease Research, Bangladesh
AUTHORS: Tania Wahed, Mohammad Nahid Mia, Abbas Bhuiya

Background: Out-of-pocket (OOP) expense is considered a key barrier to accessing healthcare. In Bangladesh, OOP accounts for 73% of total healthcare expenditure. Micro Health Insurance (MHI) has the potential to provide financial protection and increase access to healthcare. However, empirical evidence around the effect of these schemes on reducing OOP and increasing access to formal healthcare in low-resource settings is limited.

Objective: The current study examined the effect of MHI on increasing access to outpatient care and reducing OOP for healthcare.

Methods: A cross-sectional survey was carried out to explore the impact of MHI on OOP and access to formal healthcare in Chakaria, a sub-district of Bangladesh where an MHI scheme has been in operation since 2012. The survey was conducted among randomly selected 1000 MHI member and 1000 non-member households from the scheme coverage area during May-June 2016. A two-part model with one-part Generalized Linear Model was used to assess the effect of MHI on OOP for formal outpatient care.

Results: The average OOP for an episode of illness during two weeks preceding the survey was found to be BDT 290.5 (USD 3.4). Considering all sources of care, no significant difference in OOP between MHI members (mean: BDT 288.7±621.5) and non-members (BDT 290.9±709.0) was observed. However, OOP for healthcare from formal providers was significantly lower for MHI members (BDT 420.9±859.3) compared to non-members (BDT 722.2±1510.1) (p<0.05). The marginal effects for the two-part model also showed that the MHI members spend less than non-members by BDT 370 for healthcare service from formal providers (p<0.001).

Conclusions: Higher OOP drives people with limited ability to pay to access low-cost healthcare of questionable quality in countries like Bangladesh. The findings of the current study indicate that despite formal healthcare requiring higher out-of-pocket expenses MHI reduced OOP and improved access to formal healthcare for its beneficiaries compared to the non-beneficiaries. In this context the findings of the current study have important implications for health-financing policy in Bangladesh and in other similar contexts where extending financial risk protection to the informal sector population is a challenge.

A System Dynamics Model of Community-Based Health Insurance System in Bangladesh

PRESENTER: **Nurnabi Sheikh**, University of Strathclyde
AUTHORS: Susan Howick, Shehrin Shaila Mahmood, Syed Manjoor Ahmed Hanifi, Alec Morton

In Bangladesh, the rising cost of out-of-pocket health expenditures is a significant obstacle to healthcare access, particularly for the low-income population. Although the government has developed a healthcare financing strategy (HCFS) in an endeavor to achieve universal

healthcare coverage (UHC), providing healthcare protection for the large informal sector and their families remains a persistent concern. To reach a greater portion of the informal sector in Bangladesh, community-based health insurance (CBHI) initiatives managed by non-government organizations (NGOs) and microfinance institutions are aimed at the HCFS. However, there are barriers to implementing sustainable CBHI and overcoming these obstacles is a policy priority for Bangladesh. Therefore, the goal of this study is to identify appropriate policies which support a sustainable CBHI. To achieve this goal, a simulation model is constructed to identify where policies should be targeted and to then observe the impact of these policies over time.

In this analysis, we use data from a case CBHI scheme in Bangladesh from 2015 to 2020, and projections for the scheme for 2030. A System Dynamics approach is used to build the model, simulate, and evaluate policy scenario alternatives. The approach includes (1) understanding the problem behavior, (2) undertaking a literature review and conducting interviews to develop the model structure, (3) data collection and processing to populate the model (4) performing tests such as Theil's inequality statistic for assessing model fit to data to enhance confidence in the model (5) simulation and policy analysis. Four policies were evaluated: door-to-door visits by community health workers, the inclusion of non-health grocery benefits to the benefit package, financial assistance for low-income families, and increasing service availability by offering telehealth and online consultation, ensuring the availability of higher-quality medicines, and providing healthcare services by paramedics to reduce physicians' workload to alleviate the problem and increase performance.

We developed a base model to simulate the historical behavior of the CBHI scheme and projected the long-term behavior to assess which policy interventions would be more effective. Our base model demonstrated that even after a decade of implementation, only one-third of the target population would be covered due to persistently low enrollment and significant drop-out rates. In addition, we discovered a widening gap between premium collection and overall expenses, which poses a threat to the scheme's self-sustainability in the long run. Therefore, we intend to test strategies through simulation that are affirmed to increase population coverage by accelerating the enrollment and renewal processes. Initial simulation results demonstrated a significant improvement in population coverage (i.e., an increase in enrollment and renewal rates) and a higher likelihood of self-sufficiency with the successful implementation of four policies; however, the execution of these policies is contingent upon the availability of sufficient funding. This study will add to the literature by advocating for appropriate policies for the scheme operators to overcome CBHI implementation barriers and by proposing recommendations for policymakers to allow CBHI to contribute to the health sector in line with the healthcare financing strategy in Bangladesh to accomplish the target of UHC.

3:30 PM –5:00 PM   TUESDAY   [Health, Its Distribution And Its Valuation]

Cape Town International Convention Centre | CTICC 1 – Room 2.66

The Economic Impact from Poor Health and Disability: International Applications

MODERATOR: **Stephen Jan**, The George Institute for Global Health, UNSW Sydney

Economic Burden of Acute Lower Respiratory Infections Due to Respiratory Syncytial Virus Among Under-Five Children in India: A Systematic Analysis

PRESENTER: **Ruchita Jalal**, International AIDS Vaccine Initiative
AUTHORS: Jessy Joseph, Sonam Sambyal, Rajat Goyal, Rakesh Lodha, Rakesh Kumar, Anand Krishnan

Abstract

Background: Respiratory Syncytial Virus (RSV) is a prevalent cause of respiratory infections, resulting in a total of 118200 deaths globally with > 97% of RSV- deaths occurring in low- and middle-income countries. The high RSV disease burden translates into substantial economic burden. Globally, RSV-associated discounted direct costs have been estimated as around US$ 611 million, while in LMICs such as Malawi inpatient and outpatient costs per RSV episode averaged US$62.26 and US$12.51 respectively. In the Indian context, no data on RSV-specific or RSV-like illness relates costs is reported so far. This systematic analysis aims to generate closest approximation of national RSV associated acute lower respiratory infections (ALRI) economic burden among under-five (U5) children in India for the year 2020.

Methods:

Given non-availability of RSV specific cost data in India, ALRI cost estimate were utilized. ALRI cost data was obtained through systematic literature review of hospital-based studies published between January 2000- July 2021. ALRI was defined as cough or difficulty breathing with increased respiratory rate for age. ALRI cost data were adjusted using consumer price index (CPI), converted from Indian Rupee to USD using average conversion rate of 2020 and presented as summary estimates (ranges) towards cost per ALRI disease episode. National economic burden estimates were generated by applying summary ALRI cost estimates to RSV-ALRI healthcare seeking estimates (for inpatient and outpatient care). These healthcare seeking estimates were estimated as part of a larger systematic analysis effort utilizing RSV-ALRI incidence rate, hospitalization rate, positivity proportion and healthcare seeking rate (National Sample Survey Office, 2017-2018). Uncertainty intervals for national estimates calculated using Monte-Carlo simulations.

Result:

Our estimates showed that in India, among U5 children, 8.5 (Uncertainty Range (UR):6.7-10.3) million episodes of RSV-ALRI sought outpatient care in 2020; 1 (UR:0.9-1.2) million episodes of RSV-ALRI were hospitalised of which 0.07 (0.06-0.09) million episodes were ICU admissions. Total economic burden (includes out-of-pocket expenditure by patient, work loss of caregiver and provider cost) due to RSV associated ALRI was estimated at USD 313 (UR: 265-365) million with inpatient costs (USD 210 (UR:168-254) millions) had the major contribution (67%). Among the total economic burden, 66% was covered by out-of-pocket expenditure, followed by work loss of caregiver (14%) and provider cost (20%). When compared to Gross Domestic Product (2020-21), total economic burden in under 5 children due to facility attended RSV-ALRI infection was found to be 0.02%.

Conclusion:

High economic cost of RSV associated ALRI impose substantial burden on the health system and household among U5 children in India. With likelihood of effective vaccine availability in near future, these estimates will be useful for policy decisions to support prioritization of RSV prevention strategies.

Keywords:

Respiratory syncytial virus; RSV; acute lower respiratory infection; RSV- ALRI; healthcare seeking; cost of illness; national economic burden; under-five children

The Effects of Disability Benefits on the Employment of Low-Skilled Youth: Evidence from France

PRESENTER: **Naomie Mahmoudi**, Conservatoire National des Arts et Métiers (CNAM)
AUTHOR: Sylvain Chareyron

Persons with disabilities are more likely to experience poverty and economic vulnerability (United Nations, 2019). Their impairment combined with the environment in which they find themselves can hinder access to or retention of employment, and thus deprive them of a reasonable income from work. This justifies the need for specific social protection measures for them such as disability benefits programs. The difficulty in designing such programs is to find the balance between providing persons with disabilities the security of a minimum income without creating an inactivity trap (for those whose ability to work is not totally lost). Promoting the employment of persons with disabilities, and especially youth with disabilities, is particularly important given their low employment rate. In France in 2020, 15-24 years old with disabilities were three times less employed than those without disabilities (INSEE, 2021).

The French disability assistance program called AAH ("*Allocation aux Adultes Handicapés*" in French) is a form of social benefit that guarantees a minimum income for persons with disabilities under certain conditions. In particular, they can benefit from the age of 20 (or even of 16 if they are no longer dependent on their parents). It has the particularity of not having a notch, so that every additional euro of income from work gives an increase in total income. In many countries offering disability benefits programs that allow people to work while receiving them, beneficiaries lose some or all of their benefits if their earnings exceed a certain threshold which reduces the incentive to work (Kostøl & Mogstad, 2014; Ruh & Staubli, 2019).

Using the French Labor Force Survey from 2013 to 2019, we exploit the young age discontinuity in the AAH eligibility to instrument the effect of the allowance on employment using a fuzzy regression discontinuity design (RDD). The few studies on this topic that use regression discontinuity methods have used a discontinuity at a later age (Chen & Van der Klaauw, 2008; Müller & Boes, 2020). We focus on low-skilled youth with disabilities because it is expected that financial incentives will elicit a higher response from them. The wage they could obtain is distinctly lower than that of more educated individuals and so, is more directly comparable with disability benefits. The literature has shown that the response by low-skilled youth to financial incentives is strongly significant (Meghir & Phillips, 2010; Lemieux & Milligan, 2008; Bargain & Doorley, 2011).

Our study shows that receipt of the AAH reduces the probability of employment for low-skilled youth with disabilities. However, this effect is heterogeneous: it affects women more than men and is larger for those with a low level of activity limitation than those with a high level. We also find that, for women who are employed, receipt of these benefits increases their chances of working part-time and reduces their job search effort.

Our results suggest that more targeted public policies are needed to incentivize the employment of low-skilled youth who are particularly subject to allowance disincentives.

Quantifying the Economic Burden of Long-COVID in Australia

PRESENTER: **Martin Hensher**, Deakin University
AUTHORS: Barbara de Graaff, Ting Zhao, Mary Rose Angeles
Background

Since the emergence of the COVID-19 pandemic in late 2019, longer-term symptoms have been referred to as 'Long COVID'. A constellation of symptoms have been reported, including severe fatigue, pain, shortness of breath and neurological and sleep problems. As Australia's COVID-19 cases have accelerated in 2022, the estimated prevalence of long COVID has also increased.

In Australia, little research has been published on Long COVID. As a growing body of evidence suggests that Long COVID and myalgic encephalomyelitis/chronic fatigue syndrome (ME/CFS) are very similar conditions, we use cost data from our recent study on the economic burden of ME/CFS in Australia to estimate the economic burden of long COVID in Australia.

Methods

For this study, we focused on Long COVID that had occurred for ≥12 months. Long COVID prevalence was estimated using our stock and flow model which accounts for patient recovery trajectories. Based on published literature, we assumed that 0.5587% of COVID cases reported Long COVID symptoms at 1 year. These cases were categorised by fatigue severity using the Fatigue Assessment Scale: 13.2% no fatigue, 46.1% moderate fatigue, 40.7% extreme fatigue.

For cost data, we conducted a national, cross-sectional survey of people with ME/CFS in 2021. Data on fatigue severity (de Paul-Short Form questions), direct medical and non-medical and indirect costs were collected. Survey data were linked to national Pharmaceutical Benefits Scheme and Medicare Benefits Schedule datasets. Fatigue severity levels were mapped to Long COVID fatigue severity prevalence estimates. ME/CFS costs were applied to Long COVID prevalence estimates by these severity categories. A societal perspective was adopted; mean costs (95% confidence intervals (CI)) were standardised to AUD2022.

Results

Using the stock and flow model, 28,634 individuals were projected to be living with Long COVID of 12 months duration or longer as of December 2022. Of these, 3,202 were estimated to be living with no fatigue, 11,182 with moderate fatigue, and 9,873 with extreme fatigue. Annual mean per person costs were: no fatigue AUD65,523 (95% CI n/a), moderate fatigue AUD50,367 (95% CI 41,677-59,056) and extreme fatigue AUD77,663 (95% CI 67,320-88,007). Extrapolating these costs to the population, the annual estimated societal costs for these categories were AUD210 million (95% CI n/a), AUD563 million (95%CI 466m – 660m) and AUD767 million (95%CI 665m – 869m) respectively. Productivity losses accounted for the majority of costs: 59% of total costs for the no fatigue category, 69% for moderate fatigue and 77% for extreme fatigue. Overall, for 2023 we estimate the total societal costs of Long COVID to be approximately AUD1.5 billion.

Conclusions

Whilst this study was necessarily based on modelled assumptions and secondary data, the likely health and economic impacts of Long COVID in Australia will be substantial. Effective population surveillance to determine the true prevalence and duration of Long COVID is the highest priority for policy action in Australia, yet remain notable for its absence.

The Effect of Double Burden of Disease on Out-of-Pocket Expenditure in Pakistan: A Quantile Regression Analysis

PRESENTER: **Lubna Naz**, Ohio University

Background: Like other low-income countries, Pakistan is currently battling with the challenge of the double disease burden. Moreover, the financial burden of the communicable and incommunicable disease is not the same across all households. The rampant poverty, regional inequalities in universal healthcare coverage, poor governance in healthcare services, and a large share of out-of-pocket health expenditures have added to the woes of the affected households, particularly low-income families. Yet, the current studies have not adequately addressed the financial burden of the patients. This study examines the effect of double burden of diseases across different percentiles of out-of-pocket expenditure (OOPE).

Method: This study conducted the analysis using Household Integrated Economic Survey 2018-19, a nationally representative data set in Pakistan, comprising 6,775 households with at least one member experiencing double burden of disease. The exploratory data analysis was conducted to examine the relationship between sociodemographic factors and the overall prevalence of communicable, non-communicable, and double burden of diseases. We used quantile regression to estimate the associations between severity of the double disease burden and out-of-pocket expenditure (OOPE) on health.

Results: Overall, 28.5% of total households had double burden of diseases in 2018-19. The heads with no education, male headed, outpatient healthcare, patients availing public sector healthcare services, rural, older members showed a significant association with the prevalence of double disease burden. The out-of-pocket expenditure are higher on burns, depression, liver and kidney disease, road accidents, and hepatitis and pneumonia in the upper percentiles. The quantile regression results indicated that the marginal effect of having two or more communicable and non-communicable diseases on the absolute amount of monthly OOPE was higher for the lower percentiles (at the 10th percentile, coefficient 312, 95% 92-532) but less pronounced for the higher percentile of out-of-pocket spending distribution (at the 75th percentile, coefficient 155, 95% CI 30-270). The effect of having more older members were on OOP spending was higher at higher tails (at the 50th and 75th percentiles) than the lower (at the 10th and 25th percentiles). In contrast, the family size had a higher effect on OOP expenditure at lower percentiles than the higher percentiles.

Conclusion: Double burden of communicable and non-communicable diseases is associated with rising healthcare costs in Pakistan. The results call for strengthening and extending the outreach of the financial protection to more vulnerable population that experience a higher financial healthcare cost due to double disease burden.

3:30 PM –5:00 PM   TUESDAY   [Health System Performance]

Cape Town International Convention Centre | CTICC 2 – Freesia
Health System Response to the Pandemic

MODERATOR: **Borwornsom Leerapan**, Mahidol University

Analysis of the Availability, Effectiveness and Equity of Resources in the Health System Response to COVID-19 in Nigeria

PRESENTER: **Nkoli Pamela Uguru**, University of Nigeria
AUTHORS: Nwadiuto Ojielo, Chinyere Cecilia Okeke, Obinna Onwujekwe

Introduction: COVID-19 exposed weaknesses in health systems of many countries, including Nigeria, which affected the availability, effectiveness and equity of the health system response to the pandemic. Specifically, COVID-19 exposed longstanding health system inequities amidst the disproportionate burden of COVID-19. Hence, this paper explores and provides new knowledge on level of the availability, effectiveness and equity of resources in the health system response to COVID-19 in Nigeria. This is invaluable information for improving the countermeasures against COVID-19 and future pandemics.

Method: The study was conducted at the Federal and state levels in Nigeria. The two states Lagos State in southwest Nigeria and Enugu State in southeast Nigeria. They were both purposively selected for contextual considerations. Qualitative data was collected using in-depth interviews (IDIs) with 34 (thirty-four) key informants at the federal and state levels using an IDI guide. NVivo version 12 was used for the coding and thematic analysis was used to explore the data.

Findings: Statements of respondents on availability of health system response showed that , some of the policy responses and the countermeasures taken both by the federal and state governments were not commensurate with the magnitude of the problem. Though there were procedures for response, such as institution of protocols for interaction, provision of materials and training of staff, the provision of personal protection equipment (PPE) was found to be inadequate, with healthcare workers purchasing items for themselves, contributing to the high infection rate observed in health professionals. There were also some responses by the government to alleviate the sufferings of the masses from lockdowns, which included the provision of cash transfers, food items, passing of economic stimulus bill and Central Bank of Nigeria stimulus package. The effectiveness of some of the responses were sub-optimal because of several flaws in them. For instance, the cash transfers reached only a fraction of the poor because Nigeria does not have a robust national information management system, making identification of the poor and electronic payments difficult. Also, the provision of food assistance by the government, was not accomplished because transparency and accountability in the distribution system was lacking. The response was inequitable in some countermeasures because only people in the formal sector benefited in the distribution of welfare materials and financial packages, excluding the informal sector, which constitutes majority of the poor population in Nigeria.

Conclusion: This study shows that although there were many countermeasures that were put in place against Covid-19 in Nigeria, there was low availability and inequitable distribution of resources, which affected the effectiveness of the response. Also, since the implementation of the response occurred on a weak health systems base, fraught by weak accountability systems, fragmented data and information monitoring systems, the response was sluggish and mostly ineffective. Observations from this study will take stock of lessons learnt which will be invaluable in developing more effective and equitable emergency response strategies for both the current COVID-19 and future pandemics, especially in the context of weak health systems.

The Provision of COVID-19 Services By Sri Lanka's Mixed Health System: Inequities in the Provision of COVID-19 Testing and Vaccination and the Role of Public Provision and Financing

PRESENTER: **Ravindra Rannan-Eliya**, Institute for Health Policy
AUTHORS: Nilmini Wijemunige, Thimani Dananjana

Background: Sri Lanka has a high performing, mixed health system that traditionally achieves a high degree of equity in service provision and health outcomes. Public funding finances most preventive services and publicly-funded medical care is pro-poor in coverage, compensating for pro-rich coverage of private medical services. The COVID-19 pandemic and associated fiscal constraints put this system under severe challenges, with the government adopting a public monopoly in supply of COVID-19 vaccines and allowing mixed public and private provision and financing of COVID-19 PCR testing services.

Data and Methods: We used data from the Sri Lanka Health and Ageing Study (SLHAS) 2021/22 Wave 2 phone survey to assess inequalities in uptake of COVID-19 vaccines and COVID-19 PCR testing. The SLHAS is a nationally representative longitudinal cohort of adults of all ages (N=6,668) recruited just prior to the pandemic, of which 75% were reached by telephone during the survey. We assessed inequity in uptake of COVID-19 vaccines by using concentration indices to assess coverage at different time points, and by multivariate analysis of the median and mean times to be covered by successive doses, contingent on when individuals became eligible under government regulations. An asset index was used as a proxy measure to rank respondents by relative socioeconomic status (SES). Inequity

in use of PCR testing was assessed using concentration indices, overall and separately for public and private provision. Response bias in the phone survey was accounted for by sample weighting, and population estimates of vaccine uptake were validated against administrative data.

Results: Overall, coverage of COVID-19 vaccination was high compared to other countries, whilst use of testing services was less than other countries controlling for income level. Coverage by COVID-19 vaccination was highly equitable for each of the first two doses, with minimal differences in speed of uptake by SES, and other characteristics such as gender, ethnicity, and urban/rural residence. Use of PCR testing was highly inequitable in relation to SES for both public and private provision, although public provision was less inequitable. Multivariate logistic analysis found that SES was the primary determinant of variations in uptake of testing.

Conclusions: The public provision of COVID-19 vaccination at no charge and at high levels of supply achieved a high degree of equity in coverage in a context of high population confidence in vaccination services. In contrast, limited financing and supply of public testing services was not sufficient to compensate for the expected pro-rich inequity in use of private services. The results indicate that whilst Sri Lanka's reliance on mixed public-private provision is typically able to ensure equity in overall healthcare coverage, inadequate supply of the public service will lead to overall inequities in coverage.

Impact of the SARS-CoV-2 Pandemic on Hospital Costs: Evidence from Three Cohorts of Patients Hospitalized in Milan Area Before and During the Pandemic

PRESENTER: **Oriana Ciani**, SDA Bocconi School of Management
AUTHORS: Filippo Trentini, Simone Ghislandi, Elena Vanni, Aleksandra Torbica, Alessia Melegaro

Introduction

Italy was the first country in Europe to be hit by the Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2). While several studies focused on disease epidemiology, little research has been conducted to understand the economic impact of providing care for SARS-CoV-2 positive or negative patients during the pandemic.

Our study aims to quantify the incremental costs and resource consumption in terms of diagnostics, medical devices, critical care provision, personnel for each episode of hospitalization associated to 1) being hospitalized before vs after the first case of SARS-CoV-2 was notified in Italy, 2) being hospitalized with vs without a SARS-CoV-2 positive test during the pandemic for nine different Diagnosis Related Groups (DRGs).

Methods

We used data on hospitalization episodes occurred at Humanitas Research Hospital with discharge date between 1st January, 2018 and 31st December 2021. We selected hospitalizations with the following DRGs: respiratory infections and inflammations with (079) or without (080) complication or comorbidity (CC), simple pneumonia and pleurisy with (089) and without (090) CC, pulmonary edema and respiratory failure (087), respiratory system diagnosis with ventilator support >=96 (565) or <96 hours (566), Intracranial Hemorrhage Or Cerebral Infarction (014) and kidney and urinary tract infections with CC (320).

Clinical resources were automatically collected from the hospital datawerehouse (days of stays, diagnostic exams, blood transfused, drugs administered and eventual time in the operating rooms). The monetary value of these resources is the internal actual cost.

We run generalized linear models on the total costs considering the type of patient (pre-pandemic, discharged during the pandemic with and without a SARS-CoV-2 diagnosis) as the exposure, and adjusting for relevant available covariates. Statistical analyses were performed using R.

Results

Overall, 2191 (34.3%) hospitalizations occurred before 21st February 2020 and 4205 (65.7%) after. Of the latter, 2347 (55.8%) were SARS-CoV-2+ (vs 1858 SARS-CoV-2-). The median overall costs for a hospitalization were 2410EUR (IQR: 1588-3828) before the start of the pandemic, 2645EUR (IQR: 1885-4028) for SARS-CoV-2- patients and 3834EUR (IQR: 2463-6413) for patients SARS-CoV-2+.

The comparison between patients discharged during the pandemic with or without a SARS-CoV-2+ test shows the highest increases in the average costs sustained for SARS-CoV-2+ patients on DRG320 (35.26%, 95%CI: 19.54-53.66), DRG087 (34.55%, 95%CI: 27.74-41.68) and DRG014 (27.28%, 95%CI: 15.76-41.43).

The average costs sustained for patients discharged before the pandemic are significantly lower than for negative patients discharged during the pandemic, except for those with a respiratory system diagnosis who required ventilator support. For all other patients, the increase in costs sustained for negative patients discharged during the pandemic varies between 9.81% (95%CI: 5.00-14.37) and 21.24% (95%CI: 13.46-28.34), respectively for DRG320 and DRG080.

Discussion

Our study highlights the magnitude of resources needed to take care of hospitalized cases during the COVID-19 pandemic in Italy. Our results suggest a median direct hospitalization cost ³2516.9 EUR for a SARS-Cov-2 related admission.

To conclude, these results contribute to the managerial debate around the transparent definition of tariffs for hospital admissions and, overall, to the ongoing policy debate around the sustainability of the Italian healthcare system

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5:15 PM –6:15 PM   TUESDAY   [Special Interest Group Sessions]

Cape Town International Convention Centre | CTICC 1 – Room 1.43
Meeting of the Economics of Risky Health Behaviors Special Interest Group

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5:15 PM –6:15 PM   TUESDAY   [Special Interest Group Sessions]

Cape Town International Convention Centre | CTICC 1 – Room 1.42
Meeting of Proposed Special Interest Group on Digital Technology in Health and Social Care

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5:15 PM –6:15 PM   TUESDAY   [Special Interest Group Sessions]

Cape Town International Convention Centre | CTICC 1 – Room 1.44
Meeting of the Mental Health Economics Special Interest Group

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5:15 PM –6:15 PM   TUESDAY   [Special Interest Group Sessions]

Cape Town International Convention Centre | CTICC 1 – Room 2.64-2.65
Meeting of the Teaching Health Economics Special Interest Group

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5:15 PM –6:15 PM   TUESDAY   [Special Interest Group Sessions]

Cape Town International Convention Centre | CTICC 1 – Room 2.44-2.45
Meeting of the Health Systems' Efficiency Special Interest Group

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5:15 PM –6:15 PM   TUESDAY   [Special Interest Group Sessions]

Cape Town International Convention Centre | CTICC 1 – Room 2.41-2.42
Meeting of the Equity Informative Economic Evaluation Special Interest Group

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5:15 PM –6:15 PM   TUESDAY   [Special Interest Group Sessions]

Cape Town International Convention Centre | CTICC 1 – Room 1.41
Meeting of the Economics of Genomics and Precision Medicine Special Interest Group

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6:30 PM –11:30 PM   TUESDAY   [Social Events]

Cape Town International Convention Centre | CTICC 1 – Ballroom
Gala Reception: Main Social Event

9:00 AM –10:30 AM   WEDNESDAY   [Health, Its Distribution And Its Valuation]

Cape Town International Convention Centre | CTICC 1 – Room 1.42

Assessing the Health-Related Quality of Life of Children, Adolescents, and Young Adults in Africa with Preference-Based Measures: What Is the Evidence? [ECONOMICS OF CHILDREN'S HEALTH AND WELLBEING SIG]

MODERATOR: **Darshini Govindasamy**, MRC South Africa

ORGANIZER: **Rebecca Kyerewaa Dwommoh Prah**, London school of hygiene and tropical medicine

DISCUSSANT: **Giulia Greco**, London School of Hygiene and Tropical Medicine

Application of the CHU9D: Its Psychometric Performance and Correlates of Health-Related Quality of Life Among Adolescents Living with or without HIV in Kwazulu-Natal, South Africa

PRESENTER: **Stanley Carries**, South African Medical Research Council

Background:

Adolescents living with HIV (ALHIV) are at high risk of poor health-related quality of life (HRQoL). Maximising HRQoL is an important goal for adolescent HIV programmes aligned with Sustainable Development Goal 3 (improving health and well-being for all ages). Incorporating appropriate adolescent HRQoL measures in economic evaluations is key for capturing broader benefits of multisectoral HIV interventions promoting HRQoL among ALHIV. Understanding the psychometric performance of adolescent HRQoL measures and what matters most to their HRQoL can inform intervention development and outcome measures in economic evaluations. The CHU9D exhibited good reliability and validity among UK paediatric populations. Evidence of its psychometric performance among ALHIV in sub-Saharan Africa is scarce. This study assessed the psychometric properties of the CHU9D and correlates of HRQoL among ALHIV.

Methodology:

We conducted a secondary data analysis of data derived from the Impilo Enhle study (2021 - 2022), which assessed the feasibility, reliability, and validity of the EQ-5D-Y-5L compared to the EQ-5D-Y-3L and CHU9D among ALHIV sampled from clinics (n=150) vs. school learners (n=150) aged 10-15 years. Descriptive statistics were used to describe socio-demographics, completion time, missingness, and ceiling effects. Convergent validity was explored using Spearman's correlation matrices between the EQ-5D-Y and CHU9D dimensions. Factors associated with HRQoL at p<0.15 in unadjusted univariable linear regression were included in a multivariable model.

Results:

The participants' median age was 13 years. Approximately 48% of ALHIV were female vs. 57% in the school arm. CHU9D feasibility was demonstrated by short scale completion time [clinic=0.98 sec.; school=1.21 min.] and low levels of missingness [0-0.6% in both arms]. Ceiling effects (111111111) were reduced by 8-16% in both arms when moving from the EQ-5D-Y-5L to CHU9D. Key problem dimensions in the clinic arm included *doing schoolwork* (22%) and *feeling tired* (19%). There was evidence of strong convergent validity between EQ-5D-Y-5L and CHU9D dimensions: *worries* (rho=0.82) and *daily routine* (CHU9D) (rho=0.86) (p<0.0001).

A decrease in average HRQoL was detected in the school vs. clinic arm (β=-0.34: 95% CI, -1.10-0.40, p=0.369). Univariable analysis showed an average increase in HRQoL among ALHIV residing in informal housing vs. those in formal housing (β=1.24: 95% CI, 0.10-2.38, p=0.034); and an average decrease among those who self-rated their health worse than their friends vs. those who rated their health as same/better than friends (β=-1.25: 95% CI, -2.49 - -0.01, p=0.048). In multivariable analysis, HRQoL dropped for both participants living in informal housing (β = 1.00: 95% CI, 0.02-1.98, p=0.045); and those who self-rated health worse than friends (β=-1.41: 95% CI, -2.47- -0.35, p=0.045). Significant factors associated with HRQoL in the school arm (univariable model only) were informal housing (β=-1.90: 95% CI, -3.24 - -0.55, p=0.006); households with flush toilets (β=2.34: 95% CI, 1.07-3.60, p < 0.001); and piped water (β=1.85: 95% CI, 0.65-3.07, p=0.003).

Conclusion:

The CHU9D is a feasible and valid tool for use among ALHIV. Further investigations into the cognitive understanding of the scale are needed. Interventions should target these areas to improve HRQoL: internalised stigma for ALHIV, and water and sanitation among school learners

Association between Health-Related Quality of Life, Socio-Economic Status, Menstrual Health Experience, Mental Health, and Subjective-Wellbeing of Adolescent Girls in Uganda

PRESENTER: **Rebecca Kyerewaa Dwommoh Prah**, London school of hygiene and tropical medicine
AUTHORS: Stephen Lagony, Kate A Nelson, Catherine Kansiime, Levicatus Mugenyi, Fred Matovu, Helen Weiss, Dr. Giulia Greco, PhD

Background:

The Child Health Utility 9-dimension tool (CHU9D) measures the health-related quality of life (HRQoL) of adolescents. It measures HRQoL across 9 domains: worried, sad, annoyed, tired, pain, sleep, daily activities, school/homework, and able to join in activities. The tool is a good measure of children's and adolescents' HRQoL and has been used in different countries globally but rarely in Sub-Saharan Africa. Using the CHU9D, this analysis assesses the HRQoL of adolescent girls in secondary school in Uganda and explores the association between their HRQoL, their socio-demographic characteristics, mental health, subjective well-being, and menstrual health experiences.

Methods:

This paper utilizes baseline data from the MENISCUS trial, an ongoing school-based menstrual health intervention for adolescents in Uganda. The study focuses on adolescent females in Secondary 2 from 60 schools involved in the trial. The CHU9D was used to evaluate the adolescent girls' HRQoL. Mental health symptoms were assessed using the 25-item Strengths and Difficulties (SDQ) questionnaire. Subjective well-being was measured through the life satisfaction and happiness measure. Socioeconomic status (SES) was determined based on the household's asset ownership index. Additionally, adolescent girls were asked questions about their menstrual health experiences: anxiety about their next menstruation, the experience of pains in the last menstrual period (LMP), and whether they had someone they could seek help from during their menstruation. Using the generalized estimation equation (GEE), the relationship between various factors and the girls' HRQoL was modeled, adjusting for school-level clustering and population averages. In addition to the factors mentioned above, girls' socio-demographic factors such as their age, age at first menstruation, household size and caregivers/guardians' education, the number of meals consumed the previous day, and whether they were day or boarding students were considered in the model.

Results:

The study enrolled a total of 3,844 participants, with a mean age of 16 .7 years (SD=0.95). Using the Australian CHU9D tariffs, the average CHU9D score for the sample was 0.70 (SD=0.24). The GEE model showed a positive association between HRQoL and SDQ, life satisfaction and happiness, eating 3 or more meals the previous day, and being a day student. There was a negative association between HRQoL and being anxious about the next MP. Girls in the average SES group had higher HRQoL than those in the other SES groups. There wasn't enough evidence to support the association between HRQoL and girls' socio-demographic characteristics such as their age, age at first menstruation, household size, and caregivers/guardians' education.

Conclusion:

Overall, these findings highlight the factors which influence the HRQoL of adolescent girls in secondary schools in Uganda. Understanding these factors can help inform interventions and programs aimed at improving the quality of life of this population.

Health-Related Quality of Life and Associated Factors of Children with Sickle Cell Anaemia in Malaria Endemic Areas of Uganda and Malawi

PRESENTER: **Carol Kamya**, University of Bergen

Background:

Health-related quality of life (HRQoL) measures are useful for the assessment of treatment intervention's efficacy, effectiveness, and impact, and to detect changes in a patient's health status. There is a paucity of data on the HRQoL of children with sickle cell anaemia (SCA) in malaria-endemic regions in Africa. This study investigates how SCA impacts children's health-related quality of life (HRQoL) in Uganda and Malawi.

Methods:

This prospective cohort study is nested in an ongoing trial of malaria chemoprevention alternatives with either weekly Dihydroartemisinin-Piperaquine or monthly Sulphadoxine-Pyrimethamine among children with SCA in Uganda and Malawi. Participants were children aged 4 to 16 with SCA attending care in selected hospitals. We measured the HRQoL using standardised EQ-5D tools. HRQoL was assessed at enrolment and sick visits. The EQ-5D tool measures health status (mobility, self-care, usual activities, pain/discomfort & depression/anxiety) and has questions regarding self-reported health. We used the Chi-square test and Fisher's Exact to test for differences in proportions between groups in reported problems. We report mean scores for HRQoL and results from the multilevel mixed effects regression.

Results:

A total of 606 children were recruited in Uganda (365) and Malawi (241). The majority were female (51%) between 4-7 years (41%), with a mean age of 8.5 ± 3 years.

Preliminary findings show that the mean of the EQ visual analogue scale declined from 83 ± 16 and 86 ± 8 at enrolment to 58 ± 20 and 83 ± SD 9 during disease attacks in Uganda and Malawi, respectively. Similarly, the EQ-5D index declined from 0.90 ± 0.07 and 0.85 ± 0.16 at enrolment to 0.70 ± 0.29 and 0.69 ± 0.14 during disease attacks in Uganda and Malawi, respectively. The most reported health problems were pain and discomfort (86%), performing usual activities (62%), and anxiety and depression (49%). In Uganda, children reported the most problems with anxiety and depression (p = 0.059), especially those aged 12-16 years (p = 0.042), while in Malawi, the most problems were reported with self-care (p=0.000), especially among those aged 8-11 years (p=0.048). Preliminary findings illustrate that HRQoL is positively associated with parents' education (β-coefficient 0.004 CI (-0.002,0.031); p=0.080) and negatively associated with receiving a pneumococcal vaccine (β-coefficient -0.098 CI (-0.141, -0.056); p=0.000).

Conclusion:

The HRQoL of children with SCA is low. SCA causes pain/discomfort, anxiety/depression, and affects children to perform usual activities. Their HRQoL is influenced by parents' education and receiving a pneumococcal vaccine. Efforts to manage pain crises, anxiety/depression symptoms, and increase pneumococcal vaccination status may improve their HRQoL. Findings from this study will inform quality-adjusted life year calculations

Health-Related Quality of Life and Associated Factors in Young Adults Exposed to Childhood Severe Malaria in Uganda; Preliminary Findings

PRESENTER: **Perez Nicholas Ochanda**, University of Bergen

Background:

Surviving patients of severe malaria (SM) will likely have persistent cognitive, behavioral, and neurologic problems. Evidence on health-related quality of life (HRQoL) for young adults exposed to childhood SM is limited in malaria-endemic areas. We investigate the association between SM and HRQoL. We compared the HRQoL of community children (CC) with those exposed to SM in Uganda.

Methods:

Cross-sectional and historical data on HRQoL, socioeconomic and clinical characteristics of a longitudinal cohort previously exposed to SM were gathered. Neighborhood children without SM were included as controls. HRQoL data were gathered using EuroQol EQ-5D-3L and summarized using means and percentages based on respondents' characteristics between two groups (SM vs CC). Pearson chi-square tests for proportions and non-parametric tests for mean difference were used. Generalized linear (GLM) model and the truncated generalized beta regressions were used to obtain parameter estimates for EQ-5D health index. For SM vs non-SM malaria sample and estimates for SM alone.

Results:

About 226 respondents aged≥ 13 years with mean age and standard deviation of 16 (3.7) were included. The majority 121 (54%) were male. Participants were classified as CC (n=77) and SM (n=149). SM was divided into; cerebral malaria (CM) (n=95) and severe malaria anemia (SMA) (n=54). Frequency of moderate problems; mobility, pain, and anxiety were more in SM compared to CC. The mean EQ-5D index was not significant in SM (0.916 SD=0.11) compared with CC (0.894 SD=0.12). In the truncated beta regression model, exposure to SM relative to CC is significantly associated with low EQ-5D index value (-0.464, P=0.037, 95% CI: -0898,-0.029). In the GLM model, exposure to CM in reference to CC was associated with a lower EQ-5D index (-0.494, P=0.017, 95% CI: -0.897,-0.090) While, doing paid work and having an educated father is associated with higher average EQ-5D index. After adjusting for clinical complications of SM Among SM participants only, experience of coma, neurological deficit, and patient age are associated with lower average EQ-5D health index. In contrast, household socioeconomic index, father education, and patient education are positively associated with EQ-5D health index.

Conclusion:

Exposure to severe malaria is associated with lower health-related quality of life. This association is significant for SM participants that developed cerebral malaria relative to the community children. Better household socioeconomic conditions such as wealth and education may improve quality of life outcomes for individuals exposed to SM.

Cape Town International Convention Centre | CTICC 2 – Freesia

Integrated Economic-Epidemiological Modelling: Moving Beyond the COVID-19 Response

MODERATOR: **Katharina Hauck**, Imperial College London

ORGANIZER: **Edith Patouillard**, World Health Organization

DISCUSSANT: **Gesine Meyer-Rath**, University of the Witwatersrand; **Justice Nonvignon**, Africa CDC; **Raymond Hutubessy**, Secretariat G20 Joint Finance and Health Task Force on pandemic preparedness

Using Compartmental Models to Estimate Health System Requirements for COVID-19 Pandemic Response: A Philippine Study

PRESENTER: **Timothy Robin Teng**, Ateneo de Manila University

Background

The COVID-19 pandemic posed major challenges to health systems across the globe over the past two years. For a lower-middle income class country such as the Philippines with limited resources, its health system is more susceptible to being overwhelmed whenever there is a surge of COVID-19 infections and hospitalizations. Because of this, the monitoring and management of health capacity is a key component in the Philippine government's pandemic response.

Methods

To contribute to this initiative, the FASSSTER team developed compartmental models and provided corresponding outputs that would give a picture of the potential burden that the Philippine health system may face over the course of this pandemic. The aforementioned models are represented as a set of differential equations, which describe the dynamics of disease transmission. Scenario-based outputs produced by the FASSSTER models were regularly used as evidence for national, regional and city-wide policies.

Results

The first model was a modified SEIR model, which placed members of the population into six compartments: Susceptible (S), Exposed (E), Infectious and Asymptomatic (Ia), Infectious and Symptomatic (Is), Confirmed (C) and Recovered (R). Projection outputs from the C compartment, which comprise the Active Cases, were used to derive estimates of moderate, severe and critical cases; to be specific, 19% of active cases were assumed to be moderate or severe, while 1% of active cases were assumed to be critical. The numbers generated for these COVID-19 outcomes were then utilized to compute health system requirements, which include the number of hospital beds, health care workers, and other health care needs.

The threat of the Delta variant and the wide-scale deployment of vaccinations by mid-year of 2021 necessitated the development of an updated FASSSTER model. The second model builds on the previous one by adding vaccinated compartments, partial and fully vaccinated, to account for their increased protection against infection. Estimates of severe and critical case numbers that can help inform health capacity planning were then derived from the active case projections of the model, the local data provided by the Department of Health Data Collect (DDC), and effectiveness of vaccines to prevent hospitalization among those who were infected.

A third iteration of the compartmental model was developed at the beginning of the year 2022 in response to the emergence of the Omicron variant. The updated model includes a boosted compartment, composed of individuals who have received an additional dose after completing their primary doses. The model also allowed for reinfections to occur, due to the immune evasive nature of the Omicron variant in relation to the previous strains circulating in the country. After generating active case projections from this model, estimates for severe and critical case numbers were also produced based on the historical trend of these outcomes over the past year. In this paper, we highlight selected scenarios where health systems capacity estimates were used as evidence for informing policy decisions. At present, the FASSSTER model continues to be used to monitor health systems capacity as one determinant in mitigating the spread of COVID-19.

The Societal Value of SARS-CoV-2 Booster Vaccination in Indonesia

PRESENTER: **Rob Johnson**, Imperial College London

Background

The impact of SARS-CoV-2 vaccinations is often measured in terms of deaths averted, comparing to a counterfactual that assumes interactions between people in a society would have been the same without vaccines. However, many countries reduced the stringency non-pharmaceutical interventions including closures of schools and suspension of economic activity as vaccine coverage increased. Therefore, the impact of vaccines is not only in averting deaths, but also in reducing the need for socially damaging and economically costly pandemic mitigation. A counterfactual that assumes the same level of non-pharmaceutical mitigation without vaccines leads to overestimation of the number of deaths averted and underestimation of other societal costs averted by vaccines.

Methods

We define the total socio-economic cost of an epidemic and its mitigation as the sum of lost lives, lost economic activity, and lost education, which we use to identify cost-minimising mitigation in terms of business and school closures. Costs are estimated using existing monetised valuations for life years and years of education, and outcomes are simulated using an existing integrated epidemiologic-economic model named DAEDALUS. We consider the choice of mitigation to be a policy decision made to minimise total societal costs. This facilitates creation of realistic scenarios, which by comparison allow us to estimate the value of an intervention. We apply the method to the prospective assessment of the value of a one-year booster vaccination campaign in Indonesia, consisting of 187 million Moderna doses, and starting in September 2021, where the model was fit to data up to that point.

Results

The choice of cost-minimising non-pharmaceutical mitigation depends both on the availability of vaccines and on the valuation of a life year. The booster-campaign scenario results in 14 to 19 million more person--years of in-person education and an additional $153 to $204 billion in economic activity compared to the no-booster scenario in the twelve-month period. The value of the booster campaign ranges from $470 billion (95% Confidence Interval $270-$770) to $540 billion ($260-$820) in the first year, depending on life-year valuations, or $2,500 ($1,400-$4,100) to $2,800 ($1,700-$4,600) per dose. The societal benefits of booster vaccinations are substantial. Much of the value of vaccinations resides in the reduced need for costly non-pharmaceutical mitigation, suggesting that the value of vaccinations is better measured in wider socio-economic costs, rather than averted deaths.

Promoting Healthy Populations As a Pandemic Preparedness Strategy: The Case of Mexico

PRESENTER: **Martha Carnalla**, National Institute of Public Health
Background

A pandemic preparedness strategy that focuses on only strengthening surveillance and health system capacity distracts from the possibility of addressing other factors that could reduce the burden of a pandemic. The underlying health status of populations has shown to be a major determinant of the health impact of COVID-19, particularly obesity and its associated comorbidities. Mexico's obesity prevalence reached 36.7% in 2021 from 23.5% in 2000, and the country was also one of the most heavily affected countries by COVID-19.

Methods

To inform how the country would have fared in the pandemic if systemic actions would have been taken to stop excess bodyweight, we developed pandemic scenarios for infections, hospitalizations, and deaths under three historical scenarios: reducing obesity prevalence to levels observed in 2000, 2006 and 2012, and three interventional scenarios implemented two years before the pandemic: front-of-package warning labels and doubling or tripling the existing food and beverages taxes.

We quantified the impact of taxes via changes in purchases translated into caloric reductions. The impact of labelling was calculated using a previous estimated caloric reduction in Mexico. We translated caloric reductions into weight reductions using a dynamic weight change model proposed previously, and compared it with historical body mass index (BMI) distributions for Mexico in 2000, 2006, and 2012. We used a dynamic epidemic model that considered differences in heart attack, hospitalization, and infection fatality rates by BMI to estimate changes in COVID-19 infections, hospitalizations, and deaths for the Mexican population up to November 2021 for each scenario in comparison with a business-as-usual scenario.

Results

In all scenarios, infections, hospitalizations, and deaths were reduced for all age groups relative to business as usual. We estimated that the 2018 introduction of food-labelling could have reduced COVID-19 deaths by 6.5% up to November 2021. Doubling or tripling existing taxes over the same period could have reduced deaths by 4.1% and 7.9%, similar to reducing obesity to historical levels as in 2012 (-6.9% deaths) or 2006 (-9.9% deaths). Finally, picturing a population with no obesity, we estimated that 39.3% of deaths could have been averted. Sicker populations experienced higher mortality and hospitalization rates, highlighting the acute-on-chronic syndemic that characterized the COVID-19 pandemic. Obesity is linked to a worse prognosis in COVID-19, but also worsens the prognosis of other respiratory infections. Our results show that improving health population by reducing obesity might reduce adverse health outcomes in future pandemics.

The Net Benefits and Return-on-Investment of Pandemic Preparedness

PRESENTER: **Patrick Doohan**, Imperial College London
Background

Pandemics can result in significant societal costs due to both the outbreak of disease and the mitigation measures imposed in response to it; for example, the health costs of deaths, the social costs of school closures and the economic costs of business closures. The magnitude of these societal costs can be alleviated through pandemic preparedness measures, such as investment in surveillance, health systems and vaccination infrastructure, but there is little quantitative evidence of the efficacy of such measures or their cost-effectiveness, and how this may vary between different country settings.

Methods

A multi-country tool that projects the societal costs of deaths (valued life-years lost), school closures (valued learning losses) and business closures (short-term GDP loss) for various outbreak scenarios is presented. The tool is based on the previously developed Daedalus model, an integrated economic-epidemiological model that accounts for heterogeneity of mixing and disease progression based on age and economic sector, modified to account for human behavioural responses. Outcomes for a number of different diseases are estimated, based on historic respiratory epidemics/pandemics, and under four different mitigation strategies observed during the COVID-19 pandemic (unmitigated, school-closures, reactive economic closures, elimination). The reduction in societal costs with improved pandemic preparedness is examined, including the effectiveness of contact tracing programmes, hospital capacity and vaccination rollout infrastructure, and the benefits of preparedness are directly compared to its costs, which are estimated using a number of previously developed costing tools.

Results

We find that the net benefits of pandemic preparedness for countries appear to scale with GDP per capita, owing to factors such as the underlying demography (younger populations in lower-income countries), and the valuation of life years and school years. Net benefits also increase with disease transmissibility and severity. The cost of pandemic preparedness can vary according to the costing tool employed, resulting in considerable uncertainty. The resulting return-on-investment values, which take the probability of pandemic emergence into account, also vary, ranging from <0% for mild pandemics in low-income countries (e.g., Swine flu in Ethiopia) to >1000% for severe pandemics in high-income countries (e.g., Spanish flu in the United States). The results of this study clearly show the benefits of pandemic preparedness for population health, education and economic prosperity, and its cost-effectiveness, further supporting the business case for investment in pandemic preparedness measures.

9:00 AM –10:30 AM   WEDNESDAY   [Health Care Financing & Expenditures]

Cape Town International Convention Centre | CTICC 1 – Room 2.61-2.62

How Should Health Benefits be Designed to Accelerate Progress Towards Universal Health Coverage? The Case of South Africa [FINANCING FOR UHC SIG]

MODERATOR: **Susan Cleary**, University of Cape Town

DISCUSSANT: **John Ele-Ojo Ataguba**, University of Manitoba; **Veloshnee Govender**, Department of Sexual and Reproductive Health, World Health Organization

Defining Benefits Packages in Health Financing Reforms in Low- and- Middle- Income- Countries: Insights from Public Responses to the South African National Health Insurance Proposals

PRESENTER: **Geetesh Solanki**, South African Medical Research Council

Background

Many low -and -middle -income -countries (LMICs) are carrying out health financing reforms. The approach taken in defining benefit packages in these reforms are often critical to their success. South Africa is finalising legislation (the Bill) to implement a National Health Insurance (NHI) which includes provisions for generating an explicit health care benefits package for members. Extensive public input was sought as part of the process of finalising the Bill. The aim of this paper is to examine the public response to the Bill's benefit package proposals and to generate insights to strengthen these reforms for South Africa and similar settings.

Methods

As part of an extensive public input process on the Bill, Parliament's Portfolio Committee on Health (PCH) heard oral presentations from 117 organisations representing a wide cross section of South African society. This information, which is publicly available, was collated into a database structured to capture information on the data capture process (capturer, checker and reviewer), respondents (organization, sector, date presented), and inputs provided by theme (support for NHI, concerns around corruption, governance, constitutional infringements, funding, access and benefits). The data were analysed by carrying out a thematic analysis of the inputs by sector and findings on the benefit theme are presented here.

Results

Professional associations (35.6%) community organisations (17.1%) and State related bodies (12.8%) made up the largest proportion of respondents with the rest coming from business, academic institutions, trade unions, political parties and health care providers and funders. An overall 65% of respondents raised concerns around the benefit proposals. Respondents were concerned by the "open-ended" nature of the proposals which provide for a Benefits Advisory Committee (BAC) "to review the benefits and types of services that the NHI will cover and, in consultation with the Minister of Health and the Board, to determine the health care benefits the Fund will provide".

Respondents argued that this did not provide sufficient clarity on what benefits would be offered, their affordability, nor the criteria and process that would be followed in defining those benefits.

Discussion

The public response to the Bill raises questions as to the level of detail policy makers should provide in legislation on benefit packages. The case for legislation defining what benefits will be offered is weak as benefits are circumstance dependent and change over time which implies on-going legislative changes – an onerous process. The case for providing detailed principles, criteria, and processes for determining benefits is strong - providing clear legislative guidelines will assist in navigating the highly contested terrain of benefits determination.

Conclusion

The South African experience highlights the importance benefits play in determining support for reforms. The optimal route for policy makers in LMICs carrying out similar reforms would be to clearly specify the process and principles to guide determination of benefit packages, but to leave the specifics of the actual benefits to be open-ended.

Is There a Role for Clinical Practice Guidelines in Initial Health Benefit Package Design? A South African Landscape Analysis

PRESENTER: **Jeanne-Marie Tucker**, Clinton Health Access Initiative (CHAI)

Background

There is increasing consensus on the value of a more explicit health benefit package (HBP) that provides transparency on the nature and extent of trade-offs on the path towards Universal Health Coverage (UHC).

In South Africa, design of the National Health Insurance (NHI) HBP for primary health care (PHC) is structured against a 'Service Benefits Framework' (SBF) as a standardised approach to describe, codify, and cost every 'benefit'. Every benefit is defined in terms of an ICD11-coded diagnosis/condition and grounded in a national CPG.

Aim

This exploratory research aims is to review the current range of national CPGs for PHC to begin to determine whether they will be sufficient to support description of the NHI HBP as defined in the SBF?

Methods

Building on the work of Wilkinson et al (2018), a systematic review was conducted to identify all CPGs for PHC, developed between 2000 and 2022, which were consolidated in a database. They were classified in different ways, with findings by authorship categories, presented here.

Results

185 Guidelines were identified across 5 authorship categories, increasing from 2007 onwards. The majority (50%) were developed by the public sector and a further 42% by professional societies and associations. 6% Were developed by the Council for Medical Schemes (CMS), the private funding regulator. Across an initial five broad therapeutic groups used to reflect burden of disease (BOD), the National Department of Health was shown to have developed the majority of guidelines in all categories except Non-communicable diseases (NCD) and Trauma and Emergency. Excluding guidelines for Covid and ones for multiple conditions, the group with the largest proportion (30%) of guidelines was NCDs. However, in the public sector, the majority were for HIV/AIDS, TB and Malaria. By contrast, the group with the least was Lifestyle, which reflected guidelines for Nutrition, adherence and/or Health Promotion, at only 5% of all guidelines. The NDoH was responsible for 7 of these 8 guidelines, with none developed by the CMS or professional societies and associations. Although not comparable in structure, a second BOD mapping using ICD10 showed similar results.

Discussion

The steady increase in number of guidelines developed since 2007 suggests increasing recognition of the need for evidence-informed CPGs for PHC; and the increasing proportion developed by the public sector suggests a strengthening of national stewardship too. However, it also highlights the scale of the broader challenges in the literature, e.g., lack of standardisation. Overall, the 185 guidelines reflect a good starting point to support description of the NHI HBP for PHC, although misalignment is likely to be a challenge. To the extent that CPGs are used for this purpose, there development will require coordination to ensure that they are not the result of implicit priority-setting.

Conclusion

A standardized approach to describe the NHI Service Benefits – including national CPG – is an important first step to providing comparability across benefits, time and place. It is the starting point to develop comparability in costing, outcomes and economic evaluation as input to the HBP priority-setting process.

What Does Affordability Mean in Priority Setting Processes? Perceptions from Health System Experts

PRESENTER: **Tanja Gordon**, University of Bristol and University of Cape Town

Background

There is rich literature around health care affordability and cost management for patients, but literature is scant on how health systems conceptualise what they can "afford" to provide their populations. From preliminary readings, three viewpoints emerge from literature describing "affordability". The first is that it is political; by this definition health systems have little control over their budgetary allocations and an increase in their budget would mean increased borrowing, taxation and/or a reallocation of state resources, bureaucratic decisions outside the sphere of the health system. The second is that affordability is captured as the inclusion of a budget impact analysis alongside a cost-utility analysis, a method used to determine the efficiency and feasibility of a new benefit. Lastly, specifically for low- and middle-income countries (LMICs), affordability is considered in terms of health equity and the mechanisms required for a consistent supply of services. Given the importance of affordable benefits packages on the road towards universal health coverage, this paper asks the question: what does affordability mean in priority setting in different settings?

Methods

Health system experts from different settings were purposefully sampled from a list of potential key informants compiled by the research team. Online in-depth interviews were conducted with ±30 willing informants while following an interview schedule. A constant comparison approach that draws on aspects of grounded theory was used for data analysis. Interviews were fully transcribed then opened coded by three members of the research team to develop a codebook. Sets of transcripts were then iteratively coded using NVivo 20. Detailed accounts were then written for each set of transcripts for cross and inter-comparison analysis and for the development of thematic areas.

Results

Interviewing and analysis is ongoing, with twelve interviews conducted to date. Preliminary findings show that "affordability" is a complex concept that means different things to different informants. In line with existing literature, links emerged between affordability and the political fiscal space, the cost-effectiveness of new recommendations and health equity. Another theme that emerged was the budget constraints health systems face. Health systems with larger budgets have the scope to provide more healthcare services equitably while those with fewer resources are faced with difficult decisions, higher opportunity costs and limited options for equitable access to even limited benefits. There was also a general notion among informants towards the perceived absence of thought decision makers give to what may be displaced within a health system because of a financial or clinical practice change.

Discussion

Affordability has been found to be a complex concept that takes into account the design of a health system's finances, opportunity costs and decision-making, which requires a certain degree of planning, innovation, and strategy for LMICs with fewer resources. Amid increasing global health spending, it is important for further research to be done on the nuances and normativity around priority setting within health systems, especially in the developing setting where resources are few.

9:00 AM –10:30 AM   WEDNESDAY   [Health System Performance]

Cape Town International Convention Centre | CTICC 1 – Room 2.64-2.65
Measuring Health System Performance

MODERATOR: **Laura Anselmi**, The University of Manchester

Do Better Managed Healthcare Payors Deliver Better Health Outcomes for Their Managed Populations? Evidence from England.

PRESENTER: **Stephen Dorgan**, London School of Hygiene & Tropical Medicine (LSHTM)
AUTHORS: Timothy Powell-Jackson, Andrew Briggs

Background

Good management practice is believed critical to ensuring health systems perform efficiently, respond to population needs, and improve population outcomes. Over the last decade a growing body of evidence has demonstrated that better hospital management practices are strongly associated with improved patient outcomes. However, to our knowledge, no such link has been identified for healthcare payors.

Healthcare payors are key health system actors. They typically: implement policy; contract and pay for healthcare service delivery; ensure efficient and effective healthcare delivery; and seek to improve the health of their managed populations. The lack of quantitative empirical insight into healthcare payor management practices, and any potential associations with the health outcomes of their managed populations,

presents a clear gap in the literature. This study aims to address this gap using unique data on the management practices of healthcare payors within England's National Health Service (NHS).

Methods

We conducted a cross sectional study of the management practices of all 152 publicly funded NHS healthcare payors in England. The payors were responsible for spending US$120 billion on healthcare services for 54 million residents at the time of the study. The data were collected using a tool that was developed and deployed in a 40,000 person-hour census of English healthcare payors, led by the presenter, between January and June 2010. The tool measures and assesses performance in 11 management practice domains, from which we identified two distinct latent factors of healthcare payor management practice. We gathered additional data on each payor's organisation, financing, local health economy, clinical effectiveness, preventative effectiveness, and population health outcomes. We explored associations using multivariate regression models, controlling for a rich set of payor and population characteristics including: payor size, payor income per capita, General Practitioners per capita, level of deprivation, age structure, ethnicity, and rurality.

Results

We find that healthcare payors perform best in management practices related to their *engagement of other health system participants*, including their managed populations, and they perform worst in the practices related to their *optimisation of efficiency*.

In addition, we find better healthcare payor management practices correlate positively and significantly with improvements in a range of healthcare metrics for payors' managed populations. Specifically, after adjusting for covariates, we find that moving from the bottom quartile to the top quartile of payor management practice performance is associated with improvements of:

- 6.0% in MMR vaccination rates ($p < 0.01$)
- 3.4% in breast cancer screening rates ($p < 0.001$)
- 12.9% in smoking cessation rates ($p < 0.01$)
- 4.4% in years of life lost to all cancers ($p < 0.001$)
- 7.7% in mortality amenable to healthcare ($p < 0.001$)
- 0.5% in life expectancy at birth ($p < 0.01$).

Conclusions

The findings suggest that management does matter. Better healthcare payor management practices are associated with improved health outcomes for their managed populations. Improving payor management practices might be an efficient and effective means of improving population health outcomes.

Dynamics of International Health System Reforms in Times of Crisis: Is There Evidence of a New Wave?

PRESENTER: **Chiara Berardi**, University of Newcastle

In the last six decades, healthcare system reforms have shown similar dynamics in industrialized countries in specific periods of time. The policymaking process has been challenged by cycles of economic growth and recession. While previous research has focused mainly on the impact of these shocks on population health outcomes, little research has assessed their effect for health systems.

Building on Cutler's analysis of dynamics of international health system reform, we analyze drivers, and descriptive qualitative and quantitative evidence around reform trends in G7 countries in the last twenty years. In the context of two major shocks, such as global economic recession and COVID-19 pandemic, we aim to determine whether there is evidence of similar reform trends in the countries considered, and discuss policy implications for healthcare systems.

We systematically mapped, extracted, and categorized similar health system reforms trends across G7 countries between 2000-2021. Qualitative data from Observatory on Health System and Policies were coded line-by-line, and themes were constructed based on similar reform content and objective. For each theme, free codes were inductively organized, and complemented by quantitative OECD data.

We identified similar overarching reform trends across countries in response to the 2008 economic crisis: a tendency toward re-centralization of health system governance to control and leverage the efficient rationalization of public health resources. This, to some extent, countered the effects of the market-based reforms of the previous wave. The reforms implemented in response to the 2008 financial crisis were mediated by the economic repercussions of the shock on the respective countries' economies. In contrast, reforms in response to the pandemic were largely driven to counteract the direct impact of the shock on the health system, resulting in a substantial but temporary increase in health spending.

Health system reforms have altered the relative balance between public and private actors' participation in health systems. Starting from an understanding of the health systems response to exogenous shocks, and their implications for equity and efficiency, our approach offers a guidance for future developments of political economy of public and private mix in healthcare. An understanding the health system response to these crises could prevent negative consequences and provide lessons to improve health systems resilience to future shocks.

Assessment of Strategic Healthcare Purchasing and Financial Autonomy in Tanzania: The Case of Results-Based Financing and Health Basket Fund.

PRESENTER: **John Josephn Maiba**, Ifakara Health Institute

AUTHORS: Neha Singh, Rachel Cassidy, Gemini Mtei, Josephine Borghi, Peter Binyaruka

Background: Universal health coverage (UHC) is a relevant policy agenda in many low and middle-income countries. Low-and middle-income countries (LMICs) are implementing health financing reforms towards UHC. Tanzania introduced direct health facility financing of health basket funds (DHFF-HBF) and results-based financing (RBF). HBF is pooled donor funds and transferred directly into facilities' bank accounts countrywide, while the RBF program paid providers in nine regions based on performance. Since strategic health purchasing (SHP) has also received attention as a way to accelerate progress toward UHC, ongoing financing reforms should be assessed whether they align with SHP principles. SHP requires an explicit focus on what to purchase, from who, and how. We therefore examined and compared the purchasing arrangements and associated financial autonomy between RBF and HBF-DHFF programs in Tanzania.

Methods: We used document review and qualitative methods. Key policy documents and articles related to strategic purchasing and financial autonomy were reviewed. In-depth interviews were conducted with health providers (n=25) from 25 public facilities, health managers (n=8) in the Mwanza region (implementing RBF and HBF-DHFF), and national-level stakeholders (n=4). The assessment focused around the purchaser-provider relationship, purchasing arrangements, financial autonomy, and associated experience from study participants. Interviews were recorded, transcribed verbatim, and analyzed using a thematic framework approach.

Results: The design of RBF and HBF-DHFF has considered most of the SHP principles, and both programs purchased services from public health facilities. However, RBF contracted primary healthcare facilities as opposed to all public facilities for HBF. RBF paid facilities based on 16 health services and 18 groups of quality indicators, while HBF payment accounts for performance on six service indicators, equity based on the district from a district headquarters, and need based on population catchment size. RBF used a fee-for-service payment method, while HBF used a formula-based capitation approach with adjustors. Study participants reported that RBF provided more autonomy to the health facility in spending the funds, while HBF was less flexible due to a budget ceiling on specific spending items. Budgeting and spending decisions with RBF were more like "bottom-up" and "needs-based", as opposed to "top-down" and "rules-based" for the HBF.

Conclusion: Although health financing reforms are important for progress toward UHC, efforts are still needed to align them with SHP principles. The views of frontline providers and managers are critical for redesigning financing reforms especially in enhancing spending autonomy and overall health system performance.

The Effect of Health Insurance Expansion on Economic Well-Being: Evidence from the Affordable Care Act

PRESENTER: **Jangho Yoon**, Uniformed Service University

The Affordable Care Act (ACA) in the U.S. is strongly associated with improved access to health care services. In particular, the major coverage provisions of the ACA, the individual mandate and state Medicaid expansion that went into effect in January 2014, reportedly lead to positive health outcomes, improving health and health care equity. The ACA may also affect economic well-being because health can be viewed as a durable capital stock that produces healthy time and thereby income-generating activities. This study exploits the ACA as a natural experiment to identify the impact of health insurance expansion on household income.

We analyze pooled cross-sectional data on nationally representative samples of non-elderly U.S. adults for years 2007-2017 from the Medical Expenditure Panel Survey. We utilize a dynamic difference-in-differences (DiD) model with the reference year of 2013. It compares a pre-post change in family income for adults aged 18-64 (n=218,530) with a counterfactual pre-post income change for beneficiaries of TRICARE—a federally-funded universal healthcare program for over 9.6 million military personnel and their families (n=4,016). We examine individuals with family income at or less than 400% federal poverty level (FPL) (i.e., those eligible for federal health insurance premium subsidies or Medicaid expansion benefits under the ACA) and others with family income greater than 400% FPL (i.e., those ineligible for premium subsidies or Medicaid expansion benefits). We use a simultaneous-quantile dynamic DiD approach to test the heterogeneous effect of the ACA by the level of family income. Estimates are survey-weighted and adjusted for the complex design of MEPS.

Findings confirm that the parallel trend assumption underlying the DiD approach is plausible. We find no immediate effect of the ACA on family income in year 2014, the first major implementation year. However, among individuals with family income at or less than 400% FPL, the ACA on average is associated with 7.6%, 10.6%, and 13.3% increases in family income in the second through fourth implementation years, respectively. As expected, we do not find any significant income change among individuals with family income greater than 400% FPL. Further, we find greater effects of the ACA on individuals at the lower half of the income distribution among those with family income less than 400% FPL.

In conclusion, our findings suggest that the ACA has led to gradual positive gains in family income for low and middle-income individuals, pointing to a beneficial effect of health insurance expansion on economic well-being. Considering that income is a driving force behind the striking health inequity, we extrapolate that expanding health insurance coverage may serve as a means to concomitantly mitigate health and income inequity in the U.S. and elsewhere.

Cape Town International Convention Centre | CTICC 1 – Room 1.62

Smoking Behaviours and Cessation Interventions [ECONOMICS OF RISKY HEALTH BEHAVIORS SIG]

MODERATOR: **Gabriella Conti**, Department of Economics and Social Research Institute, University College London

The Impact of Cigarette Packaging and Price on University of Cape Town Students' Smoking Behaviour

PRESENTER: **Nicole Vellios**, University of Cape Town

Background Plain cigarette packaging is currently being considered in South Africa.

Aim To investigate whether cigarette packaging reduces the utility of cigarettes.

Methods Preferences were elicited using a discrete choice experiment. Data were collected in 2021 from University of Cape Town students. Both smokers and non-smokers were sampled. Intention to buy, intention to try, and perceptions of harm were investigated using conditional logit models. The attributes included packaging, price, and warnings on individual cigarettes. The design of the experiment accounted for illicit cigarettes so as to reflect current market conditions closely.

Results We found that smokers reported preferring not to buy plain packs and non-smokers preferred not to try plain packs. In terms of health risk, both smokers and non-smokers perceived plain packs to be the most risky to health.

Conclusion Plain packaging would be effective in reducing people's utility for cigarettes.

Exploring E-Cigarette Use and Smoking-Related Disparities in England

PRESENTER: **Samuel Hampsher**, BOTEC Analysis

AUTHOR: James E Prieger

Background

The British government has long recognized the imperative to reduce smoking-related health disparities between communities of different socioeconomic status (SES). The UK government has also adopted, unusually among national regulators, an enthusiastic stance towards e-cigarettes. British data confirms that e-cigarettes are popular among smokers, and e-cigarettes have been credited with increasing the proportion of quitting attempts and the success of those attempts. However, it is unclear whether these benefits are evenly distributed among the national population. If, like smoking, the uptake of e-cigarettes is greater among lower SES Britons, and if the effect of e-cigarette use on smoking cessation in these groups is similar to that of the national community, then e- cigarettes use might be expected to alleviate some of the existing smoking-related disparities. On the other hand, theory underlying consumer adoption of new technology suggests disadvantaged communities will be slower to adopt e-cigarettes relative to wealthier communities. That could concentrate e-cigarette use, and any resulting benefits, among smokers from wealthier communities, perpetuating or exacerbating the existing smoking-related disparity.

Methodology

This study examines the association between e-cigarette use and disparities in tobacco use between 'white-collar' (routine and manual) and 'blue collar' (other) workers in England between 2013 and 2019 using data from Public Health England surveys. We perform small-area estimation to compute predicted e-cigarette consumption at the local authority (LA) level (counties, towns and cities). Those data are then regressed against LA-level smoking prevalence from the Office of National Statistics (ONS). The methodology for small area estimation is well established, but it is, to the best of our knowledge, the first time the methodology has been used to investigate the local prevalence of e-cigarette use, much less e-cigarettes' impact on smoking-related disparities.

Results

The uptake of e-cigarettes was found to be negatively associated with smoking rates in both occupational groups. However, the decrease in smoking appears to be more marked in the white collar group of workers. As such, the uptake of e-cigarettes may have widened the disparity between the two groups to a small degree. Whether that finding is specific to the immature e-cigarette market (a period covered in our data series), or whether subsequent uptake of e-cigarettes may reduce the extant smoking-related disparity remains to be seen.

Implications

That finding suggests that e-cigarette consumption patterns may differ between sub-national populations; with initial uptake among lower SES groups slower than that of the general population. Greater dual use, or less successful smoking cessation among blue-collar e-cigarette users may also contribute to the finding. These possibilities require additional investigation. Our results also highlight the need for greater granularity in the survey data covering e-cigarette use and for policy messaging and cessation services to be better tailored to the specific

needs of disadvantaged groups. Finally, although the current results are best viewed as associational (i.e., the conditions under which the methodology can identify causal effect are restrictive), they produce stylized facts that can be confirmed or tested using causal methods once better data become available.

The Long-Term Impact of Maternal Leave Duration on Smoking Behaviour

PRESENTER: **Sonja Spitzer**, University of Vienna
AUTHORS: Anna-Theresa Renner, Mujaheed Shaikh

Maternal leave policies aim at protecting the health of new mothers. However, the impact of such policies on precursors of health such as smoking behavior is both theoretically and empirically understudied. We investigate the effect of maternal leave duration on long-term smoking behavior of mothers across 14 European countries by combining survey data on health behaviors with retrospective information on birth and employment histories, and link these with maternity and parental leave policies between 1960 and 2010. To identify the causal impact of maternal leave duration, we exploit between and within country variation in mothers' exposure to statutory leave duration policies in an instrumental variable framework. We find that a one month increase in maternal leave duration increases the probability that a woman smokes in the long run by 2.3 percentage points. Similarly, a one month increase in leave duration increases the lifetime duration of smoking by 13 months. We document non-linearity in this effect for the first time, showing that shorter leave durations have a protective effect, while very long maternal leave promotes harmful health behavior. Suggestive evidence shows lack of financial support from spouse around childbirth as a mediator of the observed effects, while employment and other socio-demographic characteristics play no role.

9:00 AM –10:30 AM   WEDNESDAY   [Economic Evaluation Of Health And Care Interventions]

Cape Town International Convention Centre | CTICC 2 – Nerina
Economic Evaluation of Maternal and newborn healthcare

MODERATOR: **Stephen C Resch**, Harvard TH Chan School of Public Health

Economic Analysis of HTLV-1 Antenatal Screening in Brazil: An Open Access Cost-Utility Model to be Applied Globally

PRESENTER: **Kátia Senna**, Federal University of the Rio de Janeiro State
AUTHORS: Carolina Rosadas, Milene Costa, Marisa Santos, Graham P Taylor

Background: Human t lymphotropic virus 1 (HTLV-1) is a retrovirus that causes severe diseases, such as an aggressive cancer and progressive neurological disease wich affects mainly areas with low human development index and may be transmitted from mother-to child (MTC), primarily through breastfeeding. Refraining from breastfeeding is an effective intervention to reduce the risk of infant`s infection. However, HTLV-1 antenatal screening is not offered globally. According to the World Health Organization, the lack of cost-effectiveness studies is considered one of the major barriers for the implementation of policies to prevent HTLV-1 infection.

Objective: A cost-utility analysis of a HTLV-1/2 antenatal screening to avoid HTLV-1 MTC transmition was performed compared with no screening, from the Brazilian Public Healthcare perspective.

Methods: A decision-analytic model combined with a Markov model was constructed using the Microsoft Excel®(2019) software. A decision tree captured the number of mother-to-child infections based on the detection of anti-HTLV-1/2 antibodies using an enzyme-linked immunosorbent assay (ELISA) followed by Western Blotting (WB). Markov modelled the long-term outcomes from HTLV-1 infection throughout lifetime. Five cycles of one year represented the possible health states in the target population, namely; asymptomatic infection, HTLV-1 -associated myelopathy (HAM), adult T cell lymphoma/leukaemia (ATLL), ATLL with HAM and death. Each health state included the diagnosis, patient's monitoring and treatment. Costs collected from the brazilian health data system of medical procedures, were converted to U.S. dollars (US$) at the rate of 4·97 Brazilian reais/1 US$. A 5% discount rate was used in the model. The primary outcome measure was quality adjusted life-years (QALY). Direct medical costs related to HTLV-1 screening were considered, as well as, those arising from the follow-up of people living with HTLV-1. A specialist panel was used to determine the items of costs needed for a patient medical care in case of these diseases, and were based on the current practice and recommendations of the Brazilian Ministry of Health (BmoH). Other parameters like HTLV-1 prevalence among pregnant women, rate of breastfeed up to or for more than six months, the sensitivity and specificity of the diagnostic tests, transitions probabilities and utilities to each health state were derived from existing literature. Deterministic and probabilistic sensitivity was performed to test the robustness of results.

Results: The incremental cost-effectiveness ratio of HTLV-1 antenatal screening was U$ 5,074.48/QALY. Considering the Brazilian threshold of U$ 8,048.28/QALY, equivalent to 1 Brazilian gross domestic product (GDP) per capita/QALY, the screening was considered a cost-effective intervention and resulted in 1,039 possible infections prevented each year in Brazil. The ICER to avoid HTLV-1 MTC transmitionof screening remained below the U$ 8,048.28/QALY for all parameters in the deterministc analysis, except for the prevalence of HTLV-1. In nearly all simulations of the probabilistic sensitivity analysis HTLV-1 antenatal screening was more effective than not screening.

In conclusion, the implementation of antenatal screening followed by intervention would prevent new incurable infections as a highly cost-effective strategy in Brazil. This cost-utility model developed can also be used to evaluate the cost-effectiveness of such policy in different

settings worldwide.

Evaluating the Potential Economic Value of New Delivery Technologies: Insights from Cost-Effectiveness Analyses of Integrating Contraceptive Microarray Patch into the Contraceptive Mix in Selected Low- and Middle-Income Countries.

PRESENTER: **Teddy Naddumba**, PATH
AUTHORS: Mercy Mvundura, Elisabeth Vodicka, Courtney Jarrahian, Collrane Frivold, Maggie Kilbourne-Brook

Background

In low- and middle-income countries (LMICs), approximately 923 million women of reproductive age (15–49 years) want to avoid a pregnancy. However, 218 million (24%) do not have their need for family planning satisfied by modern contraceptive methods. This unmet need is highest among adolescents and young people aged 15 to 19 years who want to delay a first birth or space births (43%). Novel delivery technologies currently in development such as hormonal contraceptive microarray patches (MAPs) have the potential to address some shortcomings of current family planning methods and improve acceptability. The objective of this study was to evaluate the potential cost-effectiveness of incorporating contraceptive MAPs into the available family planning options in three LMICs compared to the current contraceptive mix.

Methods

We used a combined decision tree and Markov model to evaluate the cost-effectiveness of using MAPs to address unmet contraceptive need and/or users switching from their current contraceptive method to a MAP presentation in Ghana, Nepal, and Senegal. These countries were selected since they have a large proportion of unmet contraceptive need (~20%–30%). The model simulated expected pregnancies, costs, disability-adjusted life years (DALYs), and costs per DALY averted for two scenarios: (1) where contraceptive MAPs are not included in the contraceptive mix and (2) where contraceptive MAPs are added to the current contraceptive mix. The model evaluated the potential value of MAPs, meeting a proportion of contraceptive unmet need under different assumptions about MAP characteristics (e.g., procurement prices ranging from US$1.65 to US$4.00 per MAP). Costs and outcomes were analyzed from the health system and limited societal perspectives over a one-year time horizon with all costs reported in 2021 US dollars. Incremental cost-effectiveness ratios were compared to willingness-to-pay thresholds of gross domestic product per capita of $2,206 (Ghana), $1,155 (Nepal), and $1,472 (Senegal).

Results

When contraceptive MAPs were available, assuming 1% unmet need addressed by MAPs and 1% current users switching to MAPs, we estimated a reduction in pregnancies by 6,868 (Ghana), 6,052 (Nepal), and 2,362 (Senegal) with corresponding costs per DALY averted of $2,070.13, $453.11, and $810.01 for each country, respectively. When exploring different MAP prices, assuming a 6-month duration of effectiveness and addressing 1% unmet need, the MAP would be cost-effective compared to the willingness-to-pay threshold for all countries at a price of $1.60 per MAP and not cost-effective at prices higher than $15.20, $5.80, and $4.60 for Ghana, Nepal, and Senegal, respectively.

Conclusions

These findings suggest that use of new innovations for contraception delivery, such as MAPs, have the potential to be cost-effective compared to the current contraceptive mix in LMICs if target product attributes are met and if MAPs enable increased use of contraception by those with currently unmet need.

Cost-Effectiveness of Induction of Labour Using the Balloon Catheter at Home (outpatient) Versus Prostaglandin at the Hospital: Evidence from an Observational Study

PRESENTER: **Sayem Ahmed**, University of Oxford
AUTHORS: Mairead Black, Linda Williams, Mairi Harkness, Cassandra Yuill, Christine McCourt, Helen Cheyne, Sarah Stock, Kathleen A Boyd

Background: Induction of labour (IOL), the process of starting labour artificially, is one of the most commonly performed procedures in maternity care in the United Kingdom (UK). IOL in hospitals have rapidly increased over the past decade, placing substantial burden on hospital services, and antenatal ward bed space, while also negatively impacting the experience of labour by pregnant women and their families. Many maternity clinics now offer cervical ripening in the home setting, which could help alleviate the hospital burden and costs associated with induction of labour (IOL) while potentially improving the mothers induction of labour experience.

Objective: Determine the cost-effectiveness of home cervical ripening with balloon catheter versus hospital cervical ripening with prostaglandin for pregnant women having IOL.

Methods: We conducted an economic evaluation alongside a UK observational cohort study, from NHS perspective. Data of 26 obstetric units were extracted from the UK BadgerNet maternity dataset (515 mothers induced at home and 4,332 mothers induced in hospital) between June 2021 and July 2022. Resource use data include time in hospital (antenatal ward, labour ward, postnatal ward and neonatal unit admissions) and healthcare utilization from induction to hospital discharge post birth. Unit cost (including method of induction) was

extracted from NHS Reference costs and British National Formulary for cost year 2021. A decision analytic model was developed synthesizing data on the costs, outcomes and potential complications. Probabilistic analysis was undertaken to account for uncertainty in the data and parameter estimates. The primary outcome was incremental cost per neonatal unit (NNU) admission avoided.

Results: The length of stay of the women who received the balloon catheter at home was significantly lower than those who received prostaglandin at the hospital (mean 5,482 minutes versus 7,317 minutes; P < 0.01). Overall mean costs were lower for the at home arm compared to hospital IOL arm (£2,204 versus £3,659). Compared to hospital, home cervical ripening was cost-saving (£1,454), and reduced (statistically insignificant) in neonatal unit admission by 1.5% (P=0.224), so can be considered a dominant strategy. Probabilistic sensitivity analysis indicates little uncertainty regarding cost savings, and the uncertainty regarding impact on neonatal unit admission was well below the pre-defined non-inferiority boundary of a 4% increase.

Conclusion: This study suggests that IOL in the at home setting with balloon catheter is cost-saving compared to prostaglandin in hospital, with no detrimental effect on neonatal unit admissions or maternal complications. Decision-makers should consider the anticipated beneficial economic impacts of IOL in the at-home setting, and the potential for improved patient experience when considering policy implications for maternity services.

9:00 AM –10:30 AM WEDNESDAY   [Health, Its Distribution And Its Valuation]

Cape Town International Convention Centre | CTICC 1 – Room 1.43

Equity and Outcome Considerations Associated with Economic Evaluation: International Applications [EQUITY INFORMATIVE ECONOMIC EVALUATION SIG]

MODERATOR: **Julia Dayton Eberwein**, The World Bank

Systematic Review of the Psychometric Performance of Generic Childhood Multi-Attribute Utility Instruments

PRESENTER: **Stavros Petrou**, University of Oxford

AUTHORS: Joseph Kwon, Sarah Smith, Rakhee Raghunandan, Martin Howell, Elisabeth Huynh, Sungwook Kim, Thomas Bentley, Nia Roberts, Emily Lancsar, Kirsten Howard, Germaine Wong, Jonathan Craig

Background: Methodological challenges in measuring health utilities in children (aged ≤18 years) using adult measures has motivated the development and use of instruments with childhood-specific or childhood-compatible classification systems and value sets. Evidence on their psychometric properties is required to demonstrate whether they are valid, reliable, and responsive for a given application. This systematic review aims to synthesise the psychometric performance of generic childhood multi-attribute utility instruments (MAUIs).

Methods: A review protocol was registered with the Prospective Register of Systematic Reviews (CRD42021295959); reporting followed the PRISMA 2020 guideline. The search covered the following databases: MEDLINE; EMBASE; PsycINFO; EconLit; CINAHL; Scopus; and Science Citation Index. Inclusion criteria were that the study provided psychometric evidence for one or more generic childhood MAUI designed to be accompanied by a preference-based value set (any language version) identified in prior research and included – 16D, 17D, AHUM, AQoL-6D, CH-6D, CHSCS-PS, CHU9D, EQ-5D-Y-3L, EQ-5D-Y-5L, HUI2, HUI3, IQI, QWB, and TANDI; data derived from general and/or clinical childhood populations; data derived from children and/or proxy respondents; and published in English. The review included 'direct studies' that aimed to assess psychometric properties and 'indirect studies' that generated psychometric evidence without this explicit aim. Eighteen psychometric properties were evaluated using a four-part criteria rating developed from established standards in the literature. Narrative syntheses described the evidence volume by instrument and property and the psychometric assessment methods/results by property.

Results: 372 studies were included, generating 2,153 criteria rating outputs across 14 instruments covering all psychometric properties except predictive validity. The number of criteria rating outputs varied markedly by instrument and property, ranging from one for IQI to 623 for HUI3, and from zero for predictive validity to 500 for known-group validity. The more recently developed instruments targeting preschool children (CHSCS-PS, IQI, TANDI) have greater evidence gaps (in terms of properties without any psychometric evidence) than longer established ones such as EQ-5D-Y, HUI2/3, and CHU9D. The inclusion of indirect studies (n=209 studies generating n=900 criteria rating outputs) to supplement direct studies (n=163 studies, n=1,253 outputs) increased the number of properties with at least one output that indicated acceptable psychometric performance. The property-specific assessment features were described, including methodological limitations such as the lack of reference measures or estimates of the minimal clinically important difference to help interpret responsiveness evidence.

Conclusion: This review provides comprehensive evidence on the psychometric performance of generic childhood MAUIs. It provides researchers and policymakers, particularly those involved in cost-effectiveness-based evaluation, with an evidence base to evaluate existing instruments and to select them for application. It informs future psychometric studies by identifying the evidence gaps for these instruments and the important methodological features for psychometric assessment.

Estimating the Quality-of-Life Impact of Musculoskeletal Disorders in Tanzania: Results from a Cross-Sectional Community-Based Survey

PRESENTER: **Eleanor Grieve**, Glasgow University

AUTHORS: Manuela Deidda, Ping-Hsuan Hsieh, Stefanie Krauth, Jo Halliday, Nateiya Yongolo, Sanjura Biswaro, Blandina Mmbaga, Kiula Peter Kiula, Elizabeth Msoka, Rose Monica Ongara, Emma McIntosh

Background

Sub Saharan Africa is currently facing a preventable crisis caused by rapid rise in people developing non communicable diseases (NCDs). This brings not only clinical but economic, societal and quality-of-life impacts on people's day-to-day life. Yet, plans to reduce NCDs often overlook the impact of Musculoskeletal (MSK) disorders. Arthritis is one of the commonest MSK disorders, is a leading cause of disability, causing significant absence from work, and incurs substantial medical costs globally. Measuring the quality-of-life impact of these diseases is urgently needed to inform policy. Our study has directly measured and valued the quality-of-life impact of MSK in Tanzania.

Methods

A cross-sectional community-based survey was undertaken between January–Sept 2021 in the Kilimanjaro region of Tanzania. Clinical screening tools, including the Gait Arms Legs Spine (GALS) and Regional Examination of the Musculoskeletal system (REMS) tools were used for identifying MSK disorders. Two-stage cluster sampling was used to administer health-related quality of life (HRQoL) questionnaires using the Swahili version of the preference-based tool EuroQol EQ-5D-5L and CHU9D, for a sample of all residents (aged over 5 years old) in selected households (N = over 2,500). To establish a reference population account of these measures, a longer questionnaire went to those who had arthritis and who were matched on age and gender (~1:3), n=153 REMS+ and n=441 controls. Thus, responses from participants screening positive with MSK were directly compared to a matched control group in a bid to establish the magnitude of impact. Ethiopia, Uganda, Zimbabwe and UK tariffs were used for conversion to utilities (Tanzania has no tariff). Regression based analysis were undertaken to estimate differences in utility scores between those presenting as REMS+/-. Other explanatory variables included age, occupation, marital status, gender, religion, education.

Results

The survey revealed a statistically significant reduction in quality-of-life, on average 20%, for those who are REMS+ (slightly less for GALS+). Population norms (~0.90 utility) are in line with HRQoL values from other countries for the average age of our dataset at 30 – 40 years old but those presenting with a positive diagnosis had a significant reduction in health-related utility of ~0.12 to 0.22 depending on what country tariff was used. The attribute 'pain/discomfort' was a major contributor to this reduction in HRQoL.

Conclusion

A good quality of life refers to a person's ability to look after themselves, get around their community, participate in their usual activities, and avoid pain and distress. Results show that those with MSK for all quality-of-life dimensions had lower utility scores than controls. This is the first study to quantify the significant burden of MSK on health in Kilimanjaro, and likely wider Tanzania. With such a baseline figure, we know that any future interventions aimed at alleviating symptoms including pain or, indeed, any preventive interventions will likely improve this quality-of-life profile. Our findings provide initial evidence to justify the need to plan effective and cost-effective interventions for the prevention and management of MSK in Tanzania, as well as ensure adequate service provision including training of rheumatology sub specialists.

Systematic Reviews for Health-Related Quality of Life and Cost Burden of Self-Harm or Suicidality in Young People

PRESENTER: **Ngoc Le**, Deakin University

AUTHORS: Long Khanh-Dao Le, Yared Belete Belay, Thi Hao Pham, Thi Quynh Anh Ho, Ha N.D Le, Jane Pirkis, Cathy Mihalopoulos

Background:

Self-harm and suicidality are of significant public health concern and associated with substantial social and economic burden, especially among young people. To our knowledge, there were no systematic reviews that investigated the health-related quality of life (HRQoL) or cost burden of self-harm or suicidality in young people.

Aims: To systematically review the evidence on (1) the association between HRQoL and self-harm/suicidality and (2) costs associated with self-harm/suicidality in young people.

Methods:

Searches were conducted on the following databases: MEDLINE, PsycINFO, CINAHL, EconLit and EMBASE. Search terms included a broad range of terms and were the combination of the following blocks: (1) self-harm/suicidality, (2) HRQoL/wellbeing/life satisfaction or costs/productivity loss, (3) children/adolescents/young adults/young people. Studies were included in the review if they were quantitative research studies published in English in peer-reviewed journals and focused on young people under 25 years of age. The quality of included

studies regarding HRQoL and costs was assessed using the Effective Public Health Practice Project (EPHPP) and the Larg and Moss's checklist for cost-of-illness studies respectively.

Results:

We identified 23 relevant studies on HRQoL and 18 studies on costs (among 4,730 and 11,570 articles from different databases respectively). Findings showed that participants who reported self-harm had lower wellbeing, lower life satisfaction or lower overall HRQoL compared to those without self-harm. There was also evidence supporting the association between HRQoL and suicidal attempt. However, the results for the association between HRQoL and suicidal ideation remained inconsistent. Additionally, mental health, emotional wellbeing, physical health, oral health, existential wellbeing, and family quality of life were found to be significant domains associated with self-harm or suicidality in young people.

Regarding costs, costs associated with self-harm/suicidal ideation/suicidal attempt in young people mainly focused on hospitalization costs. The mean cost for a person who self-harmed ranged from $1,045 to $16,540 per year. The average cost per youth suicide was $2,299,955 per year. There were no studies conducted in low-and-middle-income countries.

Conclusion:

Studies investigating HRQoL and costs associated with self-harm/suicidality in young people are limited. There were different findings on associations between HRQoL and suicidal ideation and association between HRQoL and suicidal attempt. All studies were cross-sectional and thus the direction of causality between HRQoL and self-harm/suicidality cannot be inferred. Additionally, there was a lack of studies which adopted a societal perspective, were undertaken in low-and-middle income countries contexts and covered all forms of suicidality. Further research, in particular longitudinal studies, are needed to fill these identified gaps in the literature.

Disentangling the Impact of Disease Comorbidity, Symptoms and Complications When Evaluating Health-Related Quality of Life: A Longitudinal Analysis across 27 European and Central Asian Countries

PRESENTER: **Marjan Walli-Attaei**, University of Oxford
AUTHORS: Ramon Luengo-Fernandez, Matthew Little, Alastair Gray, Aldo P Maggioni, Aleksandra Torbica, Adam D Timmis, Radu Huculeci, Panos Vardas, Jose Leal

Background: For many conditions, complications are the main drivers of poor health and reduced quality of life. However, many studies are cross-sectional analyses susceptible to bias resulting from unobserved effects that can only be minimised with the analysis of longitudinal data. This is particularly relevant when deriving the "real" effects of complications and symptoms on quality of life.

Aims: The aim of this study was to estimate the impact of disease-related symptoms, risk scores and complications on health-related quality of life, measured using the EQ-5D-5L, and quality adjusted survival. For our analysis we use atrial fibrillation, the commonest manifestation of cardiac arrhythmia, as an exemplar.

Methods: We used the European Society of Cardiology's Atrial Fibrillation General Registry, a prospective, multinational study enrolling individuals across 27 countries with up to two years of annual follow-up. Participants completed the EQ-5D-5L questionnaire at baseline, 12- and 24-months. These data were converted into EQ-5D utilities using German tariffs. Using a fixed effects model, we estimated the changes in EQ-5D values over time conditional on European Heart Rhythm Association (EHRA) symptom score, thromboembolic risk score (CHA2DS2-VASc), and AF-related complications. Results were contrasted to results using pooled OLS and random effects models.

Results: The registry comprised 10,249 patients with a mean age of 69.3±11.4 years at baseline and 40% women. Approximately 55% (n=5630) of patients reported AF related symptoms. EHRA scores at baseline indicated 36% (n=3653) with mild symptoms and 19% (n=1977) with severe or disabling symptoms. Highest EQ-5D values at baseline were reported in Southern countries (0.86), followed by Northern (0.85), Western (0.85) and Eastern countries (0.79). Results of the fixed effects model showed that ST segment elevation myocardial infarction (STEMI) had the largest decrease in EQ-5D values (-0.068, 95%CI -0.125 to -0.011) of all complications considered. Similarly, experiencing thromboembolic events or new onset or worsening of heart failure were associated EQ-5D values which were 0.050 (95%CI 0.014 to 0.085) and 0.041 (95%CI 0.019 to 0.062) lower, respectively, compared to individuals who did not suffer these complications. Mild (EHRA II) (-0.010, 95%CI -0.017 to -0.003) and severe / disabling symptoms (EHRA III and IV) (-0.057 95% CI -0.069 to -0.045) were significantly associated with lower EQ-5D values compared to no symptoms (EHRA I). The observed effects were found to be robust using the alternative models.

Conclusions: We found the EQ-5D values to be associated with AF-related symptoms and associated complications. The estimated decrements were found to be robust across the use of common panel data models. This suggests estimates of the decrement are associated with AF related symptoms and are not merely the result of unobserved patient heterogeneity.

Societal Preferences for Granting Orphan Drugs Special Status in Reimbursement Decisions

PRESENTER: **Vivian Reckers-Droog**, Erasmus University Rotterdam
AUTHORS: Lucas Goossens, Job van Exel, Werner Brouwer

Objectives: Orphan drugs are increasingly available, but often do not meet cost-effectiveness criteria for reimbursement. Consequently, policymakers are regularly confronted with the dilemma whether to relax the criteria that apply to non-orphan drugs. We examined whether —and why—there would be societal support for such differential treatment.

Methods: We conducted a novel type of discrete choice experiment in a sample of the general population (n=1,172) in the Netherlands. We elicited preferences for reimbursing an orphan drug—given that a similar, non-orphan drug would not be reimbursed because it was not cost-effective—and asked respondents to explain their choices. We used random-intercept logit regression models and inductive coding for analysing the quantitative and qualitative data.

Results: Of the respondents, 36.4% consistently chose *for* reimbursing the orphan drug (mostly because "everyone is entitled to live a healthy life and good quality healthcare") and 17.3% for *not* reimbursing this drug (mostly because "[this] is unfair to patients with a common disease"). The remaining 46.3% made alternating choices and were more likely to choose *for* reimbursing the orphan drug when patients were aged >1 and <70 years, had moderate disease severity, and considerable health gains from treatment.

Conclusions: Our results indicate that there is considerable preference heterogeneity amongst members of the public in the Netherlands for differential treatment of orphan drugs in reimbursement decisions. A large part of the general population supports reimbursing orphan drugs, even when these drugs do not meet cost-effectiveness criteria. Nonetheless, a substantial minority opposes differential treatment on moral grounds.

Equality between Whom? Estimating the Distribution of Lifetime Health for the Purpose of Decision Making Using Individual-Level Approaches to Socioeconomic Stratification

PRESENTER: **Peter Murphy**, University of York

Measuring inequalities in lifetime health is essential to assess the extent of differences and to inform health decision-making. Estimation of gradients in lifetime health, notably quality-adjusted life expectancy (QALE), have largely focussed on index of multiple deprivation (IMD) to categorise the population by socioeconomic position (SEP). Yet, IMD is an area-level indicator of SEP and there are reasons to consider that individual effects on health (such as education or income) may be greater than the corresponding area effects as well as being more attuned to the intervention level. The aim of this study is therefore to estimate gradients in QALE using income and separately education as indicators of SEP and compare the results to those across IMD. This is demonstrated through the use of a case study in which QALE is estimated across SEP groups in England.

QALE is estimated through combining multivariate mortality rates and utility values by age, sex, and SEP using Sullivan life tables, adapted using the Chiang II method. Mortality rates were obtained from the literature and were based on data provided by the Office for National Statistics for 2011 and 2012. Utility values were estimated using EQ-5D results from the Health Survey for England (HSE). To align with the mortality data, the 2011 and 2012 rounds of the HSE were used, based on 20,950 observations. Utility values were estimated using ordinary least squares regression. Multiple imputation was used for missing data and scenario analyses were conducted to explore the impact of alternative SEP groups.

The estimated lifetime utility values decreased with increased age, lower educational attainment, and lower income. The results of the estimation of the social distribution of QALE revealed an absolute gap of 14.08 QALYs between those with no qualifications and those with degree-level qualifications or higher. The gap was less pronounced across income groups with an absolute gap of 9.24 QALYs between the quintiles with the lowest and highest income. Comparison with the results estimated across IMD quintiles reveals QALE gradients appear steeper across education groups but shallower across income quintiles compared to IMD quintiles.

The use of IMD over which to assess health inequalities may be masking important information. Decisions makers should consider this alongside the merits of using area-level approaches to categorising the population if individual-level approaches are preferable. The results of this study are estimated across the population in England but the implications regarding the importance of the question of *Equality between whom?,* are relevant to countries around the world as policy concerns for health equity continue to grow.

9:00 AM –10:30 AM   WEDNESDAY   [Supply And Regulation Of Health Care Services And Products]

Cape Town International Convention Centre | CTICC 1 – Room 2.43
Organization of Healthcare Services

MODERATOR: **Peter Sivey**, University of York

Trends in Better-Paid Employment in Three U.S. Healthcare Occupations 2001-2019

PRESENTER: **Janis H. Barry**, Fordham University

In 2020, fifty percent of U.S. healthcare workers cited pay or better benefits as the reason for leaving their jobs. Burnout, stagnant wages, and dangerous working conditions contributed to healthcare shortages long before the Covid-19 pandemic exacerbated existing labor deficits. In 2019, the full-time U.S. healthcare workforce was comprised of Nurses (27.6%), other Healthcare Practitioners and Technical workers (36.4%), Healthcare Support employees (28%), and Physicians (7.8%).

This study investigates how the incidence of "better-paid" jobs changed between 2001-2019 for 1) Nurses, 2) other Professional and Technical workers (omitting physicians), and 3) Healthcare Support employees. Median and mean wage cutoffs were used to designate the incidence of "better paid" jobs in each of the three occupations for the years 2001, 2004, 2008, 2013, 2017, and 2019. Pay quality over time, as distinguished by gender, age, educational attainment, industry, and race/ethnicity, is compared across sub-groups of workers in the same occupation. The research aim is to identify healthcare market trends in wage inequality, job polarization, and the growth of low-wage jobs. The International Labor Organization (ILO) and numerous researchers have employed similar relative measures to trace job quality tendencies globally.

The American Community Survey (ACS) was analyzed to derive real hourly wages for full-time/ full-year workers aged 18-75. I track the incidence of workers in better-paid jobs by estimating the share of individuals with hourly wages equaling two-thirds or more of the occupation-specific mean or median wage. I generate estimates of the year-over-year percent change in the proportion of workers in better-paid employment between 2001-2004, 2004-2008, 2008-2013, 2013-2017, and 2017-2019. Using test statistic values, I determine whether the year-over-year changes in each occupation are significant.

Results using the preferred cutoff of earning two-thirds or more of the mean wage showed a slight decline in the share of Nurses in better-paid jobs between 2001 (83.9%) and 2019 (80.8%). A significant decrease (3.7%) in the incidence of better-paid nursing jobs occurred between 2004-2008. The share of better-paid employment declined from 68% in 2001 to 63.1% in 2019 among Healthcare Professional and Technical workers. There was a significant 4.7% and 3% better-paid incidence reduction between 2001-2004 and 2017-2019. Lastly, in the Healthcare Support occupation, the incidence of better-paid jobs fell from 76.9% in 2001 to 74.6% in 2019. Yet, year-over-year changes proved insignificant. Notably, 46.7% of those working in Healthcare Support in 2017 earned less than the poverty-level wage of $13.33.

In conclusion, males and non-Hispanic whites consistently had a higher incidence of working in better-paid jobs. The most significant decline in better-paid employment occurred in the other Healthcare Professional and Technical occupation. Here, younger workers under age 35, with limited education, and working in the hospital sector experienced dramatic and significant declines in their year-over-year share in better-paid jobs. Pay predictability, as measured by the risk of falling below the better-paid threshold, is a considerable problem for women, younger workers, workers of color, and many in Health Professional and Technical jobs.

Innovation Capacity and Hospital Resilience : Resumption of Hospital Activities during the Covid-19 Pandemic

PRESENTER: **Noémie Malléjac**, EHESP (The French School of Public Health)
AUTHOR: Zeynep Or

The COVID-19 pandemic has disrupted routine hospital services and led to a massive deprogramming of surgeries. Delayed surgery can have adverse consequences for patients' health in the short and long term. Understanding the determinants of resilience of the healthcare facilities to maintain provision of care is therefore essential. The most resilient hospitals would be those that could reorganise themselves quickly, anticipate major difficulties and adapt to new constraints. Hospitals that support service innovation and new care techniques can be more resilient since implementation of a new technology or service requires flexibility. The objective of this paper is to test the assumption that the most resilient hospitals during Covid-19 would also be those that have more innovative care practices before the pandemic. For this, we compare hospitals that implemented enhanced recovery after surgery (ERAS) protocols in digestive cancer surgery before the pandemic with those which did not. These protocols induce new and lighter surgical and anaesthetic techniques and require organisational innovations for assuring better care coordination before and after surgery. Despite the evidence from medical literature on their benefits for patients (quick recovery, shorter stays), few hospitals have introduced these protocols in France.

Using French hospital data between 2018 and 2021, we computed the monthly surgery volumes of hospital for digestive cancer patients. We also use data from administration to get hospital characteristics as data on the pandemic in France (incidence, number of people in intensive care units). We calculated a categorical variable representing the intensity of ERAS surgery before the pandemic in each hospital in the sample (none, weak, medium or strong), as a proxy for innovative hospitals. Our dependant variable is the difference in surgery volume between the second half of 2020 (after the end of lockdown in France) and the second half of 2019. We first specified a multilevel model where hospitals are nested in local areas to control for differences in local epidemiologic and social contexts as well as individual hospital characteristics (number of beds, public/private). Second, we specified an interrupted time series model using panel data fixed effects to test if there were pre-existing trend differences and control for unobserved invariant heterogeneity between hospitals.

Hospitals that practiced ERAS before the pandemic had greater ability to absorb the surgical backlog due to the lockdown. In addition, the analysis of time trends show that hospitals that intensively practice ERAS had an upward trend in volume before the pandemic but controlling for differences in trends before; they also had the strongest upward trend ex post, illustrating their ability to catch up. The results also confirm the link between the size of hospitals and their capacity to adopt innovations, as already stated in the literature.

Hospitals that were innovative before the pandemic have recovered their activity more quickly in 2020 during the first wave of Covid-19. To improve the resilience of hospitals to anticipate and adapt their organisation to future shocks it is necessary to heterogeneity in medical practice and support adoption of service innovation.

FP Commodity Stockouts and Barriers to Achieving Contraceptive Self-Reliance (CSR) Among Private Providers in Remote, Rural Areas in the Philippines

PRESENTER: **Pura Angela Co**

AUTHOR: Geminn Louis Carace Apostol

BACKGROUND

Family Planning (FP) services in the Philippines are critical in achieving the Sustainable Development Goals and attaining the demographic dividend. FP services are currently concentrated in an overburdened public sector where demand is often outstripped by available supply, and commodity stock-outs are frequent, especially in rural areas. The country's recently enacted UHC law provides opportunities for its more significant number of private providers (~65% of all providers) to address unmet needs for FP and ensure the availability of commodities across a wide methods mix. However, local private providers in remote, rural areas encounter supply chain issues undermining their potential to participate in public-private service delivery networks and ensure equitable access to quality SRH services and commodities, especially for the poor.

METHODS

A mixed-methods, descriptive analytical approach involved three stages: [1] Deployment of a facility survey on FP commodity procurement and supply management to private FP providers in two rural provinces (n=37, 95% of all private FP providers), followed by [2] key informant interviews with purposively selected providers to elicit practices and challenges in procurement and supply management. The facility survey also collected data on the availability of six indicator FP commodities on the day of the visit and in the past three months, supplemented by actual inspection and a review of inventory data. Descriptive data were summarized as means, medians, and frequencies. Manual thematic analysis was applied to qualitative data.

RESULTS

Nearly all private providers (n=34, 90% of all registered providers) reported stockouts in any of the six indicators over the past year. On the day of the visit, the least available commodities were Progestin-only pills (24%), followed by injectables (42%) and long-acting contraceptives such as IUDs (50%), and progestin-only subdermal implants (PSI) (53%). The average % of time-out-of-stock over the past three months is 47.8 days and was most common among LARCs, reflecting a situation where overwhelming demand outstrips available supply. The frequency and duration of stockouts were associated with being located in a remote area. They were most common in lower-level primary care facilities with lower procurement budgets and reliance on manual inventory systems. Interviews further support the quantitative results, with the most common reasons for stockouts being: limited budgets for procurement, insufficient knowledge to forecast client demand, ineffective inventory management practices, and poor access and leverage over suppliers and distributors.

CONCLUSION

Stock-outs reduce client choice, force clients to choose methods they do not prefer, or even result in no method being used. Stock-outs for LARCs are most apparent, despite being more cost-effective than other methods. As the Philippine government looks towards private FP providers to fill in the gaps in public service delivery, they have a critical role in equipping small-scale private providers in rural areas with the necessary capacities and data to competently forecast demand and unmet need for FP, to better access reliable suppliers and distributors, to explore the efficiency gains from pooled procurement mechanisms, to manage inventories effectively, and even to access publicly-procured commodities as they contribute to social good.

Implementation of PM-Jay in India: A Qualitative Study Exploring the Role of Competency, Organizational and Leadership Drivers Shaping Early Roll-out of Publicly-Funded Health Insurance in Three Indian States

PRESENTER: **Swati Srivastava**, Heidelberg Institute of Global Health, Medical Faculty and University Hospital, Heidelberg University

Background: The *Pradhan Mantri Jan Arogya Yojana* (PM-JAY), a publicly-funded health insurance scheme, was launched in India in September 2018 to provide financial access to health services for poor Indians. PM-JAY design enables state-level program adaptations to facilitate implementation in a decentralized health implementation space, enabling the comparison of different implementation strategies, and exploration of the influence of context. This study examines the competency, organizational and leadership approaches driving early PM-JAY implementation in three contextually-different settings.

Methods: We conducted an exploratory qualitative study, applying a framework on implementation drivers (competency, organizational and leadership drivers) to understand factors facilitating or hampering implementation experiences in three PM-JAY models; in all models the State Health Agency (SHA) provided overall oversight. These models differed in how insurance functions were assigned to different functionaries: the **third-party administrator (TPA) model** in Uttar Pradesh used TPAs as intermediaries; the **insurance model** in Chhattisgarh used an insurance company, and the **hybrid model** in Tamil Nadu used both TPAs and insurance company. We adopted a qualitative exploratory approach and conducted 92 interviews with national, state, district and hospital stakeholders involved in program design and implementation in Delhi, three state capitals and two anonymized districts in each state, between February-April 2019. Deductive content analysis and interpretation was used to identify linkages between organizational features, drivers and contextual elements affecting implementation.

Result and Conclusion: Each model used contextually-relevant adaptations to facilitate implementation, including for staff recruitment and facility empanelment, competency development of implementation staff, including beneficiary navigators and support teams, and organizational and facilitative administration. These had considerable scope for improvement in terms of recruitment, competency development, programmatic implementation support and rationalizing the joint needs of the program and program implementers. Hospitals in the TPA and insurance models reported almost no performance assessment activities for PM-JAY and had limited programmatic feedback. Hospitals in all models reported inadequate facilitative support from designated support teams, and limitations in data systems and process guidelines for staff engagement, particularly for beneficiary navigators. These issues were acute in public hospitals. Adaptations, (e.g., higher remuneration for district compared to SHA staff of same designations in order to incentivize recruitment) also created structural barriers in staff interactions and challenged implicit power asymmetries and organizational culture, indicating a need for aligning staff hierarchies and incentive structures. At the same time, specific adaptations like decentralizing staff selection and task shifting (all models), sharing of claims processing between the insurer and SHA (insurance and hybrid model), use of stringent empanelment, accreditation, monitoring and benchmarking criteria for performance assessment and reserving secondary care benefit packages for public hospitals (both in the hybrid model) contributed to successful implementation. Multi-dimensional contextual elements such as institutional memory of previous insurance schemes and underlying state capacities influenced all aspects of implementation. The type of political leadership at state and national levels and complex government bureaucracy hindered adaptive leadership approaches. These variations make comparisons across models difficult, yet highlight constraints and opportunities for cross-learning and optimizing insurance implementation to achieve universal health coverage in decentralized contexts.

Mission "Indradhanush": Universal Access to Vaccination?

PRESENTER: **Arnab Mukherji**, IIM Bangalore

Background: Vaccination, as an early childhood intervention is well-established as an efficacious intervention, and yet not all children, receive it. Children failing to receive vaccination are often poorer in socio-economic status and located in specific communities and in specific hotspots. India accounts for nearly 400,000 vaccine-preventable deaths that stem from full vaccine coverage among children at 65%.

Aim: Using a national program for expanding immunization coverage in India we seek to understand how more intensive vaccination strategies may address the deficits in immunization. The program sought to improve vaccination coverage among children, but targeting districts, communities and socio-economic profile where vaccine coverage had been low.

Method: Exploiting the staggered roll-out of the program, *Mission Indradhanush*, and the exogenous timing of when a national survey is carried out, we show that full immunization and partial immunization increase with more intensive vaccination drives.

Results: We find the districts where the program was rolled out with greater intensity tended to have larger impacts, and there were important gains for socio-economic groups that have historically had low outcomes.

Our result is robust to several robustness checks that include accounting for potential purposive program placement in a selection of districts, secular trends in district immunization rates, testing for parallel trends prior to roll-out, and a propensity score matching to account for selection of program roll-out on observable variables.

Conclusion: Our intention-to-treat difference-in-differences estimate also suggests that policy-relevant variables such as the access to health infrastructure, and intensity of vaccination drives can have a significant impact on early childhood protection from vaccine-preventable deaths.

Using Systems Thinking to Improve the Understanding of the Influence, Importance and Interrelationship of Sub-National Stakeholders Involved in the Accountability Framework of a Pro-Poor Health Financing Scheme in Nigeria

PRESENTER: **Abdu A Adamu**, Abt Associates

AUTHORS: Bolanle Bukola Olusola-Faleye, Charles Aninweze, Deji Bodunde, Umar Ahmed, Gaza Gwamna, Abdulkadir A Shinkafi, Jemchang Fabong, Andrew Murphy, Ekpenyong Ekanem, Elaine Baruwa

BACKGROUND

Basic Health Care Provision Fund (BHCPF) is a pro-poor health financing scheme of Nigeria's federal government that is disbursed directly primary health facilities at sub-national level. To maximize allocative and technical efficiency, multiple stakeholders are required to collaborate to ensure accountability. However, at sub-national level, several state and non-state stakeholders exist but their importance and influence on BHCPF accountability is not clear. Furthermore, the way these stakeholders interact with each other is dynamic but the extent of the complexity of their relationship is poorly understood. The USAID-funded Local Health System Sustainability Project (LHSS) works in Zamfara, Plateau and Nasarawa State to strengthen BHCPF accountability mechanism. Using systems thinking can improve understanding of the complex interrelationship between these stakeholders and this knowledge can inform the design of a more fit-for-purpose accountability framework that reflects sub-national context.

OBJECTIVE:

The study objective was to describe the power and influence of multiple stakeholders that are involved in BHCPF accountability mechanisms at sub-national level and describe their complex interrelationship using system thinking approach.

METHODS

We conducted a case study of BHCPF accountability in Nasarawa, Plateau and Zamfara States using information obtained during the health financing landscape analysis conducted at the early implementation phase of the LHSS program between August and September 2022. Stakeholders were mapped, and the identified actors were used to build a stakeholders analysis diagram. Based on elicited responses, an importance-and-influence graph was constructed to analyze the power of multiple state and non-state actors that are involved in BHCPF accountability. Then, causal loop diagram was used illustrate the interplay between stakeholders.

RESULTS

A total of 15 stakeholders were identified, three are external, and 12 are internal. The external stakeholders are affiliated with the federal government, and they include the Ministerial Oversight Committee (MOC), NPHCDA and NHIA. While the internal stakeholders comprise of a broad range of independent state and non-state actors within the states. The level of power of these stakeholders varies. The MOC, NHIA and NPHCDA were deemed to have high importance and high influence because they serve as the regulators of the fund. Also, the Executive Governors of the states were found to also have high influence and high importance because they are responsible for approving the counterpart funding, and their buy-in is required for smooth implementation. The power of the State Oversight Committee (SOC) and the two gateways at state-level are aligned because they are primarily responsible for direct implementation. Non-state actors like the beneficiaries of the program are important but their influence is low. The causal loop diagram showed the complex interrelationship between sub-national stakeholders as they collaborate for accountability.

CONCLUSION

Applying systems thinking approach provided a more holistic understanding of how multiple state and non-state actors with varying degree of importance and influence interact to ensure accountability in the implementation of BHCPF. The LHSS program is supporting federal and state institutions to use these findings to refine and harmonized an accountability framework that is inclusive and relevant at sub-national level.

9:00 AM –10:30 AM   WEDNESDAY   [Supply And Regulation Of Health Care Services And Products]

Cape Town International Convention Centre | CTICC 1 – Room 2.63

Challenges of Ageing Populations: Optimizing Access, Costs and Quality of Long-Term Care Services

MODERATOR: **George Stoye**, Institute for Fiscal Studies

ORGANIZER: **Marlies Bar**, Erasmus University Rotterdam

DISCUSSANT: **Rong Fu**, Waseda University; **Karinna Saxby**, Monash University; **Antoine Marsaudon**, IRDES

Impact of Regional Variation in Excess Demand for Public Nursing Homes on Price and Quality: Evidence from France

PRESENTER: **Anne Penneau**, Institute for Research and Information in Health Economics

Context. The delay to enter public nursing homes vary according to French areas due to the decentralized supply of long-term care managed by local authorities. Local nursing homes supply depend on local policy endorsing public and private-for-profit facilities as well as the attractiveness of the geographical market for facilities and explains the variations in excess demand for public places. In the US, Scanlon suggested that when there is excess demand private facilities will gain market power that would allow them to increase their prices without increasing their quality. This article aims to test empirically the Scanlon theory in the French context by measuring the relationship between the risk of excess demand for public facilities and the quality and price of accommodation for residents (in for-profit and not-for profit facilities separately).

Method. We use a unique database matching a representative sample of patients in RACF, with claims data from the health insurance database from 2014 to 2019. We match this with a survey of RACFs to have their profile, funds, and accommodation prices, and to calculate quality indexes (building, staffing, process, outcomes). The risk of excess demand for not-for profit facilities in the French residential areas is measured by an index that reflects the accessibility of RACF's and the concentration of for-profit facilities in one hour drive from the residential area. Instrumental variable estimations are used to account for the endogeneity of excess demand with accommodation prices and quality of facilities.

Results. The results confirm Scanlon's theory that for-profit accommodation prices are higher, and quality is lower in French territories where the risk of excess demand for public facilities is high. The relationship between excess demand and quality is not observed on the

more easily observable dimensions of quality such as the building or the staffing level while it is associated with lower care outcomes and process quality indexes.

Conclusion. Geographical inequalities in public RACF across French regions create excess demand for public facilities and increases accommodation prices paid by residents without improving quality. Better regulation of the supply of for-profit facilities in French local areas and more equal public RACFs supply in France would reduce out-of-pocket costs for residents and improve quality.

Delayed Admissions to Nursing Homes: Identifying the Impact on Hospital Care Use in the Netherlands

PRESENTER: **Marlies Bar**, Erasmus University Rotterdam
AUTHORS: Pieter Bakx, Nigel Rice, Rita Santos, Luigi Siciliani, Bram Wouterse

We study negative spillovers of delayed nursing home admissions on urgent hospitalisation rates. Using Dutch administrative data at the individual level, we exploit plausibly exogenous variation in within-region congestion for admission to nursing homes to account for a potential selection bias in delays. Our instrumental-variable approach suggests that delaying a nursing home admission by one month increases the risk of an urgent hospitalisation by 1.4 percentage points. The effect is twice as large for individuals with dementia. We find similar effects when we restrict hospitalisations to falls and the number of days spent in a hospital. This implies that the returns of policies and investments targeted at improving access to nursing homes can spill over to the hospital sector.

Exploring Preferences and the Willingness to Pay for a Dementia Care Program: A Discrete Choice Experiment in Australia

PRESENTER: **Sabrina Lenzen**, The University of Queensland
AUTHORS: Brenda Gannon, Richard Norman, Sally Bennett

Background: It is estimated that 487,500 Australians are currently living with dementia and 1.6 million are involved in the care of someone living with dementia. Dementia is a serious chronic health condition and is the second leading cause of death for Australians. Despite its relevance, many community-residing persons with dementia and their caregivers have unmet dementia-related needs for care, services, and support. A recent formal public inquiry into issues related to aged and dementia care in Australia recommended improving dementia care standards and mandatory dementia training for people engaged in dementia care.

Objective/Aim: In this paper, we examine preferences for the design and the willingness-to-pay (WTP) of an occupational therapy program for people with dementia in Australia using a discrete choice experiment (DCE). We use a number of choices between two design options to elicit preferences for different program characteristics, including the primary outcome of the program, focus, delivery mode, and number of sessions.

Methods: A discrete choice experiment was administered in a representative sample of the Australian adult population. The online survey approach asked a series of hypothetical choice tasks and allowed estimation of the relative value of different aspects of care as well as the overall willingness to pay for the program. Data was collected from a total of 1100 people aged 18 and older who were residing in Australia. The analysis considered the average Australian, and then also explored the level of preferences for people who have experience with dementia care.

Results: Using several model specifications, we find there is strong population preference for the program to be delivered in person, rather than online. People also place a high value on improving independence and dementia-related behaviour. The mean WTP varied across scenarios with higher values for in-person sessions, design options with more sessions, and those that went beyond improving safety during everyday activities. Respondents in this paper showed empathy and understanding towards people with dementia through their willingness to pay for this program. The overall willingness to pay for the program is between $1,600-$2,315, and thus higher than its actual costs. People are willing to pay even more if all sessions are to be delivered in person and for an increasing number of sessions.

Conclusion: Our findings are relevant for the design and implementation of occupational therapy programs for people with dementia or other vulnerable groups of society. The general Australian population values the anticipated implementation of the dementia care program provided by an occupational therapist. The results of this study and the strong population preferences should be considered when designing the program.

9:00 AM –10:30 AM   WEDNESDAY   [Health Beyond Health Care Services: Social And Related Determinants]

Cape Town International Convention Centre | CTICC 1 – Room 1.44
Parental Investment in Child Health [ECONOMICS OF CHILDREN'S HEALTH AND WELLBEING SIG]

MODERATOR: **Audrey Laporte**, University of Toronto

Mothers' Level of Education and Infant Health. Causal Effects Measured By Using the Introduction of a School Reform in Norway.

PRESENTER: **Jostein Grytten**, Universitetet i Oslo
AUTHOR: Irene Skau Sr.

Background: Several studies document a positive association between mothers' level of education and infant health. However, this association may not reflect a causal relationship. Most studies in which causal effects have been estimated are from developing countries. In these studies, beneficial effects have been identified. There are few studies from high-income countries, and the results from these studies are conflicting.

The aim of the present study was to estimate the causal effects of education on infant health in Norway. In Norway, health services are financed through taxes, and everyone has free health care at the point of delivery and equal access given equal need. All hospitals, where nearly all deliveries take place, are publically owned and financed. The prenatal care programme is comprehensive and universal. One might expect that with such a large public involvement in health care, the effect of mothers' level of education on infant health would be small or non-existent.

Methods: During the period 1960-1972, all municipalities in Norway were required to increase the number of compulsory years of schooling from seven to nine years. We used this reform as the instrumental variable to create exogenous variation in the individual's number of years of schooling (the first stage regression). Since municipalities implemented the reform at different times, we have both cross-sectional and time-series variation in the instrumental variable. Thus we could estimate the causal effects of mothers' number of years of schooling on our outcome variables (the second stage regression) by controlling for municipality fixed effects and trend variables.

The education data were combined with population register data from the Medical Birth Registry and Statistics Norway. The Medical Birth Registry includes the whole population of mothers who give birth. Our sample was restricted to mothers born between 1947-1958, who had 9 years education or less.

Our key outcome variables were: low birthweight (<2500g), low Apgar score (<8), preterm birth (before 37 weeks of gestation) and death of the baby or foetus.

Results: The first stage regression estimate showed that the reform led to an increase of 0.84 years of schooling (F-value=1024). The second stage regression estimates showed that one year of additional schooling led to a decrease in the probabilities of having a baby with low birth weight, low Apgar score, and being born preterm ($p<0.05$). For mortality, all the coefficients were small and not statistically significant. We carried out several robustness tests such as balancing tests and placebo reforms (leads and lags). The results from these tests supported our main findings.

Conclusion: Mothers' level of education has a positive influence on birth weight, Apgar score and pre-term birth. These findings show that there are inequalities for babies who survive. However, mothers' level of education has no relationship to mortality of the foetus or the child. It may be that the infant mortality rate is so low that any further reduction is not possible. This may explain why we found no effect of mothers' level of education on mortality of the foetus or the child.

The Changing Effect of Family Income on Mental Health from Early Childhood to Adolescence: A Longitudinal Study from the UK

PRESENTER: **Murong Yang**, University of Oxford
AUTHORS: Claire Carson, Mara Violato

Background

Existing research suggests that children from low income families are likely to have poorer mental health than those from more affluent families. However, it is not clear whether the impact of family income on child mental health varies across childhood and adolescence. Family income is associated with many aspects of children's lives, which is important to account for in empirical analyses. Estimates of the income gradient may also be further biased by unobserved heterogeneity. This study aims to investigate the relationship between family income and mental health problems from early childhood to adolescence in the UK and its potential variations with age.

Methods

Using data from the UK Millennium Cohort Study, child mental health was measured by the Total Difficulties Score (TDS), Internalising and Externalising subscales, all derived from the Strengths and Difficulties Questionnaire (SDQ) at ages 3, 5, 7, 11, 14 and 17 years. Mental health outcomes were standardised to aid direct comparison. Family income was derived from parent self-reported answers and was operationalised as lagged transitory income in its logarithmic form. To control for unobserved heterogeneity, panel data analysis using linear fixed-effect models was conducted on an empirical model based on the Grossman health production function. Known confounders were controlled for, and potential mediators were explored in the analysis. Survey weights were used to adjust for attrition and multiple imputation was conducted to account for item-non response.

Results

The sample included 5667 children present at all 7 survey years. Mean value of equivalised annual family income ranged from £27,131 to £30,892. Results indicated that higher family income was associated with lower child mental health symptoms, but the magnitude of the effect varied with age. After adjustment for confounding and potential mediating factors, the effect of income on overall mental health (TDS) was statistically significant at 11 and 14 years old and was the largest at 14, where a 1% increase in family income was associated with a decrease of 0.1 of a standard deviation in TDS (b=-0.113, SE=0.024, p<0.001). However, there was little evidence of an association at 3, 5, 7 and 17 years. The protective effect on internalising subscales increased as children grew older and was the largest at 17 years (b=-0.144, SE=0.040, p<0.001). For externalising problems, there was evidence of an association at 3, 11 and 14 years and the coefficient was largest at 14 years (b=-0.117, SE=0.020, p<0.001). Poor maternal mental health had a consistent independent effect on overall mental health, internalising and externalising problems.

Conclusions

A significant child mental health-income gradient remains in the UK, even after controlling for known confounders and unobserved heterogeneity. However, the gradient varies with children's age, being larger in adolescence than childhood, with increasing importance of internalising symptoms. Our findings suggest that the timing of policy intervention is important for reducing income-related child mental health inequalities. Income redistribution in the late childhood and early adolescence is more likely to reduce overall mental health symptoms, although prevention in the early years may in fact help reducing later severe problems.

Is Mother's Education Essential to Improving the Nutritional Status of Children Under 5 in Côte D'ivoire?

PRESENTER: **Sonia-Angeline Wolo Gbratto-Dobe**, Université Félix Houphouet Boigny d'Abidjan
AUTHOR: Hugues Beyet Segnon

Background

The literature shown that various indicators of socio-economic status are associated with children's nutritional status. Mothers' education has been underscored as one key factor that determine child nutritional status, in low-and-middle income countries. So far, little is known about the role of maternal education to the occurrence of child undernutrition in Côte d'Ivoire, as well as the interrelatedness of other socio-demographic factors. So, this paper analyze the role plays by mother's education on the nutritional status of children under 5 years old. More precisely, (1) verifies whether there is evidence of the key role of maternal education for child nutritional status; (2) explores the possible interrelatedness of other socio-demographic factors; (3) tests whether there is difference in the influence of these variables on middle and long-term indicators of child nutrition.

Methods

This study was performed using data from 10,212 women aged 15 to 49 and 8,743 children aged 0 to 59 months, of the MICS 5 conducted in Côte d'Ivoire in 2016. We measured child nutritional status with their height-for-age Z-score (HAZ) and weight-for-age Z-score (WAZ), according to the WHO standards. HAZ reflects stunting while WAZ, underweight. The covariates of maternal education include parental income, household assets, household health environment and education environment. We estimated two models, one without and one with the covariates, for HAZ and WAZ. Multilogistic estimates were carried out using Stata 17. Finally, we compare the results obtained for the two nutritional indicators.

Results

In line with the existing literature, we find that children whose mothers have at least primary education are less at risk of having moderate stunting [RRRp : 0.845 (95%CI : 0.731 ; 0.976) ; p-value<0.05] / [RRRs+ : 0.650 (95%CI : 0.533 ; 0.794) ; p-value<0.001] as well as moderate underweight [RRRp : 0.858 (95%CI : 0.720 ; 1.022) ; p-value<0.10] / [RRRs+ : 0.695 (95%CI : 0.545 ; 0.886) ; p-value<0.05]. In addition, children whose mothers reach a higher level (secondary and above) are less at risk of having severe stunting [RRR: 0.431 (95% CI: 0.310; 0.601); p-value<0.001] as well as severe underweight [RRR: 0.609 (95% CI: 0.390; 0.951); p-value<0.05]. Adjustment by others significant determinants of the child nutritional status (child's sex, child's age, paternal education, household living environment, household wealth index, and mother access to media) slightly increases the impact of maternal education on stunting and underweight. Finally, there is no statistically significant difference in the effects of the mother's education and most of these covariates on the two indicators.

Conclusion

These results confirm the essential role of maternal education in the strategy to fight against child malnutrition during his first 5 years of life. In addition, policy-makers should consider the rural environment and access to media as factors, among others, that can promote better child nutrition or reinforce the effect of maternal education on child nutritional status. Otherwise, this study opens a further space to explore the presence of the externalities generated by paternal education, rural environment and access to media.

Parental Gender Attitudes and Child Development

PRESENTER: **Edith Aguirre**, Institute for Social and Economic Research, University of Essex
AUTHORS: Michaela Benzeval, Aja Murray

Background. Parental characteristics play a fundamental role on children's achievements. Studies have shown that parents' education, income, health, amongst others, have an undeniable short- and long-term effect on their children's social, economic and health outcomes. We provide new evidence about the influence of other parental traits, not very often acknowledged, on child development outcomes. Our analysis is centred on parental gender attitudes, adding to the analysis two other parental traits, environmental behaviour and political engagement, to confirm the predictive power of parental gender attitudes.

Methods and Analysis. Using the UK Household Longitudinal Study (UKHLS), child development is measured by parent reporting of the Strengths and Difficulties Questionnaire, administered for children aged 5 and 8 in UKHLS. It includes five subscales measuring emotional symptoms, conduct problems, hyperactivity, peer relationship problems and prosocial behaviour. The scale started to be collected in wave 3, hence, we have pooled together data from waves 3 to 11. To examine the effect of parental gender attitudes on child development, structural equation models were estimated separately for children aged 5 and children aged 8. Models were also run separately for mothers and fathers. We explore the role parental behaviour plays as an intermediary between parental gender attitudes and child development.

Results. We find that children exhibit less emotional symptoms and are more prosocial when mothers have more egalitarian gender values, with stronger effects when children are younger. Every standard deviation (SD) unit increase on maternal egalitarian gender attitudes predicts a 0.03 SD decrease in emotional symptoms at age 8, and a 0.04 SD decrease at age 5. Similarly, every SD unit increase on maternal egalitarian gender attitudes predicts a 0.04 SD increase in prosocial behaviour at age 8, and a 0.06 SD increase at age 5. It is also observed that children have fewer peer relationship problems at age 5. No statistically significant mediation effect is observed passing through maternal behaviour. A total effect of fathers' gender attitudes on prosocial behaviour at age 8 and on peer-relationship problems at age 5 is observed, but after controlling for paternal behaviour it completely mediates the effect of fathers' gender attitudes on child development in all the SDQ scales. Environmental behaviour, neither from the mother nor from the father, show a clear statistical pattern. Interestingly, the political engagement index presents statistically significant direct effects on several dimensions. When fathers have stronger political engagement, children have fewer conduct problems, exhibit less hyperactivity/inattention problems and are more prosocial at age 8; and have fewer peer relationship problems and lower total difficulties scores at both ages. Children also exhibit less hyperactivity/inattention problems when mothers have stronger political engagement at both ages. In addition, children have fewer emotional symptoms, fewer conduct problems, less hyperactivity/inattention and less peer relationships problems if parents are older, if mothers have higher educational attainment, mothers are married and mothers are employed. In all the specifications, girls present less conduct problems, less hyperactivity/inattention, less peer relationship problems and are more prosocial, than boys.

9:00 AM –10:30 AM   WEDNESDAY   [Demand & Utilization Of Health Care Services]

Cape Town International Convention Centre | CTICC 1 – Room 1.63
Health Care Price Transparency and Patient Cost-Sharing

MODERATOR: **Ashley Leech**, Vanderbilt University

ORGANIZER: **Michal Horný**, Emory University

DISCUSSANT: **Kevin Griffith**, Vanderbilt University

Effect of Capping Insulin Out-of-Pocket Costs on Insulin Utilization

PRESENTER: **Kelly E Anderson**, University of Colorado
AUTHORS: Nathorn Chaiyakunapruk, Eric Gutierrez, H Weston Schmutz, Diana Brixner, R Brett McQueen

Type 1 diabetes (T1D) and type 2 diabetes (T2D) impact nearly 30 million Americans. For both T1D and T2D patients, tight glycemic control can reduce the risk of microvascular (e.g., blindness, lower extremity amputations, etc.) and macrovascular (e.g., myocardial infarction) complications, ultimately reducing lifetime health care costs and improving quality of life. To achieve tight glycemic control, patients rely on various medications and different formulations of insulin. In the United States, list prices for insulin more than tripled from 2007 to 2018. While the list price is not ultimately the amount paid by an insurer or the amount received by a manufacturer, the list price is often used to determine cost sharing amounts for patients. In response to the high out-of-pocket costs for insulin products, Colorado passed legislation to cap the out-of-pocket cost of insulin at $100 per month for state residents enrolled in commercial plans subject to oversight by the state health insurance commission.

Our overall objective is to estimate the effect of Colorado's insulin out-of-pocket cap policy on insulin utilization among T1D and insulin-using T2D patients. To do so, we use all-payer claims data from Colorado and Utah to conduct a difference-in-differences analysis. For our primary analysis, we compare the difference post- versus pre-policy change in the group exposed to an insulin out-of-pocket cap (Colorado pre-policy from January 1, 2018 – December 31, 2019 and post-policy from January 1, 2020 – December 31, 2020) and the difference post-policy change versus pre-policy change in the unexposed group (Utah unexposed from January 1, 2018 –

December 31, 2020). As a secondary analysis, within Colorado we conduct a difference-in-differences analysis comparing commercial enrollees in fully-insured plans (subject to the out-of-pocket cap) to commercial enrollees in ERISA self-insured plans (not subject to the out-of-pocket cap).

In preliminary analyses of the Colorado data, we find evidence that insulin utilization increased 3.1% among commercial enrollees with T1D and 5.9% among insulin-using commercial enrollees with T2D following the implementation of the out-of-pocket cap. While Colorado was the first state in the US to implement such a policy, more than a dozen states and Medicare have followed suit, making it important to understand the effects of legislative/regulatory caps on insulin out-of-pocket costs.

Absent Transparency, What Can We Actually Say about Drug Prices? The Price of a Single Molecule from 2005-2022 Using Numerous Publicly Available Data Sources in the US

PRESENTER: **Angela Liu**, Johns Hopkins Bloomberg School of Public Health
AUTHORS: Joseph Levy, Nathan O'Hara

Introduction

Drug pricing research requires meaningful estimates of actual transaction prices (net prices) that payors and patients pay to obtain pharmaceuticals. While list and retail prices paid at point of sale continue to be widely used, there is widespread understanding that these estimates are flawed. However, "how flawed" is difficult to quantify owing to a constantly evolving market, numerous supply chain intermediaries, and industry-wide trends that incentivize the inflation of list compared to net prices (i.e., rebates).

Methods

To explore this issue, we create an illustrative example using prices for a single molecule obtained via numerous public sources over a long time horizon 2005-2022. This molecule, Enoxaparin Sodium (Brand Name: Lovenox) has several characteristics that make estimating its net price complex 1) It is both physician-administered and pharmacy-dispensed 2) it is injectable and exhibits non-linear pricing per unit 3) generic competition started in 2011, with both branded version and single source generic continuing to experience considerable marketshare for 5 years.

We derive price estimates from multiple sources across different time periods (owing to data availability). The goal is to highlight what can and cannot be known about transaction prices using: Average Sales Price (ASP), Medicare Claims, Private Insurance Claims, estimates of rebates (using the SSR Health Brand Net Price Tool), Veterans Affairs (VA) Federal Supply Schedule, and recently published Hospital and Payer price transparency reports. Using NDC and J-Code specific matches, observable prices are converted to 10mg of the molecule, we estimate prices, by all metrics, as well as patients out-of-pocket by insurance type, over time. Using these findings and the SSR Branded Price Tool as a proxy for actual transaction prices, we suggest reasonable bounds to estimate the cost of the molecule over time, based on VA prices and ASP+6% as lower and upper bounds.

Results

These results trace the price of the molecule, in 2005 the list price of the brand was $6.83 per 10mg, and its Average Sales Price (ASP) was $5.16 , with minimal rebates. Generic competition began in 2011, saw the ASP to drop from $6.835 to $1.565 in 2014, a 77% reduction. By 2022q1 the ASP for the molecule fell to $0.672 (down 91.7%), however, depending on what price metric one selects, unit cost estimates range from $0.1836 (Veterans Affairs Big 4 Price) to $3.954 using NADAC. In 2022 we estimate the branded version has over 87% rebates. Out-of-pocket costs have decreased at a slower rate than estimated net, 29.3% in privately insured and 32.1% in Medicare from 2012 – 2022.

Discussion

This case study and subsequent bounding recommendations can be applied to other drugs to estimate net prices for pharmaceuticals in the US. Our results highlight a growing disparity in publicly available numbers and likely transaction prices, that is exacerbated by delivery channels, such as physician-administered and a preference for high rebate drugs among payers. While our recommendations may improve estimates of transaction prices over time, lack of transparency remains a significant obstacle to meaningful research around actual transaction prices and health

Differences in Prices Negotiated By the Same Insurer across Private- and Public-Sponsored Markets: Evidence from Hospital Price Transparency Data

PRESENTER: **Mark K. Meiselbach**, Johns Hopkins Bloomberg School of Public Health
AUTHORS: Yang Wang, Jianhui Xu, Ge Bai, Gerard Anderson

Over 150 million people in the United States are enrolled in commercial health plans sponsored by their employers. In this market, premiums and enrollee cost exposure have steadily risen, driven by high and increasing prices for services. Meanwhile, Medicare Advantage (MA), the privately managed segment of the publicly sponsored insurance program for seniors, has rapidly grown and now insurers roughly half of all seniors in the US. On average, MA plans have two to three times lower prices than commercial plans, even though they are mostly offered by insurers that offer commercial plans. However, prior work has not investigated the price differential

between MA and commercial plans within the same insurer. The objective of this study is to investigate the difference in prices between MA and commercial plans negotiated by the same insurer, with the same hospital, for the same service. Further, we document this price differences vary between different services, insurers, states, and investigate drivers of differences.

We use federally mandated price transparency data contributed by hospitals as of September 2022. We focus on hospital facility prices for 37 procedures with the highest disclosure rates, including 32 "shoppable services" (e.g., joint replacement) and 5 services for emergency department (ED) visits. In total, our data are comprised of 1.7 million unique insurer-plan-hospital-procedure observations. Services are further divided into surgical procedures, imaging, lab tests, and ED visits. We summarize overall prices and within-insurer price ratio of commercial-to-MA prices across the service categories, insurers, and states. To investigate drivers of the within-insurer price ratio, we estimate multivariable Poisson regression models for each service category with robust standard errors.

On average, we find that prices in commercial plans are 2-3 times higher than MA prices for the same procedures ($4,005 vs. $2,588 for surgical procedures, $971 vs. $397 for imaging, $65 vs. $28 for lab tests, and $811 vs. $390 for ED visits). Within an insurer, negotiating prices for the same service with the same hospital, the price ratio ranges from 5.1 on average for lab tests, to 3.7 for imaging, 2.9 for ED visits, and 2.3 for surgical procedures. All major insurers negotiated prices with hospitals that were over 2 times higher for their commercial plans compared their MA for the same procedures. Price ratios were generally lowest in states with low levels of MA penetration (i.e., most seniors enrolled in traditional Medicare), including 1.06 in Alaska, 1.67 in Utah, and 1.86 in North Dakota. In multivariable regression analysis, we found that larger within-insurer ratios were found at larger non-profit hospitals and in large national payers. Lower ratios were found in hospitals operating in rural areas (all p-values < 0.05).

High prices in the commercial market are a major issue in the US. We find that the same insurers are negotiating higher prices in this market than they do for their publicly-sponsored plans. This suggests that different incentive structures in MA, such as price benchmarking and a capitated payment system, may translate to lower prices in this market compared to commercial markets.

Service Uncertainty and the Financial Risk in Childbirth Episodes

PRESENTER: **Michal Horný**, Emory University
AUTHOR: Neeti Patel

Background: Patients' ability to understand and reliably anticipate the cost of care is critical for making informed decisions regarding provider and treatment alternatives and for financial planning. Despite several recent policies aimed at improving the discoverability of health care prices, meaningful information on the total cost of care is difficult for patients to obtain before receiving care due to various health care and systemic factors. One of the key factors is the difficulty of predicting which services will comprise an episode of care. Consequently, pre-case cost estimates are often incomplete and unreliable. This is a fundamental problem of existing price transparency initiatives in the U.S. that disclose health care prices to patients at the service level.

Objective: The objective of this research was to quantify the financial risk in childbirth episodes stemming from the ex-ante uncertainty in the sets of services that patients would receive. Childbirth is a common, expensive, and "shoppable" health-related episode experienced by 86% of women during their lifetimes and by over 3.6 million U.S. women annually.

Methods: The analytic unit in this study was an episode of care for childbirth consisting of a hospital stay of the birthing person and potential hospital admissions of newborns. We identified these episodes of care in administrative claims from the 2019 IBM$^{®}$ MarketScan$^{®}$ Commercial Database and recorded all services provided during each episode. To account for price variation across and within providers, we calculated the standardized cost of a childbirth episode as predicted values using the least absolute shrinkage and selection operator (LASSO) regression model with service indicators as the only predictors. Subsequently, we estimated the financial risk in childbirth episodes as the variation in the standardized cost of a care episode that are not explained by patient choice (e.g., elective Cesarean section, post-partum sterilization). In a sensitivity analysis, we estimated the amount of variation further explained by patient comorbidities and the choice of provider.

Results: We analyzed 119,692 childbirth episodes. Of them, 41,425 (34.6%) involved Cesarean section, and 6,180 (5.2%) involved post-partum sterilization. The median standardized cost of childbirth was $15,568. There was little variation in the standardized cost in the bottom three quartiles of childbirth episodes conditional on the mode of delivery: the first and 75th centiles were $14,343 and $15,568 for vaginal delivery; and $18,751 and $23,495 for Cesarean section, respectively. However, the distribution of the standardized cost of a childbirth episode had a long right tail with the 95th centile at $57,075. Patient choice explained only 2.27% of the variation in the total standardized cost of a childbirth episode.

Conclusions: Patients seeking maternal care face substantial financial risk stemming from the variable sets of services comprising each episode, such as due to unexpected complications or provider practice style. This risk and consequent economic burden for patients cannot be addressed by service-level price transparency. Policymakers should consider other approaches (e.g., episode-based patient cost-sharing) to help patients who bear portions of the cost of their care to better manage the financial aspect of receiving maternal care.

Cape Town International Convention Centre | CTICC 1 – Room 1.64
Health Insurance, Accessibility, and Healthcare Utilization

MODERATOR: **Giuliano Masiero**, Università della Svizzera italiana

Heterogeneous Effects of Information for Health Insurance Decision Support – a Data-Driven Analysis of Experimental Data

PRESENTER: **Ana Cecilia Quiroga Gutierrez**, University of Lucerne

Previous research has demonstrated that individuals often struggle to make health insurance choices that match their own preferences and needs. One reason for this is the fact that health insurance is a complex product that can be difficult to navigate. Another cause for this could be the lack of adequate Health Insurance Literacy (HIL), referring to the necessary knowledge and skills to select and use the right health insurance for themselves or their families. The provision of personalized information for decision support in the context of health insurance has been shown to benefit consumers, helping them make better choices for themselves. Nevertheless, personalized information might benefit some individuals more than others. For example, vulnerable groups might be less likely to look for and use information even when available. Additionally, once information is accessed, individuals with different characteristics might benefit from it to various degrees. The aim of this study is to evaluate the heterogeneous effects of information provision for health insurance decision support. We analyze data from a computer laboratory experiment that simulates aspects of the Swiss health insurance system. Participants go through rounds where they can change their current health insurance contract, earn and lose points based on a fixed income, answer trivia questions, pay health insurance premiums, and pay deductibles based on a fixed risk profile that determines potential adverse events with different costs. Using different types of random forest analysis, we estimate heterogeneous treatment effects for accessing personalized information when multiple formats are available and the conditional average treatment effects of information on health insurance choice quality. During the experiment, participants with lower levels of Health Insurance Literacy and less accumulated wealth were less likely to access personalized information when multiple sources were available. Simultaneously, these participants were also found to benefit the most from personalized information, especially when presented using a graphical format, reducing their expected costs significantly. These results hold important implications for policy and practice. Integration of graphical elements into health insurance choice environments can help individuals make better-informed choices. Additionally, concerted efforts should be made to ensure vulnerable groups have access to the information and support they need.

Strategies for Expanding Health Insurance Coverage to Informal Sector Workers in Middle-Income-Countries

PRESENTER: **Audrey Mumbi**, KEMRI-Wellcome Trust Research Programme

Background: Prepayment mechanisms such as health insurance schemes have been recommended as a strategy for making progress towards Universal Health Coverage, (UHC). The informal sector makes up most of the economy particularly in Low- and Middle-Income Countries (LMICs). Informal sector workers (ISW) tend to fall through the gaps of UHC due to the nature of their work. With the growing global commitment to achieve UHC, countries need to ensure that ISW are protected from financial hardship through expanding prepayment health financing mechanisms, including tax funding and health insurance it is essential to ensure that informal sector workers are adequately covered.

Objective: This systematic review sought to synthesize literature on the strategies taken to expand health insurance coverage to ISW in middle-income countries.

Methods: A systematic literature review was conducted by searching four electronic databases, namely Medline, Embase, Econ Lit, Scopus, and PubMed without restriction on the publication date. The studies were assessed based on inclusion and exclusion criteria, while the quality was assessed using critical appraisal tools.

Results: A total of 3,207 papers were identified; 19 studies met the inclusion criteria. Of the 19, three were conducted in Africa, one in Central America and 15 in Asia. Three strategies were identified namely, subsidization of social health insurance premiums, the introduction of health insurance programs targeting informal sector workers: and offering health insurance through public-private partnerships. However, evidence in this review shows that in many settings, governments attempt to expand health insurance coverage to informal sector has achieved limited success.

Conclusion: Extending prepayment health financing mechanisms to the informal sector workers is an essential step in a country's UHC path, especially in LMICs. As governments invest in strategies that enhance health insurance coverage among the informal sector workers, it is important that these strategies are carefully designed to suit the country's context and maximize financial risk protection.

Role of Personal Risk Attitude in Willingness to Pay for Private Health Insurance in China: A Discrete Choice Experiment

PRESENTER: **Fenghang Li**, Wuhan university
AUTHORS: Nuo Chen, Jing Bai, Meiling Ren, Jian Wang, Jialong Tan, Shaonan Kong

Abstract

Background: China is promoting private health insurance schemes to lower the financial burden on both patients and social security system. However, little evidence exists on the willingness to pay for private health insurance from demand-side, let alone the impact of personal risk attitude on it.

Objectives: This study aims to explore willingness to pay of residents with different risk attitudes for a government-involved private supplementary health insurance in China.

Methods: A discrete choice experiment was conducted during October 2021 in China. Respondents were displayed with 13 hypothetical choices of private health insurance. Each choice set was described by six attributes: government involvement, premium, benefit package, deductible, reimbursement ratio and compensation for pre-existing conditions. The risk attitudes were measured by a scale designed by Hsee. According to the risk preference index, the residents were divided into risk seeking, neutral and averse. A mixed logit model was estimated to explore the impacts of risk attitudes on the respondents' willingness to pay for the different private health insurance attributes.

Results: Among the 751 respondents, 403 (53.7%) were aged 18 to 44 years and 464 (61.8%) were female. 524 (69.8%) were risk averse, while 167 (22.2%) and 60 (8.0%) were risk neutral and seeking, respectively. Risk-averse and risk-neutral respondents all had a strong preference for government involvement, low premium, extensive benefit packages, high reimbursement ratio and compensation for pre-existing conditions, while were indifferent to the attribute of deductible. Risk-averse respondents showed a more pronounced willingness to pay for significant attributes than the risk-neutral. Risk-seeking respondents were excluded from regression for the sample was less than the size proposed by Orme and Johnson.

Conclusions: All attributes except deductible had a significant impact on risk-averse and risk-neutral respondents' preference for private health insurance. The majority of respondents were risk-averse and owned more willingness to pay for the proposed package, which suggests considering preferences of the potential risk-averse clients in the design of private health insurance would enhance acceptance. Preference and willingness to pay of the risk-seeking still need further exploration. Our study provides policy recommendations for the sustainable development of private health insurance in China.

Keywords: Private health insurance, Risk attitude, Discrete choice experiment, Willingness to pay, China

Financial Incentives and Private Health Insurance Demand on the Extensive and Intensive Margins

PRESENTER: **Nathan Kettlewell**, University of Technology Sydney
AUTHOR: Yuting Zhang

In countries with dual public and private healthcare systems, individuals are often incentivised to purchase private health insurance through subsidies and penalty. We use administrative data from Australia to study how high-income earners respond on both the intensive and extensive margins to the simultaneous withdrawal of a premium subsidy, and the increase of a tax penalty. We estimate regression discontinuity models by exploiting discontinuous changes in the penalty and subsidy rates. Our setting is particularly interesting because means testing creates different incentives at the extensive and intensive margins. Specifically, we could expect to see higher take-up of insurance coupled with downgrading to less expensive plans. We find evidence that the penalty -- despite being large in value -- only has a modest effect on take-up. Our results show little evidence of downgrading, which is consistent with a low price elasticity for the high-income earners we study.

9:00 AM –10:30 AM   WEDNESDAY   [Supply And Regulation Of Health Care Services And Products]

Cape Town International Convention Centre | CTICC 1 – Room 2.41-2.42
Quality of Care Measurement

MODERATOR: **Mary Landrum**, Harvard University

Quality Signals in Health Care: A Vignette Experiment in South Africa

PRESENTER: **Duane Blaauw**, University of the Witwatersrand
AUTHOR: Mylene Lagarde

Over-treatment in general and unnecessary prescription of drugs in particular, is widespread across healthcare systems, an particularly detrimental in low- and middle-income settings. Not only are they responsible for a lot of waste in resource-constrained settings, but they can also generate negative externalities, for example with antibiotic over-prescribing. Anecdotal evidence suggests that providers sometimes prescribe unnecessary treatment to satisfy patients and respond their actual or perceived demand for drugs. Even if they have no particular treatment preferences, it is not unreasonable to think that patients would interpret treatment characteristics, both volume and type of drugs recommended, as a signal of quality of treatment and doctor's competence. We developed a survey experiment to test this hypothesis. In an online survey, 1,000 South African respondents were randomized to see one of five versions of a short story describing the case of an individual suffering from a mild viral infection receiving care and treatment recommendations from a doctor. The five

versions were identical in all components except for the number and type of drugs recommended by the provider. In a cross-randomized treatment, we also varied information about the thoroughness of the consultation. Although the patient described in the vignette suffers from a mild self-limiting virus that would heal without any drug, respondents perceive any treatment as better than no treatment at all. They also interpret a large number of drugs (four) as a signal of quality and effectiveness of the treatment, to the extent that it does not matter what the characteristics of the drugs are (over-the-counter or prescription drugs such as antibiotics). However, when the treatment only includes two drugs, people interpret the presence of antibiotics as a signal of quality. Finally, we show that these beliefs remain largely unaffected by information about the thoroughness of the consultation, confirming the importance of treatment characteristics as a stronger signal of quality. These findings suggest that, in a context of asymmetry of information, providers' over-prescription may be a rational response to inadequate beliefs on the demand-side.

Emergency Readmissions: Is 30-Day the Optimal Time Interval to Capture Hospital Quality of Care?

PRESENTER: **Anastasia Arabadzhyan**, University of York
AUTHOR: Adriana Castelli

Background

Quality of hospital care is key for assessing hospital performance, public accountability and designing incentive schemes, such as Pay for Performance / Pay for Quality. Emergency readmissions within 30 days from discharge have been widely used as a quality metric in healthcare systems in England, the US, Germany, Denmark, China. However, some evidence suggests that 30 days may not be the optimal threshold to capture hospital care quality. Indeed, it may penalise hospitals for low quality of care that is, in fact, due to factors outside of hospitals' control.

Aim

In this study, we aim to answer two main research questions:

1. Which is the optimal time to readmission threshold to capture quality of care in the English NHS?
2. Does this threshold change if we consider sites within Trusts rather than Trusts?

Methods

We focus on patients diagnosed with a disease of the circulatory system and construct the pool of index admissions, using the 2018/19 Hospital Episodes Statistics Admitted Patient Care dataset. We estimate baseline and extended specifications of the three multilevel logistic regression models (admissions within sites, admissions within Trusts, and admissions within sites nested within Trusts) for each of the binary outcome variables indicating whether an index admission was followed by a readmission at day 0 to 90. For each model, we calculate the proportion of total variance explained by the Trust and/or site-level random effects, by means of the intracluster correlation coefficient (ICC). A higher ICC means that hospital factors have more weight in explaining the variation, so the readmission indicator is more reliable as a quality signal.

Results

Preliminary results show that the ICCs exhibit a decreasing trend as the readmission window widens, with a slight variation in their dynamic depending on the model specification. Between-site variation explains a larger proportion of the total variation in the outcome than between-Trust variation, suggesting that policy interventions would be more effective at site level.

Conclusions

Our approach to defining the readmission window cut-off suggests using the 0-3 days readmission window to ensure high reliability of emergency readmissions as a quality signal of hospital care. However, it is important to acknowledge that this is a conservative cut-off, which is likely to capture purely clinical and discharge issues. Longer time intervals may be more appropriate if one wishes to take into account care coordination issues for which hospitals are also partly responsible. This is of particular relevance for many health systems worldwide as they move towards organisational models integrating health and social care.

Variations in Expenditure and Quality across Hospital Departments: The Evidence of Endovascular Treatment of Lower Extremity Arterial Disease in China.

PRESENTER: **Yudi Dai**, Fudan University
AUTHORS: Meng Ye, Min Hu

Background

In the transition towards value-based care, providing quality care at a reasonable expenditure has become a core policy goal for most health systems. However, the relationship between expenditure and quality of care is not well established. Several studies found that lower-expenditure providers could be more efficient and achieve better quality of care than higher-expenditure providers. Previous expenditure comparative analyses primarily used hospital-level data, but often encountered analytical problems, such as the inability to control for heterogeneity among hospitals. To overcome the difficulties, we used patient-level data and focused on endovascular procedures for lower extremity arterial disease (LEAD) to explore the relationship between expenditure and quality.

Objectives:

We aimed to 1) examine variations in expenditure and quality of endovascular procedure; 2) assess the extent to which variation in expenditure is associated with variation in quality of care at department level.

Methods

We used patient-level data from the VascuBase registry, where data were obtained from surgeon surveys and patient surveys. We included 2090 patients from vascular departments of 10 tertiary hospitals in 7 provinces in China for analysis. Expenditures were defined as those incurred in the index endovascular procedure. Procedural success and improvement in quality of life were used as measures of quality of care and health gains. Procedural success was defined as technical success and absence of adverse events within 72 hours postoperatively; improvement in quality of life was defined as the difference in quality-of-life scores assessed by the Vascular Quality of Life Questionnaire preoperatively and 30 days postoperatively. We used generalized linear regression in a multilevel framework to construct a relationship between expenditure and quality of care after controlling for patient-level characteristics. Based on the regression results, at the hospital department level, we graphically depicted the amount of deviation from expenditure and risk-adjusted expenditure and compared it with the amount of deviation from quality and risk-adjusted quality.

Results

Our results showed that the unadjusted average endovascular expenditures varied among the departments, ranging from ¥52,056 ($7,277) to ¥109,845 ($15,356). In terms of quality of care, procedure success rates ranged from 87.0% to 100% across the 10 departments, and the average improvement in quality of life ranged from 1.14 to 2.79. There was a U-shaped association between expenditure deviation (X-axis) and quality deviation (Y-axis), which suggested that hospital departments on the downward sloping side of the curve could achieve better health outcomes by investing more resources. Conversely, hospital departments on the upward sloping side of the curve spent more while decreasing in quality.

Conclusion

We demonstrated significant variation in the expenditure and quality of endovascular procedures across vascular departments in China. Our study found that low quality of care could be accompanied by low expenditures, with quality of care improving as expenditures increased. When expenditures increased to a certain point, quality of care might turn down. Further research should investigate the reasons behind this situation and provide implications for improving quality within reasonable costs.

Hospital Tinder in Germany – First Best, Second Best or No Match? Structural Quality and Patient Outcomes: The Case of Heart Attack and Stroke Treatment in German Hospitals

PRESENTER: **Christiane Wuckel**, Leibniz-Institut fur Wirtschaftsforschung
AUTHORS: Alexander Haering, Anna Werbeck

A reliable measurement tool for hospital quality is of high importance for researchers and policy makers. In particular structural quality – as the basis for adequate hospital care – is currently mainly measured via the concept of volume-outcome, thus focusing on one factor of structural quality only. Using a mixed methods approach, we build a quality indicator that offers a more wholesome approach of measuring structural hospital quality for the indications of heart attack and stroke.

Using a delphi approach involving medical experts, we define criteria that a hospital must meet to offer patients with the indications acute myocardial infarction and stroke a FirstBest- or SecondBest-Treatment. A hospital that does not meet any of the criteria is defined as NoMatch. Build on this set of criteria and administrative data, we use a matching algorithm that determines if hospitals are equipped to offer adequate treatment. The algorithm examines whether patients were treated appropriately given the diagnosis and further characteristics.

In the quantitative analysis, we further examine if treatment at NoMatch-Departments is linked to poorer outcomes such as mortality. To arrive at causal estimates, we then use a differential distance approach to adjust for potential endogeneity in the patient structure.

Applying our quality indicator, we show that more than a third of patients with heart attack and stroke are treated in a hospital department that is not ideal for their indication. By using risk-adjusted regressions, we find a significant negative impact of treatment in a NoMatch-Department on different outcome measure such as mortality or readmission.

We differentiate between hospitals that are equipped for offering FirstBest-Treatment for the indications and those who do not. Building on that, we can estimate how many inadequate treatments could be avoided within the hospital by relocating to a hospital that is equipped to offer FirstBest-Treatment.

Consequently, we also identify regions that show an undersupply of hospitals with a FirstBest-Treatment opportunity for patients with heart attack and stroke.

In our study, we introduce a new measurement of structural hospital quality and show its linkage to outcome quality. We show that the structural quality of stroke and heart attack treatment has improved but is still far from ideal.

Cape Town International Convention Centre | CTICC 2 – Protea
HIV Interventions from Trials to Policy

MODERATOR: **Charles Birungi**, UNAIDS

A Chronic Disease Model for HIV Policy Analysis

PRESENTER: **Markus Haacker**, Heidelberg University, University College London, and Center for Global Development

HIV, owing to a realistic prospect of treatment nearly universally, has transitioned into a chronic disease. PLHIV now generally have a good prospect of reaching old age, although mortality remains elevated even for PLHIV receiving treatment. Under these circumstances, HIV infections or medical interventions have consequences spread over the life (typically meaning several decades) of a person affected. In contrast, HIV policy analysis typically employs an acute-disease model, focusing on spending and deaths averted (transformed into life years saved applying some multipliers derived from demographic estimates) within some policy period.

We set out to develop a framework that consistently (completely, while avoiding double-counting) accounts for:

- Health losses from changes in observed or projected AIDS deaths
- Projected health losses from changes in HIV incidence.
- Projected health gains from transition to treatment.

The analysis combined the following elements:

- HIV projections for a policy and a baseline scenario, using the established Spectrum software package.
- Estimates of life expectancy by age without AIDS, derived from GBD 2019 mortality profiles.
- Estimates of life expectancy by age with AIDS, obtained by adding AIDS-related mortality (by age and treatment status) to GBD no-AIDS mortality.
- A module on transition to treatment in line with treatment coverage.

The effectiveness of an HIV policy up to year x is calculated as the change in the number of deaths up to year x, transformed into life years gained, plus the change in the loss of life years conferred by HIV and treatment status of the population living with HIV at the end of year x. Costs are calculated as change in (a) program expenses until year x and (b) the lifetime costs of treatment of the population living with HIV at the end of year x.

The model was originally developed as a proof-of-concept piece using confidential modelling output prepared for the 2022 Global Fund's investment case. An updated substantial analysis is being prepared. This abstract draws on separate modelling output for three countries in sub-Saharan Africa, with different initial coverage rates, describing a scaling-up scenario consistent with "ending AIDS" by 2030.

The chronic disease model yields estimates of cost-effectiveness which are drastically different from the conventional model. With the latter, US$ 1 million spending by 2030 yields a gain of 2040 life years from deaths averted by 2030, equivalent to US$ 490 per life year saved. Under the chronic disease model, reduced HIV incidence and higher treatment coverage mean that the health losses to the population living with HIV at end-2030 decline, yielding a gain of 1800 years. Lifetime treatment costs to the population living with HIV in 2030 decline by US$ 0.16 million (effect of lower HIV incidence dominates higher treatment coverage). The chronic disease model returns a cost-effectiveness ratio of US$ 230 per life year gained (US$ 0.84 million divided by 3840 life years).

The chronic disease model thus offers more precise and dramatically improved estimates of cost-effectiveness of HIV programs, and provides an integrated framework for consistently assessing gains from both reduced mortality and lower HIV incidence.

The Economic Returns of Achieving the 2021-2030 AIDS Targets to End the AIDS Epidemic By 2030

PRESENTER: **Erik Lamontagne**, Joint United Nations Programme on HIV and AIDS
AUTHORS: Mead Over, John Stover, Anna Yakusik

Background

In 2019, more than 40 countries have achieved or were on track to end AIDS. Despite progress towards that goal, AIDS remains a global crisis. The gains achieved are still fragile in many countries. In June 2021, the General Assembly of the United Nations adopted the Political Declaration on HIV and AIDS: Ending Inequalities and Getting on Track to End AIDS by 2030. We estimated the benefits and costs of this ambitious commitment. We also estimated the cost of inaction i.e. the human and economic cost of failing to meet the AIDS targets for each of the 114 countries.

Methods

We estimated the incremental costs benefits and economic returns of a scenario which fulfils the AIDS targets stated in the Political Declaration, compared to a counterfactual scenario defined as maintaining coverage of HIV-related services at 2020 levels. The benefits are calculated using the full-income approach, which values both the change in income and in mortality. We value both the health gain and the intervention cost to each HIV-affected country from the perspective of that country, converting national benefits and costs to purchasing-parity-equivalent (PPP) 2019 US dollars. We estimated the value of the projected reduction in the mortality rate of the HIV programmes as the amount an average person would pay to reduce their risk of death by one in 10,000 for one year to 1.2% of GDP per capita. We allowed the income-elasticity of the willingness to pay for mortality risk reduction to decline at either 0.8% or 1.2% for every percentage decline of the country's income.

Results

Using the full-income approach, we found that each additional dollar invested between 2021 and 2030 generates US$ 7.9 [5.4-11.6] and US$ 10.6 [7.3-15.6] in economic returns from the global social planners' perspective by 2030 and 2050 respectively. From the LMIC's perspective the returns are almost double, with US$ 14.8 by 2030 and US$ 22.6 in 2050. The benefits of investment are highly correlated with the HIV prevalence total number of adults living with HIV.

Interpretation

Using the latest scientific evidence in terms of benefit-cost analysis, it appears that investing to achieve the 2025 targets in the UNAIDS Strategy and the 2030 target in the Agenda for Sustainable Development provides significant returns from both human and economic perspectives.

Use of Cost-Effectiveness Ranking to Select High Impact and Low Cost Interventions in HIV Program for South Africa

PRESENTER: **Shepherd Nyamhuno**, University of South Africa

In 2016, South Africa implemented the universal test and treat (UTT) for people living with HIV/AIDS (PLWHA) to try and control the further spread of the human immunodeficiency virus (HIV) which causes acquired immunodeficiency syndrome (AIDS). Previous studies on antiretroviral treatment (ART) scale-up had indicated that UTT is cost-effective. This study looked at how ART coverage, migration rates and pre-exposure prophylaxis (PrEP) coverage across various risk groups affected the level of cost-effectiveness of UTT. The study used the Goals model, a dynamic compartmental model with inbuilt HIV parameters to project the expected impact of the UTT under various scenarios. It was discovered that increased ART coverage is still cost-effective for South Africa and had more health benefits for the country (95% of ART coverage had incremental cost-effectiveness ratios (ICERs) of $936/ quality adjusted-life year (QALY) gained while 90% had $1,689/QALY gained). We accepted the hypothesis that increased ART coverage is cost-effective (p-value of 0.0031) and economical for the country to keep migration to the second line of ART at a low level. High levels of migrations had higher costs with no impact (minimal migration scenario cost $76/QALY gained while higher migration rates had higher costs/QALY gained ($94/QALY)). A p-value of 0.034 was obtained and we accepted the hypothesis that lower migration to the second-line regimen was cost-effective. Lastly, PrEP is cost-effective when administered to all risk populations (an all risk-level PrEP coverage scenario had the lowest ICER of $229/QALY gained). However, that coverage was very costly. We accepted the hypothesis that PrEP is cost-effective when given to high-risk populations, given the p-value of 0.042. We discovered that if antiretroviral ART drug prices are reduced by 50%, the country might save about 35% of its total ART costs. Increased ART coverage, minimal migration to the second-line regimen and focused PrEP coverage is the best program combination for the country. For the country to maximise the impact of these interventions it is necessary to create enablers such as local production of tolerable ARV drugs, improve adherence and decentralise the distribution of ARV drugs.

Cost-Effectiveness of Interventions for HIV/AIDS, Malaria, Syphilis, and Tuberculosis in 128 Countries: A Meta-Regression Approach

PRESENTER: **Fiona Silke**, University of Washington

AUTHORS: Lauren Earl, Danielle Michael, Mark M Janko, Jonah Joffe, Peng Zheng, Aleksandr Aravkin, Christopher J.L. Murray, Marcia Weaver

Introduction: Although cost-effectiveness analyses (CEA) have been conducted for many interventions for HIV, malaria, syphilis, and tuberculosis, they haven't been conducted for all interventions that are currently recommended in all countries. For example, World Health Organization researchers reported estimates for east Sub-Saharan Africa and South East Asia regions. Disease Control Priority researchers summarized evidence from low- and middle-income countries (LMIC) published in league tables. Country-specific estimates however, would better support governments and international agencies to prioritize interventions, informed by their own gross domestic product (GDP) and epidemiological context.

We conducted a meta-regression analysis of all published incremental cost-effectiveness ratios (ICERs) for interventions for HIV, malaria, syphilis and tuberculosis. Unlike most methods to transfer estimates across settings, meta-regression methods quantify the relationship between ICERs and factors at the country, intervention, and methods-level. Our regression also includes evidence from high income countries as well as LMIC.

Methods: Our data sources were the cost-effectiveness registries created and maintained by the Tufts University Center for Evaluation of Risk and Value in Health. The registries report peer-reviewed results with health improvements measured in disability-adjusted life-years

(DALYS) or quality-adjusted life-years. We included interventions with a least two articles and three ICERs per intervention, and grouped them by cause and type (prevention, diagnosis, treatment). We adapted a five-stage statistical model developed to synthesize CEA evidence on HPV vaccination and rota-virus vaccination to smaller sample sizes by grouping interventions and selecting the model with the best fit from several options, such as 1) include or exclude one-way sensitivity analyses, 2) measure burden of disease by DALYs vs prevalence, and 3) include intervention-level and methods-level variables or not. We predicted incremental cost per DALY averted for 13 currently recommended malaria, hiv, tuberculosis and syphilis interventions for each of the 128 countries that are eligible for support from the Global Fund for at least one cause. We report the predicted median ICER and 95% uncertainty interval (UI) relative to GDP per capita and country-specific GDP thresholds.

Results: Antenatal syphilis screening and treatment has the lowest median ICER in 87 countries, ranging from $3 per DALY averted in Equatorial Guinea to $3,473 in Ukraine. Pre-exposure prophylaxis for HIV for men who have sex with men has the highest median ICER in 119 countries, ranging from $2,178 per DALY averted in Lesotho to $75,518 in Maldives. In the middle range, rankings differ substantially across countries depending on the burden of disease and other parameter estimates. League tables place results in context, showing that interventions such as pre-exposure prophylaxis are affordable in some countries.

Conclusion: Country-specific league tables differ substantially across economic and epidemiological context. Meta-regression is a promising method to synthesize CEA results and transfer CEA across settings.

Economic Evaluation of Routinized Syphilis Screening Among Men Living with Human Immunodeficiency Virus: Net-Benefit Regression of a Stepped Wedge Cluster Randomized Controlled Trial

PRESENTER: **Sujata Mishra**, University of Toronto
AUTHOR: Wanrudee Isaranuwatchai

Background: Syphilis is a curable sexually transmitted infection that disproportionately affects men who have sex with men living with HIV. Opt-out syphilis tests with routine HIV viral load tests has been shown to be moderately effective at increasing detection of syphilis, especially early-stage infections. We examined the cost-effectiveness of pairing syphilis tests with routine HIV viral load testing versus physician-initiated syphilis testing (usual care) from the perspective of the healthcare system (regional Ministry of Health).

Methods: We used patient-level data from the Enhanced Syphilis Screening Among HIV-Positive Men (ESSAHM) step-wedged randomized trial conducted across four urban clinics in Ontario, Canada, between 2015 to 2017. The study population comprised adult men diagnosed with HIV and receiving HIV care. The total cost of syphilis detection tests and frequency of tests were extracted from the ESSAHM trial and adjusted to 2020 Canadian Dollars (CAD). We used a net benefit regression (NBR) framework, employing a generalized linear mixed model to estimate the incremental net benefit of the intervention adjusting for fixed and random effects. The clinical outcomes of interest were: (i) detection of new untreated cases of syphilis (any stage) and (ii) detection of new untreated cases of early-stage syphilis. We then derived cost-effectiveness acceptability curves across willingness to pay (WTP) thresholds.

Results: Among the 3024 patients were enrolled, there were 7583 screening tests and 5598 confirmatory tests conducted over the trial period. In total, 217 cases of syphilis (all stages) and 147 early-stage syphilis were detected. The average additional cost of implementing the intervention was CAD $6825/clinic compared to cost of usual care. The intervention was cost-effective with a probability 58% at a WTP of $700 for each additional detection of syphilis (any stage); and with a probability of 54% at a WTP of $6000 for each additional detection of early syphilis.

Interpretation: There is a feasible range in the value for money of implementing routinized syphilis testing with HIV viral load, depending on the willingness to pay threshold and outcome of interest. Individual and population-level health benefits of early diagnosis would provide additional cost benefits. Findings can inform the scale-up of routinized syphilis testing to clinics providing HIV care with an aim toward improving efficiency and value in health care.

9:00 AM –10:30 AM   WEDNESDAY   [Health Care Financing & Expenditures]

Cape Town International Convention Centre | CTICC 1 – Auditorium 2
Strategic Approaches to Improving Health Financing

MODERATOR: **Joseph Kutzin**, World Health Organization

The Impact of a New Case-Based Payment System Reform on the Quality of Healthcare: A Difference-in-Differences Analysis in China

PRESENTER: **Xinyu Zhang**, School of Public Health, Fudan University
AUTHORS: Jiaqi Yan, Ruixin Wang, Dawei Lv, Mengcen Qian, Xiaohua Ying

Background: A new case-based payment system called "Diagnosis-Intervention Packet" (DIP) payment under global budget has been developed and widely piloted in China. Hospitalized patients were classified based on the principal diagnosis and procedures into more

than 10,000 groups, and the system was easy to implement. Our study aims to explore the impact of DIP payment on the quality of healthcare in a large pilot city in East China, which has early implemented the reform before it was widely introduced nationwide.

Methods: We used a 5% random sample of discharge records of patients covered by the employee basic medical insurance scheme (EBMIS) in this city from July 1st, 2017 to June 30th, 2021. The city piloted DIP payment reform in EBMIS patients in July 1st, 2019, replacing the fee-for-service payment under global budget previously. Quality measures included in-hospital mortality, mortality of surgical patients, all-cause readmission within 30 days after discharge, readmission with the same principal diagnosis within 30 days, and operation associated complications or adverse events. We used a difference-in-differences approach to compare the changes of healthcare quality before and after the DIP reform between the EBMIS patients in 13 pilot hospitals and 27 non-pilot hospitals. We also included a rich set of patient and hospital characteristics at the discharge-level in the model.

Results: The study sample consisted of 43,023 records in pilot hospitals and 79,614 records in non-pilot hospitals. The DIP payment reform was associated with a 0.1 percentage points (P=0.299) decrease of in-hospital mortality rate, a 0.1 percentage points (P=0.319) decrease of mortality of surgical patients, a 3.2 percentage points (P=0.000) decrease of readmission rate within 30 days, and a 1.8 percentage points (P=0.000) decrease of readmission rate with the same principal diagnosis within 30 days. The rate of operation associated complications or adverse events increased by 0.2 percentage points (P=0.450), but the change was not significant. Subgroup analyses stratified by hospital level showed that decrease of in-hospital mortality rate, readmission rate and readmission rate with the same principal diagnosis were mainly driven by tertiary hospitals (decreased by 0.6 percentage points, P=0.000; 4.5 percentage points, P=0.000; 2.1 percentage points, P=0.009, respectively). We also found stronger effects on in-hospital mortality rate, readmission rate and readmission rate with the same principal diagnosis in the second year of the reform adoption than the first year.

Conclusions: This is the first empirical evidence on the impact of DIP payment reform on quality of care in this city. Our findings suggested that the DIP payment under global budget reform in the study city improved the quality of healthcare among patients in pilot hospitals. The quality improvement was mainly driven by tertiary hospitals, and the effects were more obvious over time. Further study should explore the mechanism of how the quality was improved through changes of provider behaviors after the DIP payment reform, and the long-term effect of the DIP payment on quality of care.

Examining the Challenges of Purchasing Primary Health Care Interventions in Urban Settings: Lessons from Kampala and Nairobi

PRESENTER: **Boniface Mbuthia**, ThinkWell
AUTHORS: Richard Ssemujju, Ileana Vilcu, Anne Musuva, Angellah Nakyanzi, Derrick Semukasa, Daniel Ayen Okello

Introduction:

Public funding is the most reliable source for financing primary health care (PHC) services, to ensure that the health services to most of the poor are accessible and equitable. There is limited focus on the PHC needs of the urban poor populations leaving them vulnerable and marginalized. The cities of Nairobi and Kampala have the highest populations at 4.3 million (8%) and Kampala at 1.7 million (4%) of their country's total population, respectively. More than 50% of both the cities' population live in the urban settlements facing many social economic barriers to accessing PHC. Kampala City and Nairobi County are responsible for purchasing PHC services on behalf of their urban populations. We examined the challenges faced by these two cities and provided policy recommendations that would strengthen purchasing of PHC services.

Methods:

This study used a mixed-method approach combining a) participatory research and in-depth interviews of policymakers funding and managing PHC services in Kampala and Nairobi, b) literature review of reports and peer-reviewed journals in both Kenya and Uganda.

Findings:

The results showed that (i) Both cities have a lower per capita allocation (USD 19 and 1 USD, respectively) than rural decentralized units with an average of USD 30, straining the available pool for purchasing PHC (ii) The poor and vulnerable populations from Kampala and Nairobi do not have access to adequate PHC services due to multiple interrelated health system gaps and ever-increasing pressure from a growing population versus low allocations of local governments e.g. in FY2022/23, KCCA was allocated approximately 118USD Million compared to 5.3USD Millions (5%) allocated to public health (iii) in both cities, PHC facilities have limited direct funding but offer free PHC services leading to implicit rationing. Also, due to PFM constraints, the funds are released late hence affecting timely use, own revenue is remitted to the central treasury and not allocated according to the priorities of these cities. In Nairobi, this includes revenue from reimbursements from National Health Insurance Fund. (iv) Both cities have low health insurance coverage at <20% in Nairobi and less than 1% of private insurance and no public health insurance in Kampala. These challenges are intensified by low public health facility distribution (17% in Nairobi and 2% in Kampala), further exposing urban poor to out- of- pocket payments (OOP).

Conclusion:

With the increasing migrant and transient urban population, governments need to rethink strategies for financing PHC. Governments can a) increase public financing for PHC, b) make timely releases, c) pool funds for those able to pay to subsidize the urban poor, d) target

PHC interventions to the urban poor to reduce OOP and e) allocate monies according to the population needs. The findings from this study could help Nairobi County and Kampala City to a transition from passive to more strategic purchasing of PHC services.

Has the Introduction of Activity-Based Funding Affected the Efficiency of Irish Public Hospitals? : A Difference-in-Differences Analysis

PRESENTER: **Gintare Valentelyte**, RCSI University of Medicine and Health Sciences
AUTHORS: Conor Keegan, Jan Sorensen

Background

In Ireland, most hospital care is government financed and delivered in public hospitals. Significant differences between the financing and delivery of hospital care across public hospitals exists, and approximately one-fifth of care delivered in public hospitals is privately financed. Patients who receive private day or inpatient treatment in public hospitals must pay private accommodation and consultation charges, funded through (voluntary) private health insurance and out-of-pocket payments. Non-consultant hospital staff, remunerated by salary, provide care to both publicly and privately financed patients. Activity-Based-Funding (ABF) is a funding arrangement to incentivise provider organisations to deliver more efficient care. On 1st January 2016, ABF was introduced centrally across the largest acute public hospitals in Ireland, to fund public patient activity. However, all private patient activity in public hospitals continues to be reimbursed on a per-diem basis, through private health insurance and out-of-pocket payment sources, and is not subject to ABF reimbursement. Significantly different financial incentive structures exist between public and private patients treated in the same Irish public hospitals. To date, there is limited evidence on the initial ABF impacts since introduction in Ireland. Our aim was to examine whether the key efficiency outcomes measuring volume, proportion of day-case admissions and length of in-patient stay, changed after ABF introduction across public hospitals in Ireland.

Methods

Using national Hospital In-Patient Enquiry (HIPE) activity data for 2013 – 2019, we estimated the causal impact of ABF across a number of commonly performed elective procedures in Irish public hospitals across three specialties: General surgery, cardiology, orthopaedics. We employed a Propensity Score Matching Difference-in-Differences approach, to exploit variation in hospital payment for public and private patients treated in Irish public hospitals. We compared differences across efficiency outcome measures (volume, proportion of day-case admissions, and length of in-patient stay) between public patients (treatment group) subject to ABF, and private patients (control group), not subject to ABF reimbursement. Sensitivity and sub-group analyses were conducted to further examine the key findings.

Results

100,698 hospital admissions over the 7-year study period were included in our analysis. For all procedures combined, a significant increase in volume by 2.1 percentage points (p.p) (p<0.001) and a reduction in length of inpatient stay by 0.18 of a day (p<0.1) for public patients post-ABF were observed. No significant changes in the proportion of day-case admissions for all procedures combined were observed. Similarly, when broken down by individual procedure, no significant effects for any of the outcomes were identified. Sub-group and sensitivity analyses suggested the presence of some significant heterogeneity across all outcome measures, but without a clear pattern.

Discussion

Overall, we found limited evidence to support a meaningful impact of ABF in Ireland, on key hospital efficiency outcomes for commonly performed elective procedures. Although significant heterogeneity is observed at sub-group analyses, no clear pattern for these effects could be identified. Further engagement with key system stakeholders may be required to identify potential approaches to strengthening the funding mechanism into the future.

Driving Strategic Purchasing and Value-for-Money in the Government of Malawi's Public-Private Partnership with a Major Faith-Based Healthcare Provider

PRESENTER: **Purava Joshi**, Clinton Health Access Initiative, Malawi
AUTHORS: Farai Chigaru, Stephanie Heung, Wingston Ngambi, Moses Zuze, Mafase Sesani, Elled Mwenyekonde, Mihereteab Teshome, Eoghan Brady, Briony Pasipanodya, Emily Chirwa, Andrews Gunda, Callan Corcoran, Aditi Kothari

<u>**Background**</u>

The Christian Health Association of Malawi (CHAM) is the largest non-governmental health provider in Malawi, providing 37% of all health services and 75% of health services in rural areas through a Public-Private Partnership (PPP) with the Government of Malawi. Through Service-Level Agreements (SLAs), CHAM health facilities are contracted to provide a defined set of services to their catchment population, including through a block grant for CHAM health worker salaries.

<u>**Research Questions**</u>

While the literature has established that the SLAs have successfully increased service utilization/access, there is a lack of evidence on the PPP's efficiency and value-for-money. We therefore investigated the extent to which the HR block grant encourages the efficient production of health services at CHAM facilities compared to public facilities. We hypothesized that the HR block grant may inefficiently over-budget for health workers, relative to the optimal health workforce required to deliver the health services contracted in the PPP.

The Government of Malawi has therefore partnered with the Clinton Health Access Initiative, the Kamuzu University of Health Sciences, and CHAM to answer this research question and inform the upcoming PPP renegotiation.

<u>Methods</u>

We used health workforce modelling to compare the expected vs. actual number of services delivered in CHAM and public facilities based on their available workforce. Using propensity score matching, we matched a sample of 30 CHAM facilities to 30 public health facilities.

First, the expected number of health services were estimated using the current number of health workers from staff return data, disaggregated by cadre, and the normative time required by each health worker cadre to deliver each of the 36 health services, based on time-motion estimates and validated by expert opinion.

Second, the expected number of health services was compared to the actual number of health services delivered, using facility-level service volume data from the national Health Management Information System (HMIS). This comparison was conducted for each of the 36 health services at each of the 60 health facilities.

<u>Key Findings</u>

Preliminary analysis indicates that the HR block grant to CHAM health facilities may be inefficient. We find that CHAM health facilities currently have more staff than required to deliver high-quality RMNCH services. Based on current staffing, CHAM is expected to produce more RMNCH services than it currently does; for instance, with its current workforce, CHAM was expected to produce 71% more ANC visits than it actually delivered. The MOH, on the other hand, produces more services than expected; for instance, public facilities delivered 20% more ANC visits than expected with their current staffing. However, one limitation is that this analysis does not control for quality of care. Additional results will be available by March 2023.

<u>Conclusions</u>

The Government of Malawi and CHAM are currently renegotiating the terms of the PPP, and these results will directly inform the conditions of the contract. Given scarce resources in Malawi's health sector, this study can help drive efficiencies in the PPP and extend access to quality care to the population of Malawi.

9:00 AM –10:30 AM   WEDNESDAY   [Health Beyond Health Care Services: Social And Related Determinants]

Cape Town International Convention Centre | CTICC 1 – Room 1.61
Public Health Interventions

MODERATOR: **Kompal Sinha**, Macquarie University

Impact of Monetary Incentives and Awareness Campaigns on the Uptake of Sanitation Facilities and Prevalence of Sanitation-Related Diseases? Quasi-Experimental Study in India
PRESENTER: **Shahid Majeed Dar**, Indian Institute of Technology, Kanpur
AUTHOR: Sukumar Vellakkal

Background: Uptake of sanitation facilities has long been a challenge in India, where 60% of households practice open-defecation, escalating environmental contamination with repercussions for several sanitation-related diseases. In this regard, the Indian government launched its flagship program, Clean India Mission (CIM), in 2014, with the goal of eliminating open-defecation by 2019. The CIM emphasizes community action and awareness campaigns to generate demand for toilets and offers financial incentives to construct in-home toilets with water facilities. Except for an economic cost-benefit analysis and a few ecological-level studies of the effect of CIM on children's health using administrative data, there is a dearth of research in assessing the impact of CIM on sanitation and health outcomes.

Objectives: To examine the impact of CIM on i) uptake of sanitation facilities, ii) practice of open-defecation, and iii) prevalence of select sanitation-prone diseases such as stomach problems, malaria, and skin disease.

Methods: This is a quasi-experimental study based on a sub-sample of low social category households from nationally representative repeated cross-sectional datasets. To address the self-selection issues arising from the voluntary nature of the program participation, we employed an instrumental variable strategy to estimate the impact on those who had taken up the program (average treatment-effects-on-treated, ATT). We further use the difference-in-differences (DD) approach, that accounts for observed and unobserved heterogeneity, to tease out the impact on the intended target beneficiaries, regardless of their program enrolment status (intent-to-treat (ITT) effects). We also provide suggestive evidence in favor of a similar trend by conducting a placebo test supported by the parallel-trend graphical evidence.

Results: The program increased the ownership of sanitation facilities and subsequently decreased the practice of open-defecation; however, the impact on the targeted population was found to be modest compared to the actual beneficiaries. Our ATT estimates show that the actual household beneficiaries are 98 percentage points (p<0.001) more likely to report ownership of in-home toilet facilities and 88 percentage points (p<0.001) less likely to report the practice of open defecation. However, at the societal level, under ITT estimates, households are only 20 percentage points (p<0.001) more likely to report ownership of in-home toilet facilities and 23 percentage points (p<0.001) less likely to practice open-defecation. In contrast, our ATT and ITT estimates confirm that the program did not generate beneficial impacts on select disease prevalence. Our results are robust across most of the alternative specifications and for different subsamples.

Discussion: Our results suggest that public health programs implemented in resource-poor settings can incentivize the uptake of sanitation facilities and reduce open-defecation but may not be enough to decrease the prevalence of sanitation-sensitive diseases. To generate meaningful health improvements, we suggest a more inclusive approach with local adaptation strategies and integrating the program with other initiatives for ensuring access to water facilities for improved and sustained usage of toilets, promote hygienic hand washing behavior, proper child fecal disposal and treatment of animal waste.

Keywords: Open-defecation, Sanitation-related Diseases, Clean India Mission, India, Instrumental variable, Difference-in-differences

How Did Decentralised Health Planning Impact Social Determinants of Health in Kerala,India ? Findings from a Witness Seminar Series

PRESENTER: **Hari Sankar Dasan**, The George Institute for Global Health
AUTHORS: Jaison Joseph, Gloria Benny, Devaki Nambiar

Background:

Kerala, a southern Indian state, actively implemented decentralised planning to enhance economic development and social justice, starting in 1996. As part of this process, the state devolved functions, finances, and functionaries to Local Self-Governments (LSGs), with direct involvement of communities in health planning. Community members, LSG members and health staff worked together to identify local health problems and co-created solutions. Decentralised health planning led to several innovative health programs in the state. A notable aspect of decentralised health panning was the thrust given to improve living conditions, education, nutrition, and livelihoods of communities. We undertook a study to document the role of the participatory bottom-up planning approach in bettering the social determinants of health in the state. To study this, on the the silver jubilee of decentralisation initiatives in Kerala in 2021, we began documenting community action for health with the actors, whom we called witnesses, in the history of these reforms.

Methods:

We employed a qualitative study design for the study. We conducted the Witness Seminar (WS), a group oral history technique to record recent history where witnesses process events, come together and narrate the events and underlying mechanisms following a structured format, as a matter of public record. Between June and September 2021, we conducted three virtual WS on the Zoom platform comprising 21 participants including included policymakers, health department officers, medical officers, frontline health workers and elected representatives. The zoom sessions were recorded and transcribed verbatim in English and Malayalam and sent to participants for approval. The approved transcripts were annotated and referenced whenever possible. Inductive thematic analysis of transcripts was carried out by three researchers using ATLAS.ti 9.

Results

Witnesses reflected that in the early years of decentralised health planning in 1996-2000, several LSG projects were formulated based on community need: these included sanitation, hygiene, and waste management, as well as women's literacy. The role of educated woman as part of literacy campaign was reflected by many participants as key determinant in improving the health of communities. Our study participants also described successful experiences of implementing these projects which resulted in reduction in the prevalence of waterborne and vector-borne diseases. Participants mentioned that current priorities for LSGs were organic farming, clean drinking water, safe disposal of plastic and biomedical waste. The recognition and incentives offered for LSGs for investing in health and related projects by the department of health have also boosted the investment in social determinants of health.

Conclusion

Decentralised health planning with LSG and community participation in Kerala has played a role in improving living conditions, sanitation, and education in Kerala. The support and handholding of the government in initiating and nurturing this bottom-up planning

approach remain critical.

Free the Period? Evaluating Tampon Tax Reforms Using Transaction Based Scanner Data

PRESENTER: **Klara Kinnl**, Vienna University of Economics and Business

We study price and volume effects of VAT reductions in the market for period products. Using household scanner data, we exploit different tax reforms in four European economies. In response to a one percentage point reduction in the VAT, prices decrease on average by 0.54%. This corresponds to a VAT pass-through of 85%, with low-income households benefiting the most. Purchased quantity does not respond strongly, consistent with inelastic demand for period products. Controlling for the announcement of VAT reductions, our results indicate intertemporal substitution effects.

Integrated Community-Based Care & Economic Outcomes Among Microfinance Group Participants: Cluster Randomized Trial Evidence from Kenya

PRESENTER: **Omar Galarraga**, Brown University

AUTHORS: Marta Wilson-Barthes, Becky L. Genberg, Juddy Wachira, Dan N. (Tina) Tran, Catherine Kafu

Background: The World Health Organization's "test and treat" approach has increased the number of persons living with HIV (PLWH) who can access and adhere to antiretroviral therapy (ART): in 2021 approximately 75% of PLWH were accessing ART and 68% were virally suppressed. The "treat all" approach, however, has strained traditional health systems in Sub-Saharan Africa (SSA) that operate with limited resources and are now having to address the growing burden of non-communicable diseases (NCDs) among PLWH. In response, Health Ministries in SSA are promoting differentiated service delivery models as a way to provide patient-centered care while reducing demands on traditional care systems. Still, out-of-pocket payments remain the only option for most NCD care. Thus, to be effective, differentiated care models must address the economic drivers – poverty, food insecurity, transportation costs, facility fees – of engagement in chronic disease care but, to-date, this is not yet standard practice.

Objective: We assessed the extent to which delivering integrated HIV+NCD care within community-based microfinance groups improved economic status among PLWH in Kenya. Using preliminary data from a cluster randomized trial, we hypothesized that microfinance group members who received care for HIV, hypertension and diabetes from a mobile clinical team in the community would have greater purchasing power and fewer outstanding debts than microfinance group members receiving standard HIV care in a brick-and-mortar facility.

Methods: We randomized 57 existing microfinance groups (with n=900 PLWH) to receive either integrated HIV+NCD community-based care or standard facility care. The integrated care intervention included evaluations, medication distribution, and point-of-care testing delivered by a clinical officer during regular microfinance group meetings in the community. Participants were followed over 18-months with quarterly collection of microfinance data. We assessed 9-month data using individual-level panel-data fixed effects regression models and treatment-by-time interactions, with robust standard errors clustered at the group level. Dependent variables were log-transformed to interpret coefficients as percentage-change elasticities.

Preliminary results: Microfinance group members receiving integrated, community-based care attended an average of 6 microfinance meetings during each 3-month study period, compared to an average of 4 meetings attended by facility-based patients. Overall intervention recipients spent 44% more on microcredit savings at each meeting than microfinance group members receiving facility care (p<0.01). Over 9 months, the percentage of members with a monthly income $\geq$$40USD (~national poverty line) remained constant among community care recipients but fell by 5% among facility patients. Outstanding loan debts decreased among integrated-care recipients at each follow-up visit (by 8% at visit 3 (p>0.10) and 58% at visit 4 (p>0.10)). Integrated-care showed a 50% increase in microcredit purchases (p<0.05), which decreased by 10% (p>0.10) and 22% (p>0.10) at the second and third follow-up visits, respectively.

Conclusions: These preliminary findings suggest that removing key barriers to accessing chronic disease care can increase the income available for economic strengthening activities. Including poverty-reducing interventions as part of differentiated HIV care approaches could improve the effectiveness and sustainability of these models in low- and middle-income countries, and warrants rigorous testing for common HIV comorbidities such as diabetes, hypertension and mental health.

9:00 AM –10:30 AM   WEDNESDAY   [Cross-Cutting Themes And Other Issues]

Cape Town International Convention Centre | CTICC 1 – Room 1.41

Mental Health, Its Impact, Cost and Interventions

MODERATOR: **Claire de Oliveira**, Centre for Addiction and Mental Health

Emotional Support and the Mental Health of Residents of South Africa's Gauteng Province: Exploring Causal and Heterogeneous Effects

PRESENTER: **Frederik Booysen**, University of Witwatersrand

AUTHORS: Adeola Oyenubi, Uma Kollamparambil

Background: The stress-buffering hypothesis proposes that the perceived availability of functional social support is associated with better health and wellbeing. Empirical evidence however suggests that the protective role of emotional support for the most part has not yet been explored in general population settings in developing countries, nor has analysis on the topic always been approached in a methodologically rigorous manner.

Research question: This study sets out to determine if perceived access to informal emotional support translates into improved levels of mental health in adults residing in South Africa's Gauteng province and whether these effects are heterogeneous in nature and if so, in what manner.

Methods: The Gauteng City Region Observatory's cross-sectional Quality of Life Survey conducted in 2017/18 and based on a multi-stage stratified cluster sampling design, collected information on a representative sample of 24,889 respondents using a structured questionnaire. In particular, survey respondents were asked, "If you ever need emotional support, do you have someone to talk to?" Responses were recorded as 'yes' or 'no'. The main study outcome is measured using the 2-item Patient Health Questionnaire self-reported measure of depressive symptoms (PHQ-2). The effect of perceived access to informal emotional support on depressive symptoms and the heterogeneity in these effects are assessed using two methodological approaches, the one being the Lewbel (2012) approach to Instrumental Variables (IV) and the other Sorted Partial Effects (SPE) analysis, respectively.

Results: Perceived access to informal emotional support reduced depressive symptoms across methods. SPE analysis suggests that the partial effects of perceived access to informal emotional support on depressive symptoms vary over a wide range, i.e. the effect though negative on average, is positive for some individuals and negative for others, and in both cases, significantly different from the average partial effect (APE). SPE-based classification analysis shows that adults that stay with their extended family report significantly fewer depressive symptoms when having access to informal emotional support, while the same is true in adults living in households experiencing food insecurity, providing support for the stress-buffering hypothesis. In terms of positive estimates, the results suggest that support seeking may be more evident in married individuals and employed respondents with tertiary education. Effects are also heterogeneous in terms of spatial location.

Conclusion: The findings highlight the need to expand access to informal emotional support to those who may not be in a position to readily access formal support of this kind, by strengthening the social networks of families and social fabric of communities. Where access to formal mental healthcare is constrained, such as is the case in many low and middle-income countries, the strengthening of informal systems of emotional support should be a priority, especially among the marginalised.

Cost-Utility Analysis of Antipsychotic Discontinuation and Reduction in Patients with Long-Term Schizophrenia and Psychosis in English Mental Health Trusts: The RADAR Study

PRESENTER: **George Bray**, University College London

AUTHORS: Joanna Moncrieff, Stefan Priebe, Louise Marston, Glyn Lewis, Nadia Haynes, Vanessa Pinfold, Sonia Johnson, Rachael Hunter

Background

The current recommended treatment for patients with recurrent episodes of Schizophrenia and related conditions is antipsychotic medication. However, many antipsychotic users remain functionally impaired and experience serious physical and mental side effects. The evidence for long-term antipsychotic treatment suffers from a number of methodological flaws and focuses on relapse without considering wider outcomes such as functioning. Evidence regarding cost-effectiveness is slim.

Aims of the Study

The aim of this study is to assess the cost-effectiveness of a gradual antipsychotic reduction and discontinuation strategy compared to maintenance treatment over 24 months from a mental health services, health care, and societal cost perspective.

Methods

Nineteen mental health trusts recruited patients to the RADAR randomised controlled trial. Quality adjusted life years (QALYs) were calculated from patient-reported EQ-5D-5L, with years of full capability (YFCs) calculated from the patient-reported ICECAP-A. Mental health services use and medication was collected from medical records. Other resource use and productivity loss was collected using self-completed questionnaires. Costs were calculated from published sources.

Results

253 participants were randomised: 126 assigned to antipsychotic dose reduction and 127 to maintenance. There were no significant differences between arms in total costs for any perspectives, despite acute mental health care costs being signficantly larger signficiantly

in the reduction arm (£5,060; 95% CI: £1,045 to £9,075). There were no significant difference in QALYs (-0.035; 95% CI: -0.123 to 0.054), whereas YFCs were significantly lower in the reduction arm compared to the maintenance arm (baseline-adjusted difference: -0.103; 95% CI: -0.192 to -0.015). The reduction strategy was dominated by maintenance and was not likely to be cost-effective for all perspectives taken and outcomes employed.

Patient-completed outcome and resource use questionnaires exhibited substantial missingness, between 38.1% - 48.2%. Multiple imputation was performed on utilities and costs generated from questionnaires in order to account for data missing-at-random. Conclusions on cost-effectiveness remained the same.

Discussion and limitations

A gradual antipsychotic reduction and discontinuation strategy is unlikely to be cost-effective compared with maintenance over two years for patients with Schizophrenia and related disorders who are on long-term antipsychotics.

Implications for Further Research

YFCs were significantly lower in the reduction arm, in contrast to QALYs where no difference was found. The EQ-5D may better reflect functioning but not relapse. Future research should contrast these results with other evidence on suitable outcome measures for economic evaluations of interventions for patients with Schizophrenia and related disorders.

Direct Medical Costs of Bipolar Disorder in China: Evidence from Urban Health Insurance Claims Data in Guangzhou City, Southern China

PRESENTER: **Xuezhu LI**, Sun Yat-sen University
AUTHOR: Hui Zhang

Background:

Bipolar disorder(BD) is a recurrent chronic mental disorder with high prevalence, high disability rate and high economic burden worldwide. Due to the largest population, China had the second largest number of BD incidence cases and the second highest total burden of BD worldwide. There were no research that have examined the direct medical costs of BD using large samples from an entire city in China. Therefore, this study aims to assess the direct medical costs of BD, and to evaluate differences in medical costs across patients classified by different subtypes of BD in Guangzhou city, Southern China.

Methods:

This study collected all inpatient reimbursement records between 1 January 2009 and 31 December 2014 for patients diagnosed with BD according to ICD-10(F31). Based on ICD-10 code, four BD subtypes were identified: manic(F31.0-F31.2), depressive(F31.3-F31.5), mixed(F31.6), and other/unknown episodes(F31.8-F31.9). Direct medical costs were calculated by adding up the costs of all hospital admissions for a patient during an entire year. Patients' outpatient records during the same period were merged from the outpatient claims database by personal identifiers. The composition of total inpatient costs by different subtypes of BD were compared. An extension of generalized linear model - the extended estimating equations(EEE) approach was performed to identify the main drivers of direct medical costs.

Results:

Among 1,053 BD patients identified in this study, the mean age was 38.90 years old. The average annual length of stay(LOS) was 77.40 days. The average annual direct medical costs per patient were Chinese Yuan(CNY) 18,387.06(USD 3,001.92 in 2014), including CNY 17,886.52(USD 2,920.20 in 2014) for inpatient costs and CNY 1,631.78(USD 266.41 in 2014) for outpatient costs. Non-medication treatment costs accounted for the largest proportion(62.95%) of the annual per capita inpatient costs. Manic episode incurred the most hospitalizations(39.53%) and manic episode accounted for the largest proportion(37.08%) of total inpatient costs. Regression analysis suggested that gender(male), younger age, insurance types(urban employees scheme), number of episode types(more than one type), hospital levels(tertiary) and longer LOS were significant associated with higher direct medical costs(P<0.05).

Discussions and Conclusions:

This was the first study on BD direct medical costs in China. This was also the first time to compare different episodes of BD among hospitalizations, and to evaluate the differences in direct medical costs for patients under two different types of health insurance schemes in China. The direct medical costs of BD were high and the LOS was the main driver. The longer LOS in China might be due to a lack of community-based psychiatric and rehabilitation services. The findings of this study suggested that establishing community-based psychiatric system, providing psychiatric and rehabilitation services might be an effective strategy to reduce LOS and medical costs. For most developing countries including China, community-based psychiatric services were in the early stages of development, which could hardly meet the growing demand for those services among the patients with mental disorders. We suggested developing a community-based psychiatric system and providing psychiatric and rehabilitation services to reduce the long LOS and high costs of BD in China.

Review on the Cross-Spousal Effect of Mental Health: Some Evidence from Indonesia Large Scale Panel Data

PRESENTER: **Ekki Syamsulhakim**, Universitas Padjadjaran

AUTHOR: Moch Fauzi Alfandri Suherman

Mental health problems are still prevalent throughout Indonesia. More than 12 million Indonesians over the age of 15 suffer from depression and more than 19 million suffer from emotional mental illnesses (Indonesian MoH, 2018). Numerous economic research on mental health has particularly paid attention on the influence of individual traits and the personal consequences of poor mental health. However, it is very likely that mental health problems can have a spillover effect on people around, especially in a setting of a married couple, where spouses must cope with and adjust to their partners' lower mental and physical health conditions (McLeod, 1993; Siegel et al., 2003). There are several theory that provide pathway on causal factors that will lead to correlation in spousal mental health. These include positive assortative mating in marriage market, common environmental risk factors, and the allocation decision on household production of health. In this paper, we try to provide the empirical evidence whether husband mental health condition will affect his wife's mental health condition.

We use two waves of the Indonesia Family Life Survey (IFLS) data in 2007 and 2014 that provide an extensive range of information gathered at the individual and household levels. Mental health status is measured using a "depression score" that was obtained from the 10-item Center for Epidemiologic Studies Depression scale (CESD-10). The score is then transformed to a Logit form using Rasch model to reduce noisy measurements and provide better interval scaling. A combination of Instrumental Variables and Fixed Effect methods are used to examine whether husband's mental health condition affects his wife's mental health condition. This method also mitigates the time-invariant unobserved heterogeneity issues, the heterogeneous nature of the spillover effect, and potential bias from the endogeneity. We utilized the indicator of husband's intense job stress and age as the instrument, arguing that once important individual and household characteristics are controlled for, they will only affect wife's mental health through their effect on husband's mental health.

Our estimation results provide clear evidence for the strong presence of the cross-spousal effect of mental health. A 1% increase in the husband's depression score increased Wife's depression score on average by 0.42% (worsening mental health). Interestingly, the effect of the husband's (spouse) depression score was higher than the effect of the wife's intense job stress and poor general health status on the wife's depression score.

Our study contributes to the literature by providing empirical evidence on the cross-spousal effect of mental health from a longitudinal analysis. We demonstrated that there is indeed a positive and significant correlation between husband and wife's mental health, and they are large in magnitude. The findings suggest that the cross-spousal spillovers of mental health could be economically substantial, and interventions that lessen mental health problems likely undervalue the downstream benefits (positive externalities) for other family members

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9:00 AM –10:30 AM   WEDNESDAY   [Health Care Financing & Expenditures]

Cape Town International Convention Centre | CTICC 1 – Room 2.46

Reflections on the Experience of the "CHF Iliyoboreshwa" Health Insurance and Its Future Role within a Universal Health Insurance Policy in Tanzania [FINANCING FOR UHC SIG]

MODERATOR: **Katherine Mwimbe Boehl-Kamm**, Swiss Tropical and Public Health Institute (Swiss TPH)

ORGANIZER: **Manfred Stoermer**, Swiss Tropical and Public Health Institute (Swiss TPH); **Kuki Tarimo**, Providing for Health Initiative

DISCUSSANT: **Paul Christopher Chaote**, President's Office - Regional Administration and Local Government; **Edward Mbanga**, Ministry of Health

Development of the "CHF Iliyoboreshwa" Health Insurance and Its Potential Future Role within a Universal Health Insurance Policy in Tanzania

PRESENTER: **Manfred Stoermer**, Swiss Tropical and Public Health Institute (Swiss TPH)

Background

The Government of Tanzania (GoT) undertakes major policy efforts for reaching Universal Health Coverage (UHC). A crucial pillar for reaching UHC is the reform of the national health insurance system. The GoT intends to transition from largely voluntary health insurance schemes to a national mandatory health insurance structure. To this effect, the GoT tabled a "Universal Health Insurance" bill in parliament in September 2022. One crucial element of this health insurance strategy is the reform of the "Community Health Fund" (CHF) in Tanzania. During the last years, the CHF has been transformed from a limited prepayment system for primary level health facilities to a fully-fledged modern health insurance − the "improved CHF" (iCHF). The iCHF focusses on the rural population, informal sector, workers and small−medium scale businesses.

Materials and Methods

The proposed contribution will provide a technical and policy overview on the reform of iCHF in Tanzania within an organized session of the conference. The presentation showcases the iCHF reformed health insurance system, presents its features and innovations, and discussed the challenges for reaching out with a meaningful health insurance offer to populations characterized by low purchasing power and informal sector working relations. The presentation will present both the experiences with developing and implementing the iCHF from the GoT perspective and from the perspective of a major support project for this process.

Results

The iCHF has been rolled out in 2018 as a national health insurance scheme. While transitioning from a limited paper-based prepayment scheme to a national health insurance scheme, a modern IT system was developed which connects all actors of the iCHF network. More than 6,000 health facilities from primary to tertiary level are providing health care to members, approximately 16,500 Enrolment Officers across the country are registering members, and more than 2,000 iCHF managers and supervisors manage the system at council and regional levels. So far, 4,167,723 beneficiaries have been enrolled in the iCHF cumulatively, corresponding to 7.6% of the population. As per September 2022, a cumulative amount of approximately USD 12.5 million has been generated in revenues. The reform of the iCHF resulted so far in a health insurance system that is affordable, offers an attractive benefits package, easy enrolment mechanisms and portability through access to 6000 health facilities, backed by a reliable payment mechanism and a strong IT management system.

Conclusion

Challenges faced by the GoT include now to further strengthen the organizational management structure at the central level, to further professionalize the marketing and sales structures, and to define the future role of iCHF within the envisaged mandatory national health insurance architecture. Providing a health insurance option for low-income earners and small and medium sized businesses while still maintaining comprehensive and high quality benefits package(s)

Community Perception and Motivation on the Improved Community Health Fund in Tanzania
PRESENTER: **Angel Dillip**, Apotheker Health Access Initiative

Background/Rationale

The Community Health Fund (CHF) is a voluntary community-based prepayment scheme aiming at contributing to a sustainable financing mechanism for health care in Tanzania. The improved CHF (iCHF) transformed the rather simple prepayment scheme into a fully-fledged health insurance scheme aiming at covering specifically the rural population and people working in the informal sector. It was rolled out nationally in 2018, the focus being on improving iCHF structures to increase enrolment in the scheme. Despite these efforts, iCHF active coverage does not exceed 10% countrywide. This study assessed the perception and motivation behind enrolment in iCHF, both among members and non-members, in order to inform strategies to increase enrolment.

Materials and Methods

This was a mixed-method cross sectional study design combining qualitative and quantitative data collection methods. A multistage sampling technique was applied to identify 1503 respondents in five regions of Tanzania. Focus group discussion complemented quantitative data collection.

Results

More than half (57%) of the participants of all study groups, including iCHF active members, were not aware of the difference between old and improved CHF. Cost saving and use of the Insurance Management Information System (IMIS) were the key reasons for joining iCHF among members, cited by 50% and 25%, respectively. Only 37% of non-members reported inability to pay the premium. Knowledge on the specific health care services included in the iCHF benefit package from dispensary to district and regional referral levels was found to be low even among active members. More than 70% of active members appreciated iCHF membership and services. Study group participants, including those among active members, thought availability of health facilities in the village (89%) and IMIS (80%) increases iCHF attractiveness. Only 50% of active members were enrolled through Enrolment Officers (EOs) who visited members at their household, while 30% of members had to actively find the respective EO at the village for enrolment. Apparently, EOs were observed inactive in study regions and mostly in Dar es Salaam. The majority of the study group participants preferred treatment access at public and faith-based health facilities. Most of the active members were observed being assisted by various organizations supporting the poor; consequently, this has contributed to the perception that iCHF is an insurance for the poor. Nevertheless more than 70% of participants expressed willingness to pay an extra amount to the current premium in order to have access to extended services currently not covered within the premium such as treatment and surgery related to non-communicable diseases.

Conclusions

Acting on the necessity of the current iCHF scheme to increase enrolment, iCHF needs to better promote the iCHF benefits package, strengthen the EOs accountability structure, increase the iCHF premium and incorporate faith-based health facilities into iCHF. To ensure

increased premium and improved quality services, the Government of Tanzania should include the iCHF scheme in its plans to introduce compulsory health insurance for all citizens in Tanzania.

Financial Viability of the Improved Community Health Fund (iCHF) in Tanzania

PRESENTER: **August Kuwawenaruwa**, Ifakara Health Institute

Background/Rationale

Universal health coverage (UHC) has become a major policy priority in Tanzania, and the government has undertaken health financing reforms to improve health insurance coverage. In Tanzania, approximately 16 percent of the population are covered by some form of health insurance. Despite efforts taken by the government, Tanzania is still far from achieving UHC. The study aimed to identify the critical components of financial viability of the improved community health insurance fund (iCHF) in its current design.

Methods

A mixed methods approach was deployed. Quantitative data extracted from the healthcare facilities consisted of revenue accruing to the facilities from insurance reimbursement, user fees and basket fund. In addition, information was collected on client's access and utilization by each provider payment method. The study was conducted in April 2022 in six regions and included 5 regional referral hospitals, 5 district hospitals, 17 public health centers, 20 public dispensaries, 14 faith-based facilities and 9 private, for-profit facilities. In addition, in-depth interviews were conducted with health care managers and health care providers. Descriptive analysis was done for the quantitative data, while framework analysis was used for summarizing the qualitative data. The findings were triangulated and synthesized across respondent groups for validation purpose.

Results

The iCHF has been operational for over 36 months as a national health insurance scheme. A total of TZS 27 billion (cumulative) have been collected, while about TZS 17 billion have been reimbursed to the health facilities from July 2018 to January 2022 (~USD 7,486,000). In terms of access and utilization, it was found that in urban settings relatively more clients were paying out-of-pocket, while in rural settings relatively more clients were within the exempted category. The costs analysis of subsidizing the poor with health insurance showed that it will cost the government TZS 29,677,604,065 (US$12,903,306) to provide subsidized iCHF coverage to 960,677 citizens who qualified for waiver/exemption. Most iCHF beneficiaries accessed primary healthcare facilities while at regional referral hospitals beneficiaries had to make co-payments. It was noted that iCHF scheme is not able to reimburse the full costs of health service provision. While this does not create problems for government operated health facilities as they are mainly funded through separate budgets it does create challenges for including private health facilities. Contrary to the private for-profit health facilities most of the faith-based non-profit facilities showed interest to provide services to iCHF beneficiaries contingent on review of service agreements with the government.

Conclusion

Costs for provision of healthcare are high, while iCHF reimbursements are low. It is important to note that full cost recovery only through membership contributions would be a challenge as iCHF needs to stay affordable for the broad population. Expanding the iCHF entitlements to private facilities seems still viable for non-profit health facilities. Existing service agreements between the government and non-profit healthcare providers should be reviewed. Replacing the exemptions/waivers for the poor and vulnerable with health insurance seems to be financially feasible for the government.

Challenges and Opportunities in Intensifying Marketing and Sales Forces for the CHF Iliyoboreshwa in Tanzania

PRESENTER: **Albino Kalolo**, St Francis University College of Health and Allied Sciences

Introduction

The Government of Tanzania in the last years embarked on a reform of the "Community Health Fund", transforming it to a comprehensive health insurance scheme with national outreach. Like similar cases of voluntary health insurance schemes, it has the potential to advance progress towards universal health coverage if the persistent problem of low enrolment can be resolved. Intensifying marketing and branding, and professionalizing sales forces may be key measures to improve the uptake of such voluntary health insurance schemes. Studies on strategies to intensify marketing and sales forces in health insurance are scarce. This study assessed the challenges and opportunities in intensifying marketing and sales forces for the improved Community Health Fund (*i*CHF), commonly known as "CHF iliyoboreshwa" in six regions of Tanzania.

Methods

This study employed a mixed methods multiple case study design. We utilized multiple data collection tools, i.e., a survey questionnaire (N=516), focus group discussions (FGDs) (N=12) and in-depth interviews (N=75) to gather information from a range of participants, including; enrolment officers, *i*CHF coordinators, admirative and political leaders, personnel from private businesses and companies and *i*CHF beneficiaries. Descriptive and thematic analyses were employed for quantitative and qualitative data respectively

Results

Enrolment activities were ongoing across the regions but only 64% of the participants were satisfied with the effectiveness of the sales forces. The *i*CHF as a product was rated 50% whereas effectiveness of marketing activities was rated 58%. Marketing activities relied on traditional marketing strategies, mainly campaigns in communities, use of local media platforms (e.g., local radio) and minimal use of social media. Reported challenges include: 1) absence of strategic or operational plans for marketing; 2) absence of marketing personnel in the entire structure of the scheme; 3) presence of similar products causing confusion; 4) inadequate know-how of using social media in marketing; 5) lack of a communication package tailored to demographic divides and social representations; 6) sales personnel working on part-time basis; 7) lack of involvement of the private sector in marketing, branding and managing sales; and 8) limited sales options. Reported opportunities include the use of social media platforms by the public, a perceived readiness of private sector to partner with *i*CHF and the popularity of the *i*CHF brand

Conclusion

Uncovering the opportunities and challenges in the marketing and sales forces is not an end in itself but only a part of the process to make *i*CHF a viable and sustainable scheme for the informal sector workforce and rural population. There is a need to intensify marketing and sales forces for the *i*CHF using a multifaceted approach that includes the wider opportunities and stakeholders while systematically addressing the challenges holistically and sustainably. Especially the abundant sales agents already active in selling mobile phone products could be systematically integrated into professionalizing the sales force for the iCHF. Further, potentials for integrating the Mobile Network Operators into a partnership should be explored in depth.

9:00 AM –10:30 AM   WEDNESDAY   [Economic Evaluation Of Health And Care Interventions]

Cape Town International Convention Centre | CTICC 2 – Daisy

Making Implementation Feasible: Accounting for Constraints in Priority Setting Under Limited Resources

MODERATOR: **Francis Ruiz**, London School of Hygiene & Tropical Medicine (LSHTM)

ORGANIZER: **Andres Madriz-Montero**, London School of Hygiene and Tropical Medicine

DISCUSSANT: **Rob Baltussen**, Radboudumc; **Stella Matutina Umuhoza**, University of Rwanda - School of Public Health

Is It Feasible? Assessing Feasibility for Health Benefits Package Prioritization in Rwanda
PRESENTER: **Andres Madriz-Montero**, London School of Hygiene and Tropical Medicine
Less than perfect implementation of benefit packages comprised of cost-effective interventions can lead to reduced efficiency in the health care system in terms of the overall health impact that can be generated. However, this is often the case arising from priority setting exercises, even when policy makers agree with the underlying objective of economic evaluation in health care – that is, to maximize the societal value of their limited health budget. The reason might be the inherent uncertainty in the decision to cover a package of technologies regarding the existing evidence of cost effectiveness and other relevant information (or lack thereof).

Decision makers are faced with multiple constraints that hinder implementation of health interventions, either limiting the pace of intervention scale-up, incurring in costs that were not observable in research settings, or may be unsurmountable even with additional resources. When priority setting does not invest in collecting additional information on relevant constraints, the process can result in incomplete implementation of benefits packages due to unfeasible health interventions being recommended.

Accordingly, there have been recent calls to incorporate health system constraints in priority setting for low- and middle-income countries (LMICs). Yet despite the increasing recognition of the importance of accounting for constraints, there are few applications of priority setting that do so and are limited to specific disease areas or incorporate a narrow set of constraints. Even more scarce, are applications of priority setting within a health benefits packages process that consider constraints or feasibility concerns.

HBPs are highly complex processes with no broadly accepted method for their design and implementation. They require significant investments in building stakeholder support and participation, developing a governance structure, recruiting additional human resources, improving technical capacities through training, and collecting substantial amounts of data. Given that HPBs need to prioritize between hundreds (if not thousands) of interventions, the process needs to make sure that all relevant information is being collected in the scoping and assessment stages so that that informed decisions can be made in an appraisal/deliberative process. A key challenge is how to design, develop and implement a HBP in a way that: (a) considers all relevant constraints; (b) achieves a balance between evidence collection and uncertainty in decision making; and (c) retains a notion of the trade-offs (opportunity costs) between investment choices.

This paper explores and develop the methods for incorporating a formal, structured and explicit feasibility assessment in a priority setting framework for benefits packages, along the relevant phases of the process (scoping, assessment, appraisal, implementation), using priority setting for the community-based health insurance system in Rwanda as a case study.

Estimating the Health System Cost of Interventions of Universal Health Coverage- Benefit Package UHC-BP at Two Districts of Pakistan

PRESENTER: **Maryam Huda**, Department of Community Health Sciences, Aga Khan University Hospital, Karachi, Pakistan

UHC is based on the principle that all individuals and communities have equitable access to essential, quality health services without significant financial burden. There are several types of health services that countries could deliver, but budgetary constraints require policymakers to limit the number of interventions financed through public expenditure. In order to sustain UHC access, there is a pressing need to determine accurate estimates of health care interventions' health systems costs to better assess implementation feasibility when prioritizing interventions based on population need. More specifically, health system costs are used in prioritization, planning, operational budgeting, economic evaluation of programs, interventions, and ultimately in disease management. While the literature provides different methods of calculation of service delivery costs there is a dearth of frameworks to comprehensively assess different components of health system costs.

Our study presents a framework to identify and measure health systems of health benefit packages, by applying a micro costing methods at healthcare facility level in Pakistan . We assess costs in two districts of Sindh province of Pakistan i.e., Hyderabad and Larkana. At each district, one first level hospital (Tehsil Headquarters Hospital (THQ) or District Headquarters Hospital (DHQ), one Rural Health Center (RHC), five Primary Healthcare (PHC) facilities (Basic Health Unit (BHU), and a total of 50 Lady Health Workers (LHWs) are selected randomly from the lists of facilities and LHWs.

A hybrid step-down and activity-based costing method is adopted from provider's perspective, using a one-year timeframe to pilot the health benefit package in Pakistan. A total of 94 interventions across 4 clusters at three levels of care. We will interview a range of providers and managers at all levels of the health service to identify the actions for scaling up these essential services required to address a range of feasibility constraints.

Cost-Effectiveness of Tuberculosis Infection Prevention and Control Interventions in South African Clinics: A Model-Based Economic Evaluation Informed By Complexity Science Methods

PRESENTER: **Fiammetta Bozzani**, London School of Hygiene & Tropical Medicine (LSHTM)
AUTHORS: Nicky McCreesh, Karin Diaconu, Indira Govender, Richard G. White, Karina Kielmann, Alison D. Grant, Anna Vassall

Nosocomial *Mycobacterium tuberculosis* (*Mtb*) transmission substantially impacts health workers, patients and communities. Guidelines for tuberculosis infection prevention and control (TB IPC) are available but implementation in many settings remains sub-optimal. Evidence is needed on cost-effective investments to prevent nosocomial *Mtb* transmission that are feasible in routine clinic environments.

A set of TB IPC interventions was co-designed with local stakeholders using system dynamics modelling techniques that addressed both core activities and enabling actions to support implementation. An economic evaluation of these interventions was carried out at two clinics in KwaZulu-Natal, employing an agent-based model of *Mtb* transmission within the clinics and in their catchment area populations. Intervention costs included the costs of the enablers (e.g. strengthened supervision, community sensitisation) identified by stakeholders as necessary to strengthen the health system to ensure uptake and adherence to the infection control measures.

All intervention scenarios modelled, inclusive of the relevant enablers, cost less than US$ 200 per disability-adjusted life-year (DALY) averted and were very cost-effective in comparison to South Africa's opportunity cost-based threshold (US$ 3,200 per DALY averted). Two interventions, building modifications to improve ventilation and maximising the use of the existing Central Chronic Medicines Dispensing and Distribution system to reduce the number of clinic attendees, were found to be cost-saving over the 10-year model time horizon. Incremental cost-effectiveness ratios were sensitive to assumptions on baseline clinic ventilation rates, the prevalence of infectious TB in clinic attendees and future HIV incidence but remained highly cost-effective under all uncertainty analysis scenarios.

In conclusion, TB IPC interventions in clinics, including the enabling actions to ensure their feasibility, afford very good value for money and should be prioritised for implementation within the South African health system.

Participatory Methods and Economic Evaluation: The Example of Cost-Effectiveness of a Quality Improvement to Capture Demand-Side Constraints

PRESENTER: **Meghan Kumar**, LSHTM

In complex adaptive systems, decision makers need to understand not just what happened but how and why it happened in order to decide how to allocate resources and sustain impacts. Trial-based economic evaluation methods focused on measuring resources required to implement an intervention and linked outcomes are inadequate to capture the contextual variations, mechanism and drivers of outcomes. This is exacerbated for complex interventions such as quality improvement, where dynamic human behaviour and feedback loops affect both implementation and outcomes. Methods that provide deeper understanding of incentives, behaviour, and the costs of what people did not do are needed to predict and describe resource use.

In this study, we examine primary data collected, analysed and published previously by the authors as a cost-effectiveness study taking a societal perspective. Using a secondary analysis, we assess how missing societal cost data might be captured with participatory methods engaging health service users and workforce. We map existing and missing cost data and possible impacts on published findings. We

combine these indicative findings with qualitative interviews with researchers, implementers and policymakers on perceived feasibility of integrating participatory methods with economic evaluation.

In the findings, we will present the categories and value of costs and consequences that were not included in the first analysis of the quality improvement intervention and which participatory approaches might have been used to capture these. We also estimate the additional costs of this data collection. Based on the interview results, we also provide more general guidance on the integration of demand-side constraints into economic evaluations, the types of costs and consequences that might be yielded from different participatory approaches in evaluation, decision maker perspectives on this evidence, and the implications for primary data collection in this area for future studies of complex interventions.

Overall, there appears to be an opportunity for participatory economic evaluation methods to improve sustainability of interventions, better reflecting the complexity of the interventions and the systems in which they are implemented. The Medical Research Council in guidance on evaluating complex interventions clearly states the critical role of implementation fidelity, mechanism and context on programme effects – yet does not well capture or define how to integrate economic aspects, which are primarily quantitative and mechanism-agnostic within evaluation. There is also a demand from policymakers for locally relevant, transferable evidence that incorporates both resources and mechanism. By combining participatory methods and economic evaluation, health systems strengthening interventions can be made more effective, sustainable and transferable, better informing resource allocation decisions.

9:00 AM –10:30 AM   WEDNESDAY   [Health Care Financing & Expenditures]

Cape Town International Convention Centre | CTICC 1 – Room 2.44-2.45

Decentralization and Public Financial Management for Health: Lessons for Improving Health Outcomes

MODERATOR: **Louise Allen**, Oxford Policy Management, South Africa

ORGANIZER: **Suresh Tiwari**, Oxford Policy Managment, Nepal

Health Sector Budget Analysis to Appraise Health PFM in Newly Decentralized Setting: A Case from Nepal

PRESENTER: **Hema Bhatt**, Oxford Policy Management

A federalized system with three tiers of government—federal, provincial, and local—replaced Nepal's previous unitary system of governance in 2017. Women, children, agriculture, health, and education were the first decentralized social sectors. Determining the consequences of decentralization on the health system depends on a variety of factors, including functional clarity, subnational capability, and decision-making authority, as well as alignment with necessary reforms in public procurement and financial management (PPFM). Limited understanding of PPFM rules, processes, and practices among health stakeholders often led to issues with budget formulation, execution, and expenditure tracking impeding service delivery. With the help of a budget analysis (BA) exercise conducted as part of a technical assistance project, this study attempts to demonstrate how the concept of health PPFM was implemented in a recently decentralized health system in Nepal. The project provided 18 months of technical support to the subnational level in 3 provinces and 38 local levels. BA evolved from being a routine task into a requirement to track, aggregate, and report on health spending across governments. This was mainlydue to lack of interoperability between the financial management information systems across governments. A framework was developed to guide the BA task at the federal, provincial, and local level followed by a three-day training for health managers and finance officers and budget advocacy workshop among newly elected representatives. The National and Provincial Health Training Centers have institutionalized the BA training curricula, master trainers, and necessary resources to assure sustainability. There is now increased fiscal space for health because of resource transfers at the subnational level. The Local level rely heavily on the conditional grant transfer compared to provincial governments (PG) limiting flexibility. The federal government streamlined procurement policy and operation at all levels of government using BA results. PGs agreed to spend a minimum of 10% of the provincial budget on health, including supporting local levels with limited financial resources. Health professionals trained in service delivery learn to appreciate their PPFM roles and responsibilities in operating a municipal health system. Both health managers and finance officers gained an understanding on the significance of policy formulation for planning, appropriate use of budget classification for budgeting & expenditure tracking and development of plans & guidelines to facilitate budget execution. As a result, several municipal governments formulated their health policies and acts to inform and align priorities. Budget for health has changed from being an unallocated budget to a structured program budget. Programs at the local level now place a higher priority on preventive and promotive care than on curative treatment. A chart of accounts and a chart of activities are used to report spending according to national targets and localized SDG indicators. Annual procurement plans and program implementation guidelines are developed to reduce audit observations. BA also started a conversation on broader PPFM issues, such as transistioning away from conditional grant mechanisms in the health sector, updating grant mechanism to make it more accessible & results-oriented, and building local level capacity to write grant proposals and fund local priorities.

Lessons from a PFM Support to the Primary and Secondary Health Care Development in Punjab, Pakistan

PRESENTER: **Faisal Rashid**, Oxford Policy Managment, Pakistan

A Technical Assistance (TA) programme was implemented to improve health service delivery in Punjab province of Pakistan from April 2019 to March 2022. Project's interventions were structured across the six health systems building block. The health financing intervention was targeted to improve the key PFM issues around budget credibility, comprehensiveness and transparency which were negatively impacting service delivery by the primary and secondary health department (P&SHD). A platform approach was taken to sequence the implementation of PFM reforms in P&SHD across the various stage of budget cycle. Simple user-friendly forms, and formats were developed to facilitate the planning process and its linkage with the medium-term budgetary framework (MTBF). Excel based tools were introduced to shift from traditional budgeting to needs based budgeting promoting automation. Basic reporting system were developed to enable budget execution reviews on monthly and quarterly basis. PFM system strengthening and capacity development was an integral part of the reform process because of which the development unit was restructured into the development and finance wing and housed by a dedicated PFM team. Support was also provided for the establishment of a complete fund flow structure along with new HR requirements from the Regional Health Authorities to the District Health Authorities. The Budget and Account Officers position were created at the district level. This reform strengthened the overall leadership and management capacity and improved accountability. As a result, budget ceiling started getting notified to each provincial and district spending unit. CEOs and additional secretary were made responsible for budget preparation and finalisation including mandatory presence in budget reviews. Provision of monthly and quarterly expenditure reviews were established including the production of bi-monthly and annual budget and expenditure report at the district and the province. Capacity building of budget & account staff fostered evidence-based planning & budgeting, improved cash forecasting, promoted appropriate use of functional budget classification, and established the importance of budget and expenditure reviews. Ranking prepared using scorecard appeared valuable in monitoring district performance. The outcomes from the project were more accurate budgeting, reduction in block allocation from 35 percent to zero percent, decrease in reappropriation of funds from 4 billion PKR to 1 billion PKR and decline in supplementary grants from 6.5 billion PKR to 0.6 billion PKR in a year. Districts health budgets were increased with utilisation improving to 96 percent from 85 percent. Being systemic interventions, budget preparation using the revised budgeting techniques and expenditure review at the provincial level is more likely to continue without the TA support. Continued support may be required to strengthen the district level including cashflow forecasting, budget preparation, MTBF statement preparation, expenditure review and the overall linkage between policy, planning and budgeting. Capacity building needs to be institutionalised into the system for ongoing training and refresher training. Setting the right expectation with Government, constant stakeholder engagement, a focus on providing the Department with actionable & practical support and the responsiveness shown by the project to respond to the COVID-19 pandemic were key lessons learnt for the project success.

What Are Countries Spending on Health? Trends in Domestic Government Budgets and Spending on Health across 52 Countries in Africa

PRESENTER: **Matthew Cooper**, Oxford Policy Management

Following the COVID-19 pandemic, many countries are facing a debt crisis and reduced fiscal space for social sectors, including health. However, it is essential to improve spending on health to continue to make gains toward national and international health goals. A key objective of the Global Fund remains to mobilise domestic resources for health, particularly for the sustainability of HIV, tuberculosis (TB), and malaria programs. Budget and financial flow analyses can help identify opportunities for increased spending on HIV, TB, and malaria through domestic health budgets. There are several sources for data on government spending on health in low- and middle-income countries, including the Global Health Expenditure Database and the Institute for Health Metrics and Evaluation's database. However, these data are often unreliable and not comparable across countries due to differences in country budget structures, quality of reporting, and assumptions used in analysis. As a result, the Global Fund is undertaking the assignment to estimate health budget allocations and spending – particularly for primary healthcare at subnational levels - in 2019, 2020 and 2021 using primary budget and expenditure data sources across in 52 African countries. The study also analyzed funding flows and autonomy and flexibility across levels of government in deciding how to use health funds. Preliminary results suggest that spending on primary healthcare at subnational levels has increased over the last three years in most African countries, particularly in countries that have devolved and implemented PFM reforms such as program-based budgeting. Further analysis is needed to identify the most effective conditions and governance reforms that contribute to improved health financing in the region. This information can help set ambitious yet realistic co-financing requirement targets in the Global Fund-supported countries including the role of subantional government in securing funds for key health programmes.

9:00 AM –10:30 AM   WEDNESDAY   [Economic Evaluation Of Health And Care Interventions]

Cape Town International Convention Centre | CTICC 2 – Orchid

Novel Approaches to Considering Equity [EQUITY INFORMATIVE ECONOMIC EVALUATION SIG]

MODERATOR: **Jiunn Wang**, University College London

Equity in National Healthcare Economic Evaluation Guidelines: Essential or Extraneous?

PRESENTER: **Tuba Saygin Avsar**, University College London
AUTHORS: Paula Lorgelly, Xiaozhe Yang

Background: The focus on health maximisation in a healthcare economic evaluation (HEE) – that is a QALY is a QALY is a QALY – has significant implications as health systems attempt to address persistent and growing health inequities. This study aimed to

systematically compare and contrast the equity principles of different health technology assessment (HTA) agencies and how equity is addressed in HEE guidelines.

Methods: HTA methods guidelines were identified through the ISPOR, INAHTA, GEAR, iDSI, HTAi, INAHTA, HTAsiaLink, and tRedETSA websites. The guidelines were grouped into two categories: well-established and newly-developed agency guidelines, based on whether or not they published their first guidelines before 2009. Data extracted summarised the methodological details in the reference cases, including specifics on how equity featured and in what role.

Results: The study included 46 guidelines from 51 countries. Amongst the selected guidelines, 16 were published after 2009 and the corresponding HTA agencies were classified as newly-developed agencies and the others as well-established. Most HEE guidelines were not explicit about the role of equity. Although equity featured in 24 guidelines, only seven recommended specific methods to incorporate inequalities. Addressing equity concerns was suggested as an additional analysis rather than a key part of the assessment. It was unclear how the trade-offs between equity and efficiency were balanced in the decision-making processes.

Conclusion: Equity is given less attention than efficiency in HEE guidelines. This indicates that HTA agencies while subscribing to an extra-welfarist approach have a narrow evaluative space – focusing on maximising health and not considering the opportunity cost of the equity constraint. The omission of equity and the lack of systematic approaches in guidelines poses a threat to the international endeavours to reduce inequalities. It is timely for HTA agencies to reconsider their positions on equity explicitly.

Estimating Health Equity Weights across Multiple Domains

PRESENTER: **Matthew Robson**, University of York
AUTHORS: Owen O'Donnell, Tom Van Ourti

Background: Numerous experiments find substantial aversion health inequality. However, aversion to health inequality may not be independent of the source of that inequality. Some inequalities may be due to factors entirely beyond an individual's control, while others are not. Some inequalities may be considered fair or deserved, while others may not. The priority given to the worse-off may depend not only on their health but also on other equity-relevant characteristics. Few experiments are designed to make this distinction. This is the first study to separately identify health inequality aversion parameters and equity weights across multiple non-health domains - sex, income and smoking status. To do this, we develop a novel experiment design and use this to obtain the first estimates of these parameters and weights for the UK adult population.

Objective: To separately identify health inequality aversion parameters and equity weights across multiple domains - sex, income and smoking status – for use in Distributional Cost-Effectiveness Analysis.

Methods: Experiment participants allocate scare resources that differentially impact on the health of recipients of the resources. In separate treatments, each with 10 rounds, recipients are 1) anonymous, and 2) identified by a) biological sex, b) income, and c) smoking status. Choices made within and across the treatments makes it possible to disentangle aversion to health inequality from weights on the non-health, potentially equity-relevant characteristics. We gather rich experimental data (76,338 obvs.) in an interactive online experiment with a representative sample of the UK adult population (n=899) recruited through Prolific. We specify social welfare functions and estimate the inequality aversion and equity weight parameters at the participant-level using a random behavioural model. This permits policy evaluation to be conducted in a Distributional Cost-Effectiveness Analysis framework.

Results: The majority of participants exhibit a significant degree of health inequality aversion. We find that, on average, participants give a high weight to non-smokers over smokers, a moderate weight to the poor over the rich, and a small weight to females over males. The estimated health inequality aversion parameters combined with domain-specific equity weights have clear consequences for the allocation of resources across groups defined by the non-health characteristics and the prioritisation of those groups in response to baseline health inequalities between them. We illustrate these policy consequences using baseline data on Quality Adjusted Life-Expectancy. This highlights problematic recommendations of existing CEA and DCEA methods. We uncover reasons for heterogeneity across domains and between participants using detailed questionnaire data. This reveals that beliefs surrounding responsibility, luck and fairness drive heterogeneity in equity weights across domains and between participants.

Conclusion: Aversion to health inequality is marked but is domain specific. Priority is given to the worst-off in terms of their health but also to non-smokers, the income poor, and females.

Keywords: Inequality Aversion, Health, Experiment, Responsibility, Fairness, Social Welfare

Health Inequality in Economic Evaluation and Localised Decision Making: Same Term, Different Meaning?

PRESENTER: **Sebastian Hinde**, Centre for Health Economics, University of York
AUTHORS: Dan Howdon, James Lomas, Matthew Franklin

Objectives. Quantitative analysis frameworks including economic evaluations have increasingly employed methods and data to understand how funding decisions within care sectors (e.g. health and social care) impact health inequalities. However, there is a disconnect between the methods used by researchers (e.g. within academia) and analysts (e.g. within publicly funded agencies), and the evidence needs of decision makers in regard to how health inequalities are accounted for and presented within such frameworks. Our

objective is to explore how 'inequality', with a focus on health inequality, is defined and quantified in different contexts. We focus on how specific approaches have developed in-part dependent on available data, what similarities and differences have emerged, and consider how any disconnect can be bridged to facilitate effective co-production and collaboration.

Methods. We explore existing methodological research regarding the incorporation of inequality considerations into economic evaluation in order to understand current best practice alongside conventional frameworks such as cost-effectiveness analysis. In parallel, using the English care setting as an example, we explore how policy makers compel localised decision makers to incorporate inequality considerations into their commissioning processes, and how data has been used and analysed to monitor levels of inequality within localised jurisdictions.

Results. We summarise the recent development of distributional cost-effectiveness analysis in the economic evaluation literature: a method which makes explicit the trade-off between efficiency and equity in healthcare commissioning. In the parallel policy and decision-making setting, while the alleviation of health inequality is regularly the focus of their remit, few applied details have been formalised regarding how health inequality should be defined or quantified. While data developments have facilitated the reporting and comparison of metrics of inequality to inform commissioning decisions, these tend to focus on measures of care utilisation and behaviour rather than measures of health.

Discussion. We suggest that while both researchers and those associated with publicly funded commissioning agencies are increasingly putting the identification of health inequalities at the core of their actions, little consideration has been given as to how to ensure that such actors are approaching the problem in a consistent way. The extent to which researchers and commissioning agencies can collaborate on best practice has important implications for how successful policy is in addressing health inequalities.

Promoting Early Childhood Development in Vietnam: Equity-Informative Cost-Effectiveness Analysis Alongside a Cluster-Randomized Trial

PRESENTER: **Yeji Baek**, Monash University
AUTHORS: Zanfina Ademi, Thach Tran, Alice Owen, Trang Nguyen, Stanley Luchters, David Hipgrave, Sarah Hanieh, Tuan Tran, Ha Tran, Beverley-Ann Biggs, Jane Fisher

Objectives The world has achieved reductions in child mortality with efforts to combat poverty and hunger. Despite the progress, however, disparities still persist with more deaths and challenges to child health and wellbeing in disadvantaged groups. Little attention has been paid to incorporating equity in planning and evaluation in the economic sense. There are missed opportunities to identify who benefits more from interventions or who is left behind, and whether interventions reduce or increase inequalities. To our knowledge, no studies have examined the cost-effectiveness of early childhood development (ECD) interventions with equity considerations in low-and middle-income countries. Understanding the equity impacts of programs provides meaningful information to refine strategies to reach the most disadvantaged group and achieve equity. This study aimed to examine the equity impacts of a multi-component ECD intervention in rural Vietnam.

Methods We estimated the cost-effectiveness of the intervention with a 30-month time horizon from the service provider and household perspectives. Data were from a cluster-randomized controlled trial comparing the intervention with the local standard of care. The intervention addressed maternal nutrition and mental health, parenting capabilities, infant health and development and gender norms through eight group sessions during pregnancy, one home visit after childbirth, and 11 group sessions during the first postpartum year. The incremental cost-effectiveness ratios (ICER) per child cognitive development score gained were estimated by household wealth quintile and maternal education level, adjusted for cluster effects and baseline characteristics such as maternal parity and age. A 3% discount rate was applied to costs, and non-parametric bootstrapping was used to examine uncertainty.

Findings Children in the intervention arm had higher cognitive development scores than those in the control arm across all subgroups. The difference between trial arms was the largest in the poorest quintile and the smallest in the richest quintile. Based on intervention recurrent cost, the ICER per cognitive development score gained was lower in children from the poorest quintile (-US$6) compared to those from the richest quintile (US$16). Similarly, the ICER per cognitive development score gained was lower in children whose mothers had the lowest education level (-US$0.02) than those with mothers who had the highest education level (US$7).

Conclusion With a 30-month time horizon, the intervention was more cost-effective in children in the poorest two quintiles than those in the higher wealth quintiles, and more cost-effective in children with mothers who had less educated mothers than those with more educated mothers. Even though our findings should be interpreted with caution due to the insufficient study power, the findings suggest that the intervention could promote equity while improving child cognitive development with greater cost-effectiveness in disadvantaged groups.

10:30 AM –11:00 AM   WEDNESDAY   [Social Events]

Cape Town International Convention Centre | CTICC 1 – Clivia, Jasminum & Strelitzia conservatories
Refreshment Break and Poster Viewing

11:00 AM –12:30 PM   WEDNESDAY   [Health Beyond Health Care Services: Social And Related Determinants]

Cape Town International Convention Centre | CTICC 1 – Room 2.63
Workforce participation, wages, health and wellbeing

MODERATOR: **Michelle McIsaac**, World Health Organization (WHO)

The Effect of Minimum Wages on Health in China
PRESENTER: **Silvana Robone**, University of Insubria
AUTHORS: Gilberto Turati, Dan Liu

Since 2004 the employment regulations in China require that nominal minimum wages should be adjusted at least once every two years in all the provinces of this country. A minimum wage increase might have a positive impact on health through the channel of income or income distribution. However, it might also be adversely linked to health due to a worsening of working conditions (such as the request of higher productivity and/or more working hours). Thus, a priori, the net effect of minimum wages on health is uncertain. By using data from the Wave 1 of the World Health Organization (WHO)'s Study on Global Aging and Adult Health in China (2007-2010) in our study, we estimate this net effect. Our final sample includes about 1825 observations for each health domain considered.

We use ten health and well-being domains (*mobility, memory, learning, sleep, vision, pain, discomfort. depression and anxiety*) as the dependent variables and estimate an ordered probit model. We include as controls standard socio-demographic characteristics which have been proved to be relevant determinants of health (*age*, *gender*, *marital status*, *education, annual household income*, *individual annual wages*, *other sources of income),* variables related to the employment status of workers (*the type of employment*, *job sector* and *type of contract*) and to the living environment of the respondents (*safety, population density, urban).* We control for unobserved residual heterogeneity including province and year fixed effects.

We found that the *real minimum wage* is negatively and significantly related to all the health outcomes These negative effects are mostly found for employees in the private sectors and with a full-time contract. Some "back of the envelope" computations show that the magnitude of the effect of a potential increase of the *real minimum wage* of the individuals is not negligible. If we consider the average increase in the *real minimum wage* in one year (20 RMB), for *mobility*, *memory* and *learning*, for istance, this increase would induce a reduction in the probability of being in the best health category of 2.7%, 4.9% and 4.4%, respectively.

Minimum wages can be considered as exogenous since the health status of workers is not taken into account by provincial governments when determining the minimum wage rate. This exogeneity assumption is supported by empirical literature (Dreger et al. 2019, Li et al. 2019) and by the results of a placebo regression, where we use as placebo group individuals who are self-employment or working in the informal sector.

Since the health domains are self-reported and measured on a categorical scale, the issue of reporting heterogeneity might bias the results of our analysis (King et al., 2004). To address this issue, we exploit the "vignettes" questions provided in the WHO dataset and estimate Hierarchical Ordered Probit (HOPIT) models. Although reporting heterogeneity is present in nine out the ten health domains, correcting for it does not change our conclusions significantly, since the results for *real minimum wage* we obtain in the HOPIT model are very similar to those obtained in the ordered probit model.

Local Economic Policy, Wellbeing, and Biology: Evidence from US Living Wage Ordinances in the Cardia Cohort
PRESENTER: **Mustafa Hussein**, The City University of New York (CUNY) Graduate School of Public Health

Background: Since the mid-90s, 100+ US cities passed ordinances mandating substantial "living wages" (LW) and often health insurance and other benefits for employees of contractors/subcontractors, businesses receiving financial assistance, and sometimes municipal/county government employees. Although LW ordinances directly covered only a small portion of low-wage workers, their broader spillover and sheer generosity likely drove their well-documented positive economic effects (e.g., several studies by Adams & Neumark 2002-2005, Neumark et al 2012). Overall positive health effects are plausible, yet unknown.

Methods: In a difference-in-differences (DID) design, we leverage a quasi-experiment in LW policy adoption across metro areas (MSAs) in the CARDIA epidemiologic cohort (panel) to assess the policy effects on allostatic load (index of cardiovascular, inflammatory, and

metabolic biomarkers), material & psychological wellbeing (financial hardship, CES-D scale for depressive symptoms), and consumption of alcohol and tobacco. Our sample includes 4,514 participants (age 38.1±6.2y; 55.6% female; 51.5% White) observed over 4 exams (1992-2006; *n* obs=14,622), in 35 "treated" MSAs with LW in major cities & 186 control MSAs. Across treated and control MSAs, DID balance tests show generally comparable characteristics and modest/little contemporaneous changes in composition across the two groups of MSAs. In our models, we adjust for changes in area-level characteristics and in cohort composition by race, poverty, and education due to aging and loss to follow. We focus on participants with less than high school (LHS; 5.6%) and high school graduates (HSG; 22.3%) who are most likely to be low-wage earners. Our models adjust for MSA, year, and individual fixed effects, participant geographic mobility, background changes in the federal/state minimum wage, density of LW-covered industries in the local economy (using industry location quotients), and lagged, time-varying MSA-level confounders. Robustness checks address composition of the study sample, additional MSA-level controls for unions and local politics (available for a sub-sample), as well as several ongoing tests of heterogeneity of policy effects, following the recent statistical and econometric literature (e.g., Callaway and Sant'Anna (2021,2022)). Finally, all estimates account for multiple comparisons through adjustment for the false discovery rate.

Results: At a 100% increase in the wage floor amount, LHS participants were less likely to report difficulty buying basic needs by 12.3 percentage points (pp) [95%CI: -1.9,-22.7] but also less likely to have health insurance by 21.6 pp [0.1,44.1]; consumed 5.2 [0.7,8.2] more cigarettes/day and 4.3 [2.8,8.5] more drinks/week; and had a 14% [-2.2,30.4] rise in allostatic load (~0.1 unit). HSGs, on the other hand, became less depressed (CES-D≥16) by 18.4 pp [-6.1,-30.7], ~60% decline. Both groups saw relatively large, full-time employment gains. These patterns are generally robust and appear stronger in occupations directly covered under the studied ordinances. Early evidence shows little heterogeneity-related bias in estimated average effects.

Conclusions: Mostly aligned with extant evidence, these findings suggest the net health effects of economic policies may reflect both gains in financial and psychological wellbeing as well as potential acceleration of pre-existing unhealthy consumption behaviors, moderated by workers' characteristics (e.g., skill level, time preference) and other social protections (e.g., the presence of public insurance).

11:00 AM −12:30 PM   WEDNESDAY   [Cross-Cutting Themes And Other Issues]

Cape Town International Convention Centre | CTICC 1 – Room 2.64-2.65
Economic issues in COVID

MODERATOR: **Timothy Powell-Jackson**, London School of Hygiene & Tropical Medicine (LSHTM)

Cash Transfers As a Response to COVID-19. Experimental Evidence from Kenya.
PRESENTER: **Jackline Oluoch-Aridi**, University of Notre Dame
Abstract

Cash transfers as a response to COVID-19. Experimental evidence from Kenya.

Background: The coronavirus pandemic hit Kenya in March of 2020. A variety of programs were initiated to respond to the effects of this unprecedented negative health related shock globally and in Kenya. This study reviews the impact of the cash transfer a policy within an informal settlement amongst women microentrepreneurs. This group were disproportionately affected by the economic shocks associated with the COVID-19 crisis

Methods: This study provided a short-term unconditional cash transfer (UCT) by delivering a one-time UCT to female microenterprise owners in Dandora, Kenya, an informal settlement in Nairobi county. The study provided one month's average profit to a randomly selected group of female microenterprise owners immediately preceding the initial exponential growth in COVID-19 cases in Kenya. We evaluate the effects of this one-time UCT using a randomized controlled to assess the impact of the UCT on economic and business outcomes- profit, revenue, inventory expeditures. We estimate the treatment effects compared to a control group in terms of economic and other outcomes such as spending on items e.g. food and PPE.

Results : We observe a substantial increase in profit, revenues, and inventory spending within treated businesses. Profit doubles relative to control, with a point estimate of 0.99 (p = 0.000). Relative to a control group, the firms in the treatment group recoup about 40 % of their profits. This translates to one third of their initial decline in profit during the initial economic shock. Married women see a smaller impact on their profit, with a treatment effect half that of an unmarried women (p=0.036).The Control groups profit responds to economic conditions and government announcements during our study period, and treatment effects are largest when control profit is at its lowest. The treatment groups food expenditures. PPE spending and precautionary management practices increase to mitigate the health risks of more intensive firm operation, but only among those who perceive COVID-19 as a major risk.

Conclusion: This paper provides new experimental evidence on the impact of a one-time cash transfer during a severe global economic downturn due to the COVID_19 pandemic. Our results show that there are substantial impacts from an unconditional cash transfer during a particularly severe economic downturn and UCTs are effective at helping microenterprise owners maintain their livelihoods and engage

in consumption smoothing when needed public health measures are taken. These results demonstrate that UCTs may play an important role in mitigating the economic costs of a public health crisis for microentrepreneurs who make up a large part of the urban workforce in developing countries.

Adjusting to Covariate Shocks: Tiding the COVID-19 Wave in India?

PRESENTER: **Deepti Sharma**, IIM Bangalore
AUTHOR: Arnab Mukherji

Background: Income risk and consumption adjustments have been an everlasting feature of humankind. Often generated by economic fluctuations or shocks from wars, climate change, or even epidemics, some of these are anticipated, while others remain unforeseeable; in either instance, households seek to insure from these fluctuations. Much of this literature seeks to understand how human behaviour to such shocks varies with credit constraints, poverty, socio-economic factors, and even household risk preferences in the context of idiosyncratic shocks, or at most, locally covariate shocks.

Aim: COVID-19 (C19) not only affected household health, but the associated economic disruption, exacerbated by C19 management practices, presents an opportunity to investigate household behaviour when faced with widespread shocks with limited opportunities to insure.

Methods: Using longitudinal data from India we investigate the impact of C19 on household finances during a three-year period spanning January 2019 to December 2021. The Consumer Pyramids Household Survey (CPHS) data visits households 3 times a year and support the study of households facing multiple within-year shocks as seen with C19. CPHS allows us to measure the impacts of the C19 peaks on household income and consumption in India. While earlier research using CPHS has investigated the effects of a single C19 peak8, we extend this to enable the effects of multiple peaks to investigate the completeness of financial markets that households have access to. We estimate how these effects vary across income and consumption distributions, occupational and income gradients, and the mechanisms that households used to adjust.

Results: Using a sample of 25,114 households we find that households in the lowest income quintile making less than US$ 125 a month faced the largest shocks in percentage terms during the first shock (C19 peak and first lockdown), and yet, they also recovered when the wave receded and were able to maintain their consumption patterns. In contrast, the highest income quintile (US$ 980 a month) experienced much larger consumption shocks reflecting greater challenges in smoothing their income shocks. In a similar fashion, households in formal employment faced greater reductions in consumption indicating challenges in smoothing than households with informal employment. Across the income distribution we find evidence that household repeatedly prioritized food consumption by reducing non-food expenditure, including expenditures on education and health that have long term welfare costs and may exacerbate inequalities in human capital investments. In addition to cutting back expenditures, households finance adjusted by running down savings and increasing borrowings from various sources, often relying on extended social networks and informal channels and rather than from formal channels such as banks.

The Impact of Covid-19 on Transitions: Transition Planning and Sustainability in Response to the Covid-19 Pandemic

PRESENTER: **Charles Birungi**, UNAIDS
AUTHORS: Divya Srivastava, Michael Borowitz

The impact of Covid-19 on transitions: Transition planning and sustainability in response to the Covid-19 pandemic

Objective:

A pressing policy problem is whether transition policies of multilaterals need to change due to Covid-19. Multilaterals focus on financial transition (external assistance to domestic resources). They balance financial sustainability (external assistance for commodities), and programmatic sustainability led and supported by external partners outside the health system alongside support from international and local technical assistance. The paper asks, "What are the opportunities to address current challenges in transitions to better meet the aims of Universal Health Coverage?"

Methods

It draws on key evidence arising from a targeted literature review, including grey literature that has been completed. The paper includes evidence on the impact of Covid-19 on finances including country income differences, external partner assistance, and implications for transitions, drawing on recent macro-fiscal data from the World Bank and the IMF. The paper also considers the currently macro-fiscal climate for national health financing systems and the role of external partners given heightened political uncertainty in Europe. It draws on evidence of Covid-19 impact on service disruption due to the impact of Covid-19 and examples of community of practice.

Taken together the paper, will then draw on key features of the cross-programmatic efficiency analysis framework taking into consideration core health system functions to support effective coverage.[1] It will map a select number of relevant transition readiness assessment (TRA) tools against the above-mentioned WHO framework to identify gaps and opportunities of current approaches to transitions. This will be completed by end of 2022 with a complete paper by Q1 2023.

Results:

This paper offers a way forward to rethink how key stakeholders can work together more effectively by identifying what to focus on now. This paper links the learnings to what we are seeing now with Covid-19 with respect to shortage of finances and service impact and sets out a way forward to prioritise a coordinated approach to transitions. The paper's findings discuss rethinking timelines, guiding principles, transition readiness assessment tools, platforms for coordination and collaboration, and community of practice for building evidence. The recommendations of this paper are timely, pressing for coordinated action.

[1] World Health Organization (2022). Step-by-step guide to conducting a cross-programmatic efficiency analysis, Geneva: WHO.

Willingness to Pay to Escape COVID-19 Related Social Restrictions

PRESENTER: **Tinna Laufey Asgeirsdottir**, University of Iceland
AUTHOR: Hjordis Hardardottir

During the COVID-19 pandemic the world's population was subjected to various types of social restrictions, albeit different ones across time and geographic area. We estimate the willingness to pay to escape different bundles of social restrictions imposed by the authorities in Iceland during the COVID-19 pandemic using contingent valuation methods. We find that the average willingness to pay to escape a bundle of social restrictions for 1 month is USD 139 which amounts to approximately 2% of the monthly GDP per capita in Iceland. The average willingness to pay does however vary depending on type and severity of the restrictions imposed, with the least restrictive bundles having an estimated willingness to pay of USD 115 per month, but the bundle of restrictions that people appear to find most restrictive is valued at USD 201. Studying the relative importance of each social restriction, we find that the willingness to pay is highest when children are subjected to the social restrictions as opposed to being exempt (marginal willingness to pay of USD 62). The marginal willingness to pay for other changes, such as increasing mandatory social distancing from 1 meter to 2 meters, changing the maximum amount of people allowed to gather at a time, and opening hospitals and elderly care homes to visitors, is smaller.

Resilience of the Acute Sector in Recovery from Covid-19 Pressures

PRESENTER: **Laia Bosque-Mercader**, University of York
AUTHORS: Daniel Lasserson, Catia Nicodemo, Raphael Wittenberg

Motivation. The Covid-19 pandemic has had a profound impact on the management and delivery of acute healthcare. To tackle the pandemic, hospitals redesigned their organisational models with changes in processes of assessment and care delivery, redeployment of staff, and new pathways of care. These changes were implemented to provide a rapid increase in acute care assessment and treatment capacity for patients with Covid-19, whilst also trying to maintain delivery of care for patients with non-Covid-19 healthcare needs. The capacity to adjust and recover after Covid-19, which we define as hospital resilience in this study, might be shaped by both measures taken by acute hospitals and wider factors such as patient case-mix or the level of activity by other nearby hospitals. To the best of our knowledge, there is however no empirical evidence analysing how these factors affect hospital resilience in the English National Health Service (NHS) after the Covid-19 pandemic.

Objective. The aim of this study is to examine how supply and demand characteristics in acute care are associated with recovery of elective activity to pre-pandemic levels after the height of the Covid-19 pandemic.

Data. This study uses anonymised patient-level data from Hospital Episode Statistics aggregated at monthly and trust level for all acute English NHS hospital trusts with type 1 emergency departments performing any elective activity in calendar years 2021 and 2019. The analysis explores the capacity of hospitals to recover from Covid-19 and reach their pre-pandemic levels of provision of elective care services by defining hospital recovery rate (our main dependent variable) as the ratio of monthly hospital elective activity in 2021 to monthly hospital elective activity in 2019. We then employ a set of explanatory variables measured at the hospital trust level in 2019 as potential factors which could explain whether some hospital trusts had a higher or lower recovery in hospital elective activity. These explanatory variables include supply (e.g., beds, workforce, elective capacity within the vicinity) and demand characteristics (e.g., proportion of elderly or income-deprived) as well as type of hospital (i.e., foundation trust or teaching status) and geographical differences (e.g., region where the hospital is located).

Methods. We estimate the associations between hospital recovery rate and supply and demand characteristics and type of hospital by employing linear regressions of the proportional change over time in elective activity against a set of explanatory variables. We add month fixed effects to capture any seasonality (e.g., winter pressures) and region fixed effects to capture any geographical difference across hospital trusts.

Results. The descriptive statistics show that the hospital recovery rate was 83.2% for total elective activity, 75.8% for surgical elective activity and 88.1% for non-surgical elective activity on average. Overall, the preliminary results show that none of our explanatory variables are statistically associated with hospital recovery rate, except for regional differences. The rate of recovery of total elective activity is negatively associated (less resilient) with hospital trusts located in the North of England compared to London (driven by orthopaedic surgical and renal non-surgical elective activity).

Pharmaceutical Expenditure during COVID-19 Pandemic in Indonesia

PRESENTER: **Yunita Yunita**, Universitas Indonesia

AUTHORS: Examinar Examinar, Rita Yuniatun, Fairuz Rabbaniyah, Difa Zhuhra, Andre Zida, Laurel Hatt, Arry L Putra, Gustavo Bastos, Nurul Rahmayanti, Anastasia Susanto, Jack Langenbrunner, Yuli Farianti, Herlinawati Herlinawati, Nana Tristiana Indriasari, Mardiati Nadjib, Prastuti Soewondo, El Iqbal, Yeni Yeni, Apriliya Prihayati, Mazda Novi Mukhlisa, Erie Gusnellyanti, Roy Himawan, Agusdini Banun Saptaningsih

Introduction: Health expenditures in Indonesia continue to increase, especially with the COVID-19 pandemic. Pharmaceutical expenditures as a proportion of total health expenditures have not yet been comprehensively measured in Indonesia.

Objective: This study aimed to measure Indonesia's Total Pharmaceutical Expenditures (TPE) in 2021 and disaggregate these by type of disease.

Methods: We obtained secondary data from the Ministry of Health on the distribution of pharmaceuticals by wholesalers and manufacturers in 2021 and the Food and Drug Authority on the imported medicines and vaccines. We applied an estimation methodology developed and pilot-tested by the USAID Medicines, Technologies, and Pharmaceutical Services (MtaPS) program. We estimated final consumption amounts by adjusting for buffer stocks and price markups based on published literature and validating with other data sources. Expenditures by type of disease were estimated based on generic drug names and Anatomical Therapeutic Classifications (ATC).

Results: TPE in Indonesia for 2021 was USD 12.2 billion or 25.8% of Total Health Expenditures (THE). TPE per capita was USD 44.7. PE from e-purchasing mechanism amounted only USD 0.4 billion (3.3% from TPE in the same year) which mostly purchased by Ministry of Health and the majority were drugs for priority programs (HIV, TV, MCH) and vaccines. Disaggregated by type of disease, the biggest portion of pharmaceutical expenditures in 2021 was used for COVID-19 (USD 3.4 billion), followed by unspecified diseases/conditions (n.e.c) (USD 2.1 billion), unspecified Non-Communicable Diseases (NCDs) (USD 1.08 billion), unspecified communicable diseases (USD 1.06 billion), cardiovascular diseases (USD 0.9 billion), and diseases of the digestive tract (USD 0.7 billion). Apart from COVID-19, spending on generic medicines was approximately 15% (USD 1.2 billion) of the total PE on the 10 major types of diseases.

Conclusions: The COVID-19 pandemic influenced the pattern of pharmaceutical expenditures in Indonesia during 2021 with COVID-19 vaccines as one of the main drivers of pharmaceutical expenditure. However, pharmaceutical expenditures on NCDs during the pandemic were still high and most of them were treated using non-generic drugs, so efforts to prevent NCDs should also be considered and using the generic products.

Keywords: COVID-19 pandemic, diseases, pharmaceutical expenditures

The Impact of COVID-19 on Health Financing Arrangements in Kenya

PRESENTER: **Angela Kairu**, KEMRI Wellcome Trust Research Programme

Introduction

Sudden shocks to health systems, such as the COVID-19 pandemic may disrupt health system functions. Health system functions may also influence the health system's ability to deliver in the face of sudden shocks such as the COVID-19 pandemic. We examined the impact of COVID-19 on the health financing function in Kenya, and how specific health financing arrangements (purchasing and public finance management) influenced the health systems capacity to deliver in the face of the COVID-19 pandemic.

Methods

We conducted a cross-sectional study in three purposively selected counties in Kenya using a qualitative approach. We collected data using in-depth interviews (n = 56) and relevant document reviews. We interviewed national level health financing stakeholders, county department of health managers, health facility managers and COVID-19 healthcare workers. We analysed data using a framework approach.

Results

Purchasing arrangements: COVID-19 services (testing, case management, isolation) were partially subsidized by the national government, exposing individuals to out-of-pocket costs given the high costs of these services. The National Health Insurance Fund (NHIF) adapted its enhanced scheme's benefit package to include COVID-19 services but did not make any adaptations to its general scheme. This had potential equity implications given that enhanced schemes targeted specific formal sector groups such as civil servants while the general scheme included the less well-off in society. *Public Finance Management (PFM) systems:* At the national level, PFM processes were adaptable and partly flexible allowing shorter timelines for budget and procurement processes. At county level, PFM systems were partially flexible with some resource reallocation but maintained centralized purchasing arrangements. . The flow of funds to counties and health facilities was delayed and the procurement processes were lengthy. *Reproductive and child health services:* Domestic and donor funds were reallocated towards the pandemic response. This resulted in postponement of program activities and affected family planning service delivery. *Universal Health Coverage (UHC) plans:* Prioritization of UHC related activities was

negatively impacted due the shift of focus to the pandemic response. Contrarily the strategic investments in the health sector were found to be a beneficial approach in strengthening the health system to achieve .

Conclusions

The COVID-19 pandemic has tested the ability of the Kenyan health system to withstand crises while maintaining routine functions. Strengthening health systems to improve their resilience to cope with public health emergencies requires substantial investment of financial and non-financial resources. Health financing arrangements are integral in determining the extent of adaptability, flexibility, and responsiveness of health system to COVID-19 and future pandemics.

11:00 AM –12:30 PM   WEDNESDAY   [Health, Its Distribution And Its Valuation]

Cape Town International Convention Centre | CTICC 1 – Room 1.42

Putting into Context the Distribution of Health and Equity in Health Outcomes: Findings from Approaches Using Geographic Measures in the United States of America

MODERATOR: **Nancy Breen**, Formerly National Institutes of Health US

DISCUSSANT: **Tryphine Zulu**, Platinum Health Medical Scheme; **Felix Masiye**, University of Zambia

Putting the Distribution of Health in Context: Fundamental Causes and Social Determinants of Health

PRESENTER: **Nancy Breen**, U.S. National Institutes of Health

Background: We explore two population health concepts associated with preventable morbidity and mortality. Structural racism and poverty have been singled out as "Fundamental Causes" of health inequities. Housing stability, food security, transportation, and health care are key Social Determinants of Health (SDH) which, if inaccessible, worsen health.

Objectives: To introduce population health concepts and argue for their incorporation into health economics. We argue that knowledge of the fundamental causes of health inequity and SDH, which are often associated with geographic location, would enable economists to conceptualize and measure more effectively the contexts where population health inequities occur. Thus, they can be addressed more effectively.

Structural racism and poverty are Fundamental Causes because studies show they influence a wide range of population health outcomes negatively and they result from policy. In the US, for example, policies have segregated racial/ethnic and poor populations by geography, leaving them physically isolated from public and commercial services needed to thrive.

A range of macro-level structural inequalities, called "upstream social determinants" in public health and "social stressors" in sociology are associated with preventable mortality. SDH are the conditions in which people are born, grow, live, work, age, and die. They are shaped by the distribution of money, power, and resources at global, national, and local levels. Deeper understanding of upstream determinants requires investigating the historic roots of economic inequality. Social stressors occur when a person/family/community lacks the resources needed to cope; for example, when income is insufficient to cover the expenses of housing, food, transportation, and medicine. When stressors (negative events, chronic strains, and traumas) are measured comprehensively, their damaging impacts on physical and mental health are seen to be substantial. Whole vicinities may experience structural inequalities and social stressors.

Methods: This talk examines how researchers can use population health concepts to explore geographic segregation, differential distribution of key resources, and their effects on population health over time. In the US, for example, a wide range of policies has isolated African Americans in areas with poorer-quality schools and fewer jobs, where over-policing substitutes for community resources. Geographic isolation by race and income made it possible to test for differences in resource distribution and mortality among African Americans and poor whites. Social Isolation Indices were used to test two main effects, Racial Isolation (RI), and the interaction of RI with economic deprivation, or Racial Isolation in Poverty (RIP) in a cross-sectional fixed-effects model.

Results: The geographic isolation that characterizes residential segregation by race and poverty allowed us to measure the effects of these Fundamental Causes in US counties. Both RI and RIP increased mortality for blacks while only RIP increased mortality for whites. Inequities in resource distribution within rich nations is mirrored across the globe. Researchers can more effectively identify causes, types, and locations of inequity using these concepts. The purpose of exploring causes and types of health inequities in geographic context is to help policymakers and advocates know where and what kinds of policies are needed to address health inequities.

Area-Based Distribution of Social Determinants of Health (SDH) Indices Among Racial and Ethnic Populations: Does Residential Concentration Matter for Measuring Life Expectancy?

PRESENTER: **Ninez Ponce**, University of California at Los Angeles

Research Objective: Multidimensional area-based indices capturing social determinants of health (SDH) are often used by United States public agencies as policy tools to select the most-at-risk neighborhoods for interventions. For example, the state of California used the COVID-19 case rates for the poorest quartile of the Healthy Places Index as criteria for safer school and economic reopening and area-based vaccine prioritization in 2020 and 2021. Use of such spatial indicators facilitates rapid deployment and triaging of resources but may miss out on addressing specific population health needs. This study assesses the implication of use of three multidimensional SDH indices in California, the most populous state in the US, which ranks first in socio-economic, racial and ethnic diversity. California houses the California Health Interview Survey, the largest state population survey in the US. The auxiliary small area estimates data platform, AskCHIS Neighborhood Edition (NE) is used for this analysis.

Study Design: We examine the social vulnerability index (SVI), Area Deprivation Index (ADI), and Healthy Places Index (HPI) stratified by the major racial and ethnic groups in California. These measures, developed by federal and state agencies, are disseminated by AskCHIS . We linked small area life expectancy estimates from the US National Center for Health Statistics and cumulative COVID-19 data from the Centers for Disease Control and Prevention. We first calculate the degree of concordance between pairs of indicators, that is, how frequently they identify the same set of tracts as being in the most "disadvantaged" SDH quartile. The concordance rate is the number of tracts in common divided by tracts identified by either or both indicators. We then quantify in a regression model how well each measure performs in predicting the health risks of each population studied. Health risk is defined as both cumulative risk (life expectancy in 2016 prior to the pandemic) and race and ethnicity stratified and catastrophic risk(COVID-19 death burden = share of COVID-19 deaths/share of population as of June 2023).

Population Studied: The analysis focuses on the distribution of multidimensional SDH indices for Latino/Hispanic ethnicity and five major racialized minoritized groups residing in California—American Indian/Alaska Native, Asian, Black or African American, Native Hawaiian/Pacific Islander, and White populations.

Principal Findings: Concordance rates vary from a low of <40% (ADI and SVI) to a high of over 60% (HPI and SVI). ADI and SVI have better predictive power for overall life expectancy. ADI performed relatively better than the other 2 measures in assessing COVID-19 burden of deaths in a population.

Conclusions: There are more uniquely identified tracts than commonly identified ones; therefore, the choice of indicator inherently translates into a significant variation in the sets of tracts that are classified as being eligible or ineligible for use in policy prioritization. SVI and ADI performed "better" in their association with life expectancy. Choice of indicator in predicting COVID-19 burden has varying implications for each racial/ethnic group in California, suggesting the need to augment place-based measures with population-based indicators.

The Economic Burden of Health Inequities in the United States in 2018

PRESENTER: **Darrell Gaskin**, Johns Hopkins University

Background: Most health inequities exist because disadvantaged and marginalized populations are exposed to economic, social, structural, and environmental risks that impact their health negatively. They also have lower access to health care and other resources that can improve their health. In the US, racial and ethnic minorities and persons with low educational attainment suffer with higher death rates and prevalence of poor health conditions. Excess mortality and morbidity are morally unacceptable and economically costly. Our prior research shows the economic burden of racial and ethnic health inequities was $309.3 billion in 2006 and $320.2 billion in 2014. This study updates the prior estimate to 2018, improves the methodology, and includes estimates for persons with low educational attainment.

Objective: This study estimates the economic burden of health inequities on racial and ethnic minorities and person with low educational attainment in the US. Specifically, we compute estimates for the nation, 50 states, and DC.

Data: This is a cross-sectional analysis. We use the 2016-2019 data from the Medical Expenditure Panel Survey (MEPS) and state-level Behavioral Risk Factor Surveillance System (BRFSS), 2016-2018 mortality data from the National Vital Statistics System (NVSS), and 2018 IPUMS American Community Survey (ACS).

Methods: Consistent with cost of illness studies, we established aspirational health equity targets for crude death rates and prevalence rates for 13 health conditions (i.e., the 10th percentiles within each age and sex cohort). We compared the actual crude death rates and prevalence rates for each race and ethnic group and low education groups to the health equity target to compute years of life lost. We used a willingness to pay approach to compute economic burden of excess premature death (under 78). We used an incremental costs approach to compute excess medical care costs and lost labor market productivity. We developed econometric models to predict medical care costs and labor market outcomes. We compared model predictions using the actual prevalence rates to their predictions using the health equity targets. Computations were performed for five racial and ethnic minority (AIAN, Asian, Black, Latino, and NHPI) populations and three low educational attainment (less than HS, HS/GED, and some college but less than a 4-year degree) populations.

Results: In 2018, the estimated economic burden of racial and ethnic health inequities ranged from $421 billion to $451 billion, and for educational health inequities ranged from $940 billion to $977 billion. The economic burden of health inequities ranged widely across states. The economic burden of racial and ethnic health inequities varied from 0.14% of GDP in Vermont to 8.89% of GDP in Mississippi and the educational health inequities varied from 1.9% of GDP in DC to 18.29% of GDP in South Carolina.

Conclusion: The economic costs of health inequities in the US are unacceptably high. Policymakers should invest resources to develop research, policies, and practices to eliminate racial and ethnic health inequities and address poor health and declining life expectancy for persons with less than a 4-year college degree. Costs of not addressing health disparities are a world-wide concern.

11:00 AM –12:30 PM   WEDNESDAY   [Health System Performance]

Cape Town International Convention Centre | CTICC 1 – Room 2.46

What Resources Are Available and How Technically Efficient Are Primary Health Centers (PHC) in West Africa in Providing Adolescent Mental, Sexual and Reproductive Health, and Well-Being Services? a Multiple Case Study of Burkina Faso, Ghana, and Niger

MODERATOR: **Ama Pokuaa Fenny**, Institute of Statistical, Social and Economic Research

DISCUSSANT: **Pavitra PAUL**, Independent researcher and development consultant

1. Technical Efficiency of Primary Health Facilities in Providing ASRH Services in Ghana: Evidence from Facilities in the Greater Accra Region

PRESENTER: **Jacob Novignon**, Kwame Nkrumah University of Science and Technology

The region selected for the study in Ghana was the Greater Accra region. This region has the highest population density in the country. Data was collected in 78 facilities within two municipalities and two semi-rural districts in the region, of which 67 were general primary health care facilities also providing adolescent services, and 11 were sick bays of senior high schools. More than 60% of the facilities were led by female heads, most of whom were midwives. Most of the facilities studied provide ASRH services; these services include antenatal, delivery, Postnatal, Comprehensive abortion and family planning. Generally, facilities in rural areas had more adolescent outpatients seeking ASRH services than facilities in urban areas. This occurrence was attributed to the fact that adolescents within urban areas were more comfortable seeking sexual reproductive health services from local pharmacies than from primary health care (PHC) facilities.

In terms of the capacity of the PHC facilities under study, more than 70% of the facilities had available pharmacies and laboratories which rendered services for adolescent sexual reproductive needs. In addition, these facilities had a staff strength of an average of 10 clinical staff per facility. However, about 46% of the facilities had no clinical staff trained in ASRH services. This illuminates the gap in the provision of ASRH by these PHC facilities. Most staff had general training, but just a few had special training in adolescent services. Mental health services for adolescents were generally not available.

Preliminary SFA results show average technical efficiency score of 0.59. Efficiency was highest in health centres (0.6) compared to CHPS compounds (0.58) and clinics (0.51). The level of efficiency was explained by environmental factors at the health facility (including availability of functional electricity, access to water and number of consulting rooms) and community (including literacy, insurance subscription and poverty). The preliminary findings seem to support anecdotal evidence of inefficiencies in the use of health resources to provide ASHR services. Efforts to streamline ASHR services at primary health facilities and ensure optimal resource allocation will be a step in the right direction. Also, this study recommends that more effort should be made by the government to empower personnel in adolescent sexual and reproductive health services.

2. Provision of Adolescent Sexual and Reproductive Health (ASRH) Services and Technical Efficiency of Health Facilities in the Use of Resources Mobilized to Provide ASRH Services in Niger: The Case of Maradi and Niamey Regions

PRESENTER: **Nassirou Ibrahim**, Université de Montréal

In Niger the region selected for the study was the Maradi and Niamey regions, which are the most densely populated region in Niger, with birth rate among adolescents 57%. Data was collected in 160 health facilities (rural and urban) that provide adolescent health services. The data was collected from May 31 to June 24, 2022. Preliminary results show that more than 80% of the health facilities surveyed reported offering ASRH services to adolescents in the Maradi and Niamey regions. Mental health services for adolescents were generally not available. Preliminary stochastic estimates indicate an average technical efficiency score of 50%.

The health facilities with a higher-than-average score are in urban areas and run by women. Deterministic estimates indicate that the gender of the chief executive officer, the type of management authority, and the type of facility explain the technical efficiency of health facilities in the two regions. We highlight the fact that to promote efficient use of resources mobilized in the production of ASRH services, a clearer understanding of the management gap between female and male health workers is needed to allow specific recommendations to be proposed. This allows us to examine what other factors besides gender come into play that make it important to give women more responsibility for health facilities offering ASRH services.

3. Provision of Adolescent Sexual and Reproductive Health (ASRH) Services and Technical Efficiency of Health Facilities to Provide ASRH Services in Burkina Faso

PRESENTER: **Ludovic Tapsoba**, University of Montreal

In Burkina Faso the regions selected were the Hauts Bassins and Centre-West regions. Criteria for selection of these two regions included considerations of accessibility of sites given the context of insecurity in the more Northern parts of Burkina Faso where Islamist insurgency and unrest in the Sahel is a continuing problem. A total of 152 health facilities were surveyed (rural and urban), including 77 in the Centre-West region and 75 in the Hauts-Bassins' region.

According to the status of the health facility, 90.8% are public and 9.2% private. The number of health facilities in rural areas is 71.7% and 28.3% in urban areas. Adolescent sexual and reproductive health services (ASRH) are provided in 98.7% of health facilities and 42.8% of these facilities offer mental health services. Pharmacy services are available in 96.1% of health facilities and laboratory services are available in 75.7% of health facilities. In 78% of the facilities, the medical staff have received training in ASRH. The technical efficiency analysis will reveal the extent to the facilities are able to provide these services at an optimum level.

4. Constraints with Resource Mobilisation for ASRH Services, Opportunities to Improve Access to Resources – Burkina Faso, Ghana and Niger

PRESENTER: **Annick Tiemele**, Dodowa Research Centre

This paper presents the results of funding sources and availability for primary care service delivery to adolescents in health facilities that provide ASRH and Mental health services, the funding challenges, and potential solutions to resource mobilisation for these services. This paper relies on both quantitative and qualitative methods to triangulate the information across the selected countries. Preliminary results reveal that tracking resource flows into the selected facilities has proved challenging because of poor record keeping.

Resources are also generally pooled rather than specifically allocated to adolescents or other groups. in all 3 countries triangulating of qualitative and quantitative data was needed to get an estimate of funding sources, flows and availability. All 3 countries face similar challenges with lack of data on funding being a key limitation. It is important to ascertain the needs of facilities with regards to providing the appropriate services for adolescents and to budget adequately for them. These steps are fundamentally missing, and the study draws the importance of adequate preparation in subsequent years to avert funding shortfalls. Inadequate prioritization of certain goals in the budgeting process creates a deficit in implementation especially where programmes are heavily dependent on external funds. Also, under-resourced healthcare facilities are likely to deliver poor quality services and outcomes of care.

11:00 AM –12:30 PM   WEDNESDAY   [Health Care Financing & Expenditures]

Cape Town International Convention Centre | CTICC 1 – Room 1.44
Achieving financial protection

MODERATOR: **Gil Shapira**, The World Bank

Catastrophic Health Expenditure during Routine Follow-up Among Patients Suffering from Selected Chronic Condition/s in Four Districts in Sri Lanka

PRESENTER: **Anuji Gamage**, KDU
AUTHORS: Nuwan Darshana, Therani Gunasekere, Deepika Attygalle, Sridharan Sathasivam
Introduction

Healthcare financing systems dependent on out-of-pocket expenditure(OOPE) impose a burden on those who use the services regularly, such as patients suffering from chronic diseases. High OOPE for health services leads to decreased utilization of the services and catastrophic health expenditure and would impede the achievement of Universal Health coverage.

Aim

To determine the extent of and factors associated with catastrophic health expenditure of households with patients suffering from selected chronic conditions in four districts in Sri Lanka.

Methodology

This study involved 2344 adult patients diagnosed with NCDs in 4 districts in Sri Lanka. They represented urban, rural, semi-urban, and estate dwellers. Multi-stage stratified cluster sampling technique was used to select the respondents from each district. Data was collected using a validated interviewer-administered questionnaire. Data were analyzed using SPSS version 23 and Excel. 572 patients on regular clinic follow-up and incurred OOPE were involved in the current analysis. OOPE reported direct-health and non-health-related expenditures in Sri Lankan Rupees(SLR). Total expenditures for clinic follow-ups and hospital stays were calculated separately.

Mann-Whitney U test was used to compare the median OOPE between government and private sector follow-ups. Catastrophic-Health-Expenditure(CHE) is the ratio between out-of-pocket healthcare expenditure(numerator) and a household's ability to pay for healthcare/total income(denominator). Binary logistic regression identified the predictors of CHE, and categorization was done, considering 15% as the threshold. The level of significance was considered 0.05.

Results

The analysis focused on 572 patients who were currently undergoing regular clinic follow-up. Among them, 52.1% were females. The mean age was 51.5(SD ±15.1) years. Nearly 58% were followed up in the government sector healthcare institutions, while 41.8% were in the private sector. Considering clinic visits majority(n=521, 91.1%) incurred only direct health out-of-pocket expenditure(OOPE), while 4.5%(n=26) had only direct non-health OOPE. Interestingly, only 4.4%(n=25) had both direct health and non-health OOPE. The median (IQR) direct cost incurred was SLR 3100.0(4662.5), while the median(IQR) indirect cost incurred was SLR 375.0(605.0). The Median(IQR) for the total cost incurred for a clinic was SLR 3000.0(4525.0). Majority(68.4%) of patients had total OOPE (direct+indirect) of less than 5000 rupees per visit. Additionally, there were sector-wise variations. Catastrophic expenditure was less than15% for majority of patients(n=461, 80.6%), between 15%-25% and 25%-40% for 9.6%(n=55) and 3.7%(n=21) patients respectively and more than 40% for 6.1%(n=35). Patients being followed up in the private sector incurred more OOPE than those in the government sector($p <0.001$). High CHE was significantly associated with age, monthly income, place of treatment, duration of disease and complications(p<0.05).

Conclusions

The direct health and non-health costs incurred on regular clinic follow-up for NCD care at public and private healthcare facilities are high leading to CHE. Patients incur high OOPE on direct medical costs. There were sector wise variations in OOPE. Patients admitted private sector hospitals had higher CHE.The risk for CHE for regular follow-up visits increases with patients' age, duration and complication of disease. Proportions and determinants of multi-morbidity and the reasons for the demand for private sector care despite a universal public health system should be studied.

Who Is Footing the Bill? an Umbrella Review on the Household Economic Burden from Non-Communicable Diseases

PRESENTER: **Surya Surendran**, The George Institute for Global Health, India
AUTHORS: Claudia Batz, Siddharth Srivastava, Lama El-Chaar, Samiksha Ingale, Stephen Jan, Grace Dubois, Marijke Kremin, Devaki Nambiar

Background: Catastrophic health expenditure occurs in more than half of patient populations living with Non-Communicable Diseases (NCDs) in some LMICs impedes the delivery of Universal Health Coverage (UHC). Given this reality, it is pertinent to investigate how People Living with Non-Communicable Diseases (PLWNCDs) are experiencing and coping with Out-Of-Pocket (OOP) costs for outpatient visits, diagnostics, medicines, and hospitalisation. This umbrella review of systematic reviews assessed the extent to which PLWNCDs are having to pay OOP for their care globally.

Methods: Using pre-defined search criteria, an umbrella review of systematic reviews published between 2009 and 2022 was conducted within the PubMed database. Systematic reviews that investigated OOP expenses, their impact on households, and the coping strategies used by PLWNCDs to cover their expenses were included. Furthermore, the study will investigate potential modifiable risk factors for such adverse outcomes such as health insurance coverage, access to capital, and service characteristics. Articles were screened by two reviewers on Covidence using a blinded review process. Conflicts were resolved by a third independent reviewer who was not involved in the initial screening process. Data will be synthesised through thematic analysis to identify key themes in the included studies.

Results: The initial search resulted in 666 studies of which 75 have been included in the full-text review that is currently underway. A codebook was developed for data extraction which broadly focuses on the financial burden and its impact, the use of insurance, and management of expenses through loss of savings or assets and seeking additional funds.

The results will highlight the impact of OOP costs for the NCDs and will shed light on factors that influence such burden thereby pointing to potential remedial strategies, both at the individual and policy level.

Conclusion: This study provides a snapshot of the global household burden of NCDs and will provide the latest evidence to inform a submission by the NCD Alliance to the 2023 UN High-Level Meeting on Universal Health Coverage.

Cardiovascular Disease and Its Implication for Higher Catastrophic Health Expenditures Among Households in Sub-Saharan Africa

PRESENTER: **Folashayo Ikenna Peter Adeniji**, College of Medicine, University of Ibadan

Cardiovascular diseases (CVDs) impose an enormous and growing economic burden on individuals. Like many chronic health conditions, CVD predispose families to catastrophic health expenditure (CHE), especially in sub-Saharan Africa (SSA) where majority of the countries are still grappling with how to achieve Universal Healthcare Coverage (UHC). This study assessed the spillover effects

of having CVD on the risks of incurring higher CHE among households in two SSA countries, Ghana and South Africa. This study utilized data drawn from the WHO Study on Global AGEing and adult health (WHO SAGE), wave 1 which was carried out between 2007-2010. Following standard procedure, CHE was defined as the health expenditure above 5%, 10%, and 25% of total household expenditure. Similarly, a 40% threshold was applied to household total non-food expenditure also referred to as the capacity to pay. To compare the difference in mean CHE by household CVD status as well as the predictors of CHE, student's t-test and logistic regression were utilized. The share of medical expenditure in total household spending was higher among households with CVD in Ghana and South Africa. Households with CVD were more likely to experience greater CHE across all the thresholds examined in Ghana. Households who reported having CVD were twice more likely to incur CHE at 5% threshold (OR:1.946, CI:0.965-1.095), thrice likely at 10% threshold (OR: 2.710, CI: 1.401-5.239), and four times more likely to experience CHE at both 25% and 40% thresholds, (OR:3.696, CI:0.956-14.286) and (OR: 4.107, CI:1.908-8.841), respectively. In South Africa, only household CVD status, household health insurance status and the presence of other disease conditions apart from CVD, were associated with incurring CHE. Households who reported having CVD were three times more likely to incur CHE compared with households without CVD (OR:3.002, CI: 1.013-8.902). This study found evidence that suggests that CVD predisposed households to risk of higher CHE. Equity in health financing presupposes that access to health insurance should be predicated on individual health needs. Findings in this study emphasizes the need to target and prioritize the health needs of individuals with regards to healthcare financing interventions in sub-Saharan Africa.

Association between National Health Insurance Scheme and out-of-Pocket Health Expense in Children: Evidence from Gabon

PRESENTER: **Olouyomi Scherif Adegnika**, CERMEL
AUTHORS: Yabo Josiane Honkpehedji, Friederike Roeder, Ayola Akim Adegnika, Bertrand Lell, Elisa Sicuri

Background: Over the last few years, universal health coverage (UHC) is increasingly being introduced into the health systems of African countries, and national health insurance schemes (NHISs) are a key element in the establishment of UHC programs. Gabon is part of a few sub-Saharan African (SSA) countries to successfully set up a national health insurance scheme. Since the establishment of Gabon NHIS in 2008, very few studies have been conducted to assess progress towards the targets set by the government when introducing the scheme. The few publications have focused either on the use of healthcare or on the quality of services. No study on the Gabon NHIS has yet focused on healthcare expenses, including catastrophic ones, or on financial protection for people covered by the insurance. Our study aimed to assess the role of the Gabon national health insurance scheme on out-of-pocket health expense in children, to examine the determinants of health expenses in children, as well as the extent of catastrophic health expenditure.

Methods: Primary data for this study were collected from May 2019 to January 2020 in Lambaréné, a town located in the Moyen Ogooué province of Gabon near the equator in the Central African rainforest. Health expenditure data was collected through a cross sectional survey among children aged below 16 years represented by their legal representatives and presenting to health facilities in Lambaréné for seeking care either as inpatients or outpatients. Wilcoxon rank sum test was used to describe the collected costs data, multivariate linear regression was used to assess the relationship between out-of-pocket health expenditure and having national health insurance, and multivariate logistic regression was used to identify factors that influenced catastrophic health expenditure.

Results: The insured participant's out-of-pocket health expenditures were significantly lower than those of the uninsured participants. A reduction of 35% was observed for inpatients and 43% for outpatients. When focusing on malaria diagnosis only, 33% reductions were obtained by insured inpatients and 43% for insured outpatients. When assuming that household food expense represents respectively 40% (Scenario 1), 50% (scenario 2), and 60% (scenario 3) of total expenditures, the probability of incurring in catastrophic health expenditure was lower and statistically significant for inpatients in scenario 1 among the insured as compared to the uninsured but not significant in any of the remaining scenarios or type of patients.

Conclusion: The Gabonese government's effort to set up the national health insurance scheme seems to have partially paid off as the insurance is significantly associated with lower out-of-pocket health expenditure among the insured as compared with the uninsured participants. The financial difficulties for a high proportion of the insured in meeting out-of-pocket health expenditure suggests the government should strengthen the financial protection provided by the insurance, expand the number of diseases covered by the insurance, and extend its population coverage.

The Association between Financial Protection and Multidimensional Poverty in China: Evidence from China Family Panel Studies (CFPS)

PRESENTER: **Yusheng Jia**, Fudan University
AUTHORS: Jun Xie, Min Hu

Background

Financial protection, as a key dimension of Universal Health Coverage (UHC), has been under increasing attention. The goal to eradicate monetary poverty due to healthcare expenditure, however, without addressing poverty's multiple social, economic, and environmental facets is unlikely to succeed. The concept of multidimensional poverty (MP) intrinsically provides a holistic approach to identify households at risk of medical impoverishment. Previous studies have estimated the association between MP and health-related outcomes including health status, health behaviors, and healthcare utilization. However, there is limited research investigating the association between CHE and MP. This study aimed to estimate the incidence of CHE and MP, and assess the association between the incidence of CHE and the intensity of MP in the context of China.

Methods

Using data from the 2018 China Family Panel Studies (CFPS), this study estimated the incidence and intensity of MP and CHE. Our estimation of MP was based on a self-developed Multidimensional Poverty Index (MPI), which is an adjusted version of Global Multidimensional Poverty Index (G-MPI) that has been extensively used in profiling the deprivation situation of households and individuals globally. Our MPI includes 6 indicators spanning health, education, and standard of living (i.e. average education level of household adults, whether household member with chronic diseases, source of drinking water, type of cooking fuel, durable goods value, and access to the Internet). The Alkire-Foster method was used to identify the incidence and intensity of MP. The deprivation score of MP was used to assess the intensity of MP. Catastrophic health expenditure (CHE) as a commonly used indicator was used to conceptualize financial hardship. The incidence of CHE in this study referred to the proportion of households whose health expenditure exceeds 40% of total household expenditure net of food consumption. Logistic regression analysis was used to estimate the association between CHE and MP. Sampling weights were applied in the analysis.

Results

A total of 10,450 households (38,398 individuals) were included in the analysis. Our results showed that the incidence of CHE was 9.07%. The average deprivation score of MP was 0.25 (SD = 0.25). The regression results showed that the intensity of MP was significantly associated with CHE, adjusted for region, rural residence, and characteristics of household heads (p-value<0.05). With a 0.1 unit increase in deprivation score, the odds of encountering CHE for Chinese households increased by 4.05 times.

Conclusion

This study estimated the incidence of MP and CHE in China and further demonstrated a significant association between the intensity of MP and the incidence of CHE using a national representative dataset. Despite the achievement of UHC progress, it should be noted that a substantial number of households are at risk of impoverishment due to medical expenses. Policymakers could leverage MPI as a monitoring indicator to identify those households above the poverty line yet with multidimensional deprivation of capabilities, thus improving financial protection in China as well as in other low- and middle-income countries.

Gender Differences in Informal Payments for Healthcare in Kenya: A Qualitative Study

PRESENTER: **Evelyn Kabia**, KEMRI Wellcome Trust
AUTHORS: Kui Muraya, Dina Balabanova, Eleanor Hutchinson, Edwine Barasa

Background: Informal payments are payments made by a patient to a provider in addition to the officially determined service fees. In 2019, 16.9% of Kenyans reported having paid a bribe to access health services at public facilities. Informal payments limit access to care and expose individuals to financial risk, thus slowing progress toward attaining universal health coverage. Of the various patient socio-demographic characteristics associated with informal payments, gender is a key social determinant of health that influences health needs, outcomes, and experiences. This study explored gender power relations in informal payments in Kenya.

Methods: We conducted a qualitative study in 2022 at four public health facilities (two hospitals and two health centers) in an urban county in Kenya. We conducted four focus group discussions with men (n=2) and women (n=2) seeking care at the study health facilities, and in-depth interviews (n=17) with health workers and non-clinical staff of various cadres. Data were analyzed using a framework approach.

Results: Informal payments were reported to be more common among male than female patients. This was linked to men having more disposable income, wanting quicker services to enable them to resume work, and some men not wanting to appear as though they could not afford the informal payments. Participants reported that men were also more likely to pay or be induced to pay informally for delivery services to ensure the safety of their unborn child and the mother. Male health workers were reported as being more likely to demand informal payments compared to their female counterparts. This was associated with being the primary breadwinners of their families, being bolder, and having pressure to meet societal expectations of a 'particular standard of living', especially as male health workers (regardless of cadre) were presumed to be doctors by profession. Female health workers were reported to be more empathetic towards patients and fearful of demanding informal payments. Female patients were perceived as being more likely to report to health facility managers when informal payments were solicited compared to male patients. This was associated with greater awareness of health costs, the need to save money to meet other household requirements, and having to account to their spouses how they spent given money. Factors that contributed to better awareness among women included: frequent care seeking especially for reproductive, maternal, and child health services; wider media coverage of women's health; and being at home when community health workers conducted household visits. Lower reporting among male patients was linked to societal norms around men handling problems themselves before seeking help.

Conclusions: Gender affects patient experiences with informal payments by influencing 1) who has access to income and thus men's higher ability to pay informally 2) the division of labour whereby being the primary caregivers, women visited health facilities more often and were thus more aware of health costs, and 3) social norms and beliefs, for example, whether to report demands for informal payments. To be more effective, interventions developed to address informal payments need to take into consideration gendered nuances.

Cape Town International Convention Centre | CTICC 1 – Room 1.61

Tracking Equity and Efficiency of Health Financing for Universal Health Coverage at the Sub-National Level in Low and Middle-Income Countries [FINANCING FOR UHC SIG]

MODERATOR: **Josephine Borghi**, London School of Hygiene & Tropical Medicine (LSHTM)

ORGANIZER: **Peter Binyaruka**, Ifakara Health Institute

DISCUSSANT: **Laura Anselmi**, The University of Manchester

Tracking Equity and Efficiency of Health Financing Towards Universal Health Coverage between Regions in Tanzania

PRESENTER: **Peter Binyaruka**, Ifakara Health Institute

Introduction: Equity and efficiency in health financing are important intermediate goals for tracking progress towards universal health coverage (UHC). However, to date most of the equity and efficiency analyses have focused at the national level and less at sub-national level. The need to track UHC progress sub-nationally is increasingly recognised as a way to monitor and address within-country inequities and inefficiencies, and inform policy reforms towards UHC. This study assessed whether health funds were allocated or contributed equitably over time and spent efficiently across regions in Tanzania.

Methods: Health financing data at regional level were obtained for all 26 regions in mainland Tanzania. Data on annual government health expenditure and donor funding through health basket funds (HBF) (2017/18–2020/21) were obtained from the Ministry of Health; while contributions to health insurance and out-of-pocket (OOP) payments were obtained from the recent national household budget survey (2017/18). We calculated Kakwani indices (KI) to quantify the degree of equity in regional funding from government and donor over time, and equity in households' contributions to insurance and OOP payments in 2017/18. Regional GDP per capita was used to proxy regional economic status. Efficiency analysis used four financing inputs (government and donor funds, household contributions to insurance and OOP payments) and two UHC outputs (service coverage index using three maternal health indicators, and financial risk protection index using catastrophic and impoverishment status). Data envelopment analysis used to estimate efficiency scores.

Results: Government per capita spending across regions declined by 41% on average from 2017/18 to 2019/20, while donor HBF allocation increased slightly by 0.1% on average in the same time period. The government spending declined substantially among regions whose spending was the largest in 2017/18. Despite an indication of increased HBF allocation from 2017/18 to 2019/20, the government funding was consistently the largest source of funds than donor-HBF. Government spending and HBF allocations were equitably distributed (progressive), being more targeted to regions with high economic need (poor). Equity in government spending improved over time (KI: –0.047 to –0.109), while equity in HBF allocations declined (KI: –0.195 to –0.121). The burden of contributing to social health insurance (NHIF) fell among the least poor regions (progressive, KI=0.06), while the burden of paying for community-based insurance (CHF, KI= –0.15) and OOP payments (KI=–0.189) fell among poor regions (regressive). The average efficiency score of four financing inputs was 90% (SD=0.11) for UHC outputs. This shows that 90% of financial resources were optimally used on average to achieve UHC outputs, while 10% were being wasted or underutilised, and regions were capable to improve UHC outputs by 10% with similar level of funding.

Conclusions: To further progress towards UHC, Tanzania should continue mobilising domestic resources for health, and reduce reliance on inequitable OOP payments. There is also a need to continue strengthening the resource allocation formula and public financial management to enhance equity and efficiency, respectively. Continued tracking of resources sub-nationally is important towards UHC.

Equity and Efficiency in Health Financing for Universal Health Coverage between Counties in Liberia: An Assessment of Levels and Trends

PRESENTER: **Alfred k Tarway-Twalla**, University of Liberia, Institute for population studies

Introduction: Since many countries are implementing health system reforms towards universal health coverage (UHC), there is a need to track UHC progress sub-nationally. Equity and efficiency in health financing are important intermediate objectives of UHC. Available evidence of equity in financing have focused at the national level. This study assessed whether health resources were allocated equitably and spent efficiently across 15 counties in Liberia.

Methods: County health financing data were obtained for all 15 counties in Liberia: annual government health expenditure and donor/external financing were obtained from the Ministry of Health and resource tracking report (2015/16–2020/21); while household contributions to out-of-pocket (OOP) payment were obtained from the Household Income and Expenditure Survey (HIES) 2016. We calculated Kakwani indices (KI) to quantify the degree of equity on each source of financing over time, and for OOP payments in 2016. County GDP per capita was used to proxy county economic status. Efficiency of financing used two financing inputs (government and donor funds) in 2018/19 and one outputs with respect to RMNCAH coverage index using five indicators for 2019. We also estimated

efficiency scores for the two financing inputs in 2015/16 with respect to UHC outputs. Data envelopment analysis used to estimate efficiency scores.

Results: Average government and donor spending per capita across counties was 2.3 USD and 16.3 USD in 2018/19, respectively. The average RMNCAH coverage index was 71.4%. At county level, external/ donor funding was consistently larger than that of government spending for 2015/16 and 2019/20. Government and external resources were equitably allocated (progressive) across counties over time. Equity in government spending declined over time (KI: –0.243 to –0.199), while equity in donor funding fluctuated over time. However, household OOP contributions in 2016 were inequitable/ regressive (KI: –0.079). On average, only 68% of government spending and donor funding were efficiently used across counties to achieve RMNCAH coverage outputs. However, the efficiency score of two financing inputs in 2015/16 was 78% with respect to UHC outputs.

Conclusions: Liberia need to continue monitoring both equity and efficiency in financing in an effort to further progress towards UHC. Efforts are also need to maintain equitable allocation of resources across counties especially among counties with greatest need, and further improving efficiency in resource spending to reduce wastage of resources. Improving prepayment mechanisms and reducing reliance on OOP payments will help to achieve financial protection for UHC in Liberia.

Subnational Variations in Efficiency and Coverage of Key Interventions in Zambia
PRESENTER: **Peter Hangoma**, University of Bergen
Background: The need to achieve Universal Health Coverage (UHC) consistent with SDG 3 requires improvement in health financing. However, with limited fiscal space and flattening or declining development assistance for health (DAH), increasing funding may be challenging. There is a call to increase efficiency by reducing waste. Health system outputs such as coverage rates of different interventions at sub-national level are key to examining performance. However coverage rates of different intervention normally require household surveys, such as DHS, but these surveys are not designed to generate representative findings at the district level.

Methods: The study combines multiple datasets and methods such as small area estimation and stochastic frontier analysis (SFA) to estimate composite intervention coverage and levels of efficiency in coverage at the district level in Zambia. Composite coverage was estimated by combining seven interventions estimated using small area models. The indicators/interventions were Family planning demand satisfied, completion of four ANC visits, skilled birth attendance, BCG immunization, DPT# immunization, ORS treatment coverage in children with Diarrhea, share of children with fever who sought care, Insecticide treated net coverage, and completed treated for TB. All variables were from the DHS 2018 except ITN and TB which were obtained from administrative records at MOH. The SFA analysis used composite coverage as dependent variable and the inputs were district spending on human resources and non-human resource district spending. We also controlled for other things such as district deprivation, population density, and educational level that may affect efficiency but not within the control of the health system. We then used regression analysis to assess factors associated with efficiencies in composite coverage that are within the control of the health system.

Findings: We found substantial variation in composite coverage across provinces in Zambia with highest coverage being in Lusaka (80%) and Eastern province (79%) and lowest coverage in Western (69%) and Northern (71%) provinces. Yet interesting, even provinces such as eastern province with coverage rates of 79% had districts with intervention coverage of as low as 55%. This highlights the fact that it is important to obtain coverage rates at the district level and that this can be done even in countries where household datasets such as DHS are not representative at the district level. Deprivation is negatively associated with composite coverage. Education and non-HR health expenditure are positively associated with composite coverage at the district level. We also find that substantial variation in efficiency scores across districts suggesting that in some districts, it is possible to reduce spending by almost 50% without affecting composite coverage. Alternatively, without need for additional resources, composite coverage can be substantially increased if wastages are reduced. Budget execution rate was found to be one important predictor of efficiency.

Conclusion: We conclude that given challenges in financing, opportunities to improve primary health intervention coverage exists by eliminating inefficiencies in subnational units. It is crucial to estimate efficiency in coverage of interventions at the primary care at subnational units as national level estimates may mask important geographical differences.

11:00 AM –12:30 PM   WEDNESDAY   [Health Care Financing & Expenditures]

Cape Town International Convention Centre | CTICC 1 – Room 1.63
Moving Towards Universal Health Coverage (UHC) from Hybrid Public-Private Health Systems: Preconditions for Equity and Efficiency

MODERATOR: **Josefa Henriquez**, University of Newcastle

ORGANIZER: **Chiara Berardi**, University of Newcastle

DISCUSSANT: **Helen Kean Redpath**, Berkeley Research Group

Do All Roads Lead to Rome? A Conceptual Framework to Establish Managed Competition

PRESENTER: **Josefa Henriquez**, University of Newcastle
AUTHORS: Wynand van de Ven, Adrian Melia, Francesco Paolucci

Health systems' insurance and financing, as well as provision can be organized in several ways. Some countries have adopted systems with a mixture of mandatory and voluntary insurance (e.g., Australia, Chile, Ireland, South Africa, New Zealand) which creates two-tier health systems allowing consumers (groups) to have preferential access to the basic standard of care (e.g., skipping waiting times). The degree to which, efficiency and equity are achieved in these types of systems is questioned. In this paper, we consider integration of the two tiers by means of a managed competition model. We discuss a two-part conceptual framework, where first, we review and update the existing framework of pre-requisites for the model of managed competition (Van de Ven et al. 2013) to fit a broader definition of health systems, and second, we typologize pathways, problems, and tasks to be addressed in the transition to managed competition in the three functions of the health system: insurance and financing, provision, and governance/regulation. Our analysis derives in three new pre-requisites for the establishment of the managed competition model: definition of a basic benefit package, existence of affordable out of pocket payments and no conflict of interest by the regulator. We typologize three pathways to reform the insurance and financing in the transition: convergence of the public and private scheme, abolishing the private scheme and establishing the principles of managed competition with the public scheme, and last, abolishing the public sector, and establishing the principles of managed competition within the private system. Moreover, our results highlight the problems that need to be resolved in the market of providers in the transition related to contracting, human resources, number and distribution of providers, and governance of providers. Last, we describe the several tasks that underlie the preconditions in the governance/regulation function, which include: allocation all the tasks, establishing the tasks in the agency/institution that "knows best", avoiding the "judge, jury and executioner" problem, formulating clear goals and accountability mechanisms, and avoiding political capture and the political cycles. This work can be seen as a comprehensive framework for researchers and policymakers that wish to assess their health systems against these criteria, and elaborate on pathways for reform.

Roadmaps to Managed Competition: To What Extent Does South Africa Meet the Preconditions for Equity and Efficiency?

PRESENTER: **Alex van den Heever**, University of the Witwatersrand

South Africa offers universal health coverage through large public and private systems. The private system is characterised by a regulated market for health insurance, referred to domestically as medical schemes. From 2000, the private system was undergoing a reform process consistent with theoretical approaches for managed competition for health insurance. However, from 2008, the reform process was interrupted, leaving in place a partial framework which included open enrolment, community rating and regulated minimum benefits but excluded, inter alia, risk equalisation. The incomplete reform, however, provides an opportunity to examine the system outcomes that result from a partial approach. This paper therefore reviews the system outcomes of the partial reform using a descriptive data analysis. The findings then inform an evaluation of the extent to which the preconditions for managed competition have been met as indicated by the theory of managed competition in healthcare. The paper therefore highlights the areas where regulatory interventions need to be prioritised in South Africa to achieve the objectives of managed competition that enable to achieve access, fairness and efficiency. The analysis points to significant failures at the level of health insurance competition in South Africa with resulting outcomes consistent with the theory of managed competition.

The Preconditions for Managed Competition in Australia: Are They Fulfilled?

PRESENTER: **Chiara Berardi**, University of Newcastle
AUTHORS: Pablo Arija Prieto, Josefa Henriquez, Andrew Matthews, Francesco Paolucci

The Australian health system is characterized by high quality care by international standards, produced by a mix of public and private provision and financing of health care services. Despite good overall results, three issues are a cause of concern: the first issue relates to the public scheme, and specifically, the purchasing of primary care, which's flaws have impacted individual's access to care, and out-of-pocket spending; second the sustainability of the private health insurance market, given the government's goal of relieving public hospital pressure through increased participation; and third, the interaction between public and private schemes. To ensure a sustainable, efficient, and equitable health system, structural reforms are necessary to deal with long-term increase in performance. In this paper, using the framework of preconditions for managed competition, we evaluate the preparedness of the Australian health care system for such reforms.

Roadmaps to Managed Competition: To What Extent Does Chile Meet the Preconditions for Equity and Efficiency?

PRESENTER: **Carolina Velasco O.**, Instituto de Politicas Publicas en Salud Universidad San Sebastian (IPSUSS)
AUTHOR: Josefa Henriquez

The prevailing health system in Chile is characterized by a public-private mix in terms of financing, insurance, and provision. Following several reform attempts, a rejected Constitution referendum that planned to overhaul the health system, its key issues remain unsolved. Longstanding problems include access to care in the public hospital system, and the sustainability of private health insurance. These problems have been heightened by the endemic phase of COVID-19, and continuous court rulings in-lieu of reforms. The managed competition model has been in the table on several occasions as a solid option for reform, as there are several advantages of implementing such a model in the Chilean case such as: accommodate valued featured of the existing system such as choice in both insurers and products, and providers, address feasibility concerns of reforms (both technical and political) and third, it has the economic and regulatory foundations to increase incentives for efficiency through competition, while maintaining/increasing equity ("third wave"

of reforms outlined in Cutler (2002)). In this paper, we describe what the managed competition model would look like- where the public and private insurers and providers in Chile would operate over time under one set of regulatory rules. We identify the gaps existing from the current situation to the end model and analyse with special interest the contentious policy points. The aim is to shed light on ways to lift the existing roadblocks. To our knowledge, an exercise of this type, where a diagnosis of the gaps is made against a comprehensive conceptual framework- has not been conducted in the country.

11:00 AM –12:30 PM   WEDNESDAY   [Economic Evaluation Of Health And Care Interventions]

Cape Town International Convention Centre | CTICC 2 – Freesia

Scaling-up Violence Against Women and Girls (VAWG) Prevention in Low- and Middle-Income Countries: New Evidence on Cost, Cost-Effectiveness, and Volunteer's Preferences for Remuneration [ECONOMICS OF RISKY HEALTH BEHAVIORS SIG]

MODERATOR: **Giulia Ferrari**, London School of Economics and Political Science

DISCUSSANT: **Giulia Greco**, London School of Hygiene and Tropical Medicine

Cost-Effectiveness of Men Engagement in Women Empowerment (MEWE): A Trial- and Model-Based Economic Evaluation of a Life-Skills Building and Cash Transfers Intervention to Empower and Improve the Mental Health of Women in Pakistan
PRESENTER: **Samral Idrees**, Aga Khan University
AUTHORS: Nasim Zahid Shah, Noor un Nisa Hussaini, Tazeen Saeed Ali, Rozina Karmaliani, Giulia Ferrari
Background

Cash transfers can reduce women's exposure to intimate partner violence (IPV) and depression. Life-skills training can reduce exposure to IPV among female recipients of financial support or services. However, the impact of also training spouses on women's depression and IPV exposure is poorly understood. National cash-transfer schemes are ideal platforms to deliver life-skills training. Policy makers need to know whether adding life-skills training to cash transfers is cost-effective compared to delivering cash transfers only. To our knowledge, no study has addressed this question.

Aims

We addressed this gap by testing the cost-effectiveness of the Men's Engagement in Women's Empowerment (MEWE) intervention in Sindh, Pakistan, using a randomised controlled trial (RCT). MEWE offers life-skills building to female cash transfer recipients, either alone (female-only arm) or with their spouse (couples arm).

Objectives

Determine if MEWE is cost-effective when delivered to female-only participants or to spouses, compared to recipients of cash transfers only. Determine the incremental cost-effectiveness of the couples' delivery model compared to the females-only. Determine MEWE's cost-effectiveness during research and at scale. Determined MEWE's cost-effectiveness from a provider perspective, and quantify the uncertainty of results.

Methods

We cost the intervention using bottom-up micro-costing, and assess its health impact with multi-level mixed effects models. Our primary outcome is the incremental cost per Disability-Adjusted Life-Year (DALY), a standard unit of health, averted. We also measure the incremental cost per case of maternal depression averted and per year free from IPV, for the benefit of implementers. We determine cost-effectiveness from a provider perspective. We estimate results in a research setting and at national scale, and determine the long-run impacts of the intervention using a Markov model. We quantify the uncertainty of our results with univariate and probabilistic sensitivity analysis.

Results

Preliminary results suggest that the female-only delivery model is the most cost-effective option.

Recommendations

Preliminary results suggest that augmenting cash transfer programmes with life-skills building for female clients is a cost-effective strategy.

Impact of our Findings

Our results contribute to informing the decision to add life-skills training to one of Pakistan's largest cash-transfer programmes, potentially benefitting thousands. They also expand the growing evidence-base on the cost-effectiveness of violence prevention programming in low and middle income countries (LMICs). Our work is the first to apply a Markov model to trial data of violence prevention in a LMICs, breaking new ground on the quality of evidence on IPV prevention.

Cost-Effectiveness of Gender Training: The MAISHA Intervention for Women Tanzania

PRESENTER: **Meskerem Kebede**, London School of Economics & Political Science
AUTHORS: Giulia Ferrari, Tanya Abramsky, Guilhem Labadie, Dr. Giulia Greco, PhD, Saidi Kapiga, Shelley Lees, Sheila Harvey

Background

The implications of intimate partner violence (IPV) range from heightened health risks to lowered economic power. The MAISHA study was implemented in Mwanza, Tanzania, to address IPV through delivery of a gender-training curriculum (MAISHA) to women microfinance clients, or to neighbourhood groups. Neighbourhood groups are a preferred platform for the delivery of public health interventions. The evidence on the cost-effectiveness of IPV prevention through community mobilisation is promising, but evidence on neighbourhood groups is lacking, to our knowledge. Microfinance is a global market, with millions of clients and an ideal platform to bring IPV prevention to scale. However, to our knowledge, evidence documenting the cost-effectiveness of IPV prevention as a microfinance add-on is lacking.

Aims

Investigate the incremental cost-effectiveness of MAISHA integrated with microfinance and delivered alone.

Objectives

Determine the incremental cost per person-year free from IPV, and per Disability-Adjusted Life Years (DALYs) averted of delivering MAISHA to microfinance clients, compared to microfinance only; and to neighbourhood groups, compared to no intervention. DALYs measure burden of disease for health priority-setting.

Methods

Two cluster-randomised controlled trials (cRCTs) evaluated MAISHA's impact on women's past-year IPV exposure. One tested MAISHA's incremental impact on microfinance clients; another on community members organised in neighbourhood groups.

We used bottom-up micro-costing to determine the economic costs of MAISHA from a provider perspective. We report in USD 2020 prices, at 3% discount rate, in a research setting and at national scale. We compute the cost per DALY averted by MAISHA compared to the control condition. We also report the incremental cost per person-year free from IPV, which is useful for programme implementers. Univariate sensitivity analyses show how uncertainty in the cost drivers impacts MAISHA's cost-effectiveness. A probabilistic sensitivity analysis computes the likelihood that MAISHA is cost-effective given the budget constraints in Tanzania.

Results

Preliminary results suggest that MAISHA can be cost-effective as an add-on for microfinance clients.

Recommendations

Adding gender-transformative training to microfinance programme can be a cost-effective strategy to reduce women's IPV risk. Future work should measure more health-related and economic outcomes on study participants to fully capture intervention cost-effectiveness.

Impact of our Findings

Our study provides essential evidence to policy makers, donors and implementers to decide whether and how best to deliver IPV prevention programming. It provides the first evidence on the incremental cost-effectiveness of gender-transformative training alone and as an add-on for microfinance clients, a market with millions of customers. It contributes to the growing evidence on the value for money of IPV prevention from RCT-based studies, which are already contributing to resource allocation decisions in the field of violence prevention.

The Stated Preferences of Community-Based Volunteers for Roles in the Prevention of VAWG in Ghana: A Discrete Choice Analysis

PRESENTER: **Nikita Arora**, London School of Hygiene & Tropical Medicine (LSHTM)
AUTHORS: Sergio Torres-Rueda, Kara Hanson, Anna Vassall, Giulia Ferrari, Rebecca Kyerewaa Dwommoh Prah, Rachel Jewkes, Deda Ogum Alangea

Background

Globally, one in three women experience violence by an intimate partner in their lifetime. Rates of VAWG in Ghana are high: 38.7% of ever-married women between ages 15-49 years reported having experienced physical, sexual or psychological violence perpetuated either by current or previous partners in their lifetime. Interventions to prevent VAWG, often implemented at the community level by volunteers, have been proven effective and cost-effective. One such intervention is the Rural Response System in Ghana, a volunteer-run rural response system which sensitises the community about VAWG and provides counselling services. To increase programmatic impact and to maximise the retention of these volunteers, called COMBATs, it is important to understand their preferences for incentives.

Aim

To investigate the incentive preferences of VAWG volunteers in Ghana, with a view to improve their retention in the workforce.

Objectives

To conduct a discrete choice experiment (DCE) among 107 COMBAT volunteers, in two Ghanaian districts in 2018, to examine their stated preferences for financial and non-financial incentives that could be offered in their roles

Methods

Each COMBAT answered 12 choice tasks, and each task comprised four hypothetical volunteering positions. The first three positions included different levels of five attributes: amount of per-diem (payment) offered, number of sensitization activities undertaken in the community, reimbursement of transport expenses incurred during volunteering, trainings offered, and number of supervision visits made in the year. The fourth option was to cease volunteering as a COMBAT volunteer (opt-out). Data were analysed using multinomial logit, mixed multinomial logit, and latent class models.

Results

We found that, overall, COMBAT volunteers gained varying utility from the DCE attributes. They cared most for receiving training in volunteering skills and three-monthly supervisions. A three-class latent class model fitted our data best, identifying subgroups of COMBAT workers with distinct preferences for incentives. The younger 'go getters', a third of the sample, were more educated on average and showed very strong preferences for training and supervision visits. The 'veterans', 15% of the sample, were older, more experienced at their jobs, and preferred to receive higher per diems to undertake more sensitisation visits. Lastly, the 'balanced bunch' encompassing the majority of the sample (51%), preferred all DCE attributes roughly equally.

Impact of our findings

Understanding preferences and how they vary between sub-groups can be leveraged by programme managers to improve volunteer motivation and retention, particularly as effective VAWG-prevention programmes are scaled up from small pilots to the national level.

Global Estimates of Costs and Effects of IPV Prevention: Rapid Review and Metanalysis

PRESENTER: **Meskerem Kebede**, London School of Economics & Political Science
AUTHORS: Giulia Ferrari, Nadia Carvalho, Kimberly Wu, Andra Fry, Heather Dawson, Deng Simon Garang Tor, N Cornee, Sa'id Gaya, Seema Vyas, Alexandra Robinson, Tharanga Godallage, John Stover, Howard Friedman

Background

Policymakers and international agencies are investing in intimate partner violence (IPV) prevention in low- and middle-income countries (LMICs). However, they lack information on costs and effects of IPV prevention for informed decisions on priority setting. Reviews on the global effectiveness and cost-effectiveness of IPV prevention are scarce, and only focus on the costs of violence or on interventions in high-income countries.

Aims

Synthesize the cost-effectiveness of IPV prevention programming globally, focusing on LMICs and fragile and conflict-affected settings.

Objectives

Review the academic and grey literature on IPV prevention cost, effectiveness and cost-effectiveness. Extract data on costs and effects. Estimate pooled effects and costs by intervention type.

Methods

We conducted a rapid review of academic and grey literature on costs and effects of IPV prevention from 01/01/1990 to 31/03/2022. We searched PubMed, EconLit and Google Scholar, hand-searched the references in the documents found, and sought expert feedback. This search yielded 618 documents. We retained 128 after screening. We extracted costs and effect with a bespoke Excel tool. We computed intervention effectiveness with random-effects meta-analyses, accounting for study and beneficiary heterogeneity. We computed cost per participant reached (2020 PPP-adjusted US$) by target population and intervention type.

Results

We extracted 225 estimates of costs (N=86) or effects (N=133) from 43 countries, 46% of which were LMICs, through 70 studies. The programmes most likely to reduce IPV are economic transfers (OR: 0.57; 95% CI: 0.65 to 0.74 - physical violence); couples counselling (OR: 0.40; 95% CI: 0.56 to 0.78 - physical violence); interventions to change gender-norms and beliefs (OR: 0.39; 95% CI: 0.59 to 0.89 - physical or sexual violence); and group-based workshops with men and women (OR: 0.31; 95% CI: 0.40 to 0.51 - physical violence). Costs per participant vary from a cost saving of US$ 7 for training medical personnel to support survivors to US$ 1,980 for couples counselling. IPV prevention programming holds promise. More work is needed to capture all impacts, expand the geographic coverage of evidence, include more interventions in fragile and conflict-affected settings, and test cost-effectiveness at scale. Reporting of costs and effects needs further standardisation to enable synthesis.

Impact of our Findings

Our preliminary findings have been incorporated in the UNFPA impact40.org tool to support policymakers' decisions related to IPV programming with evidence-based cost-effectiveness analysis.

11:00 AM –12:30 PM   WEDNESDAY   [Health Care Financing & Expenditures]

Cape Town International Convention Centre | CTICC 1 – Room 1.62

Decision-Making Processes for Essential Packages of Health Services: Experience from Six Low- and Middle Income Countries

MODERATOR: **Gavin Surgey**, Radboud University Medical Center

ORGANIZER: **Rob Baltussen**, Radboudumc

DISCUSSANT: **James Humuza**, School of Public Health, Rwanda

Decision-Making Processes for Essential Packages of Health Services: Experience from Six Low- and Middle Income Countries

PRESENTER: **Rob Baltussen**, Radboudumc

This presentation present the analytical framework and results of the review of HBP decison-making processes in six low and middle income countries (Afghanistan, Ethiopia, Pakistan, Somalia, Sudan and Zanzibar-Tanzania). It distinguishes the practical organisation, fairness, and institutionalisation of decision-making processes.

The review shows that countries: (i) largely follow a similar practical stepwise process but differ in their implementation of some steps, such as the choice of decision criteria; (ii) promote fairness in their EPHS process by involving a range of stakeholders, which in the case of Zanzibar included patients and community members; (iii) are transparent in terms of at least some of the steps of their decision-making process; (iv) in terms of institutionalisation, express a high degree of political will for ongoing EPHS revision with almost all countries having a designated governing institute for EPHS revision.

We advise countries to organise meaningful stakeholder involvement and foster the transparency of the decision-making process, as these are key to fairness in decision-making. We also recommend countries to take steps towards the institutionalisation of their EPHS revision process.

Arrangements for Institutionalisation of Essential Health Benefits Package in Northern African Countries

PRESENTER: **Reza Majdzadeh**, School of Health and Social Care, University of Essex, Colchester, UK
AUTHOR: Gavin Surgey

Arrangements for institutionalisation of EPHS in northern African countries

Institutionalisation is defined as how a set of activities becomes an integral part of a planning system and is embedded in ongoing practices. Countries may want to institutionalise the decision-making process so as to facilitate any ongoing EPHS revision and realise a lasting impact on the EPHS. The institutionalisation of EPHS revision relates to issues such as legal framework, governance, and capacity.

This presentation concentrates on institutionalisation of decision-making processes of EPHS revision in a series of northern African countries. In these countries, specific documents were prepared for institutionalisation alongside the development of EPHS, aimed at a set of governance conventions, management actions, and resources.

Stakeholder Involvement in Benefit Package Revision in Pakistan

PRESENTER: **Maryam Huda**, Department of Community Health Sciences, Aga Khan University Hospital, Karachi, Pakistan

This presentation reports on the involvement of stakeholders in health benefit package (HBP) revision in Pakistan.

The HBP revision in Pakistan employed a governance structure based on three connected stages of deliberation around several specific priorities and involved more than 100 stakeholders. The first stage concerned the involvement of four already existing Technical Working Groups (TWGs) for specific disease cluster: Reproductive Maternal Neonatal Child and Adolescent Health (36 members), Non-Communicable Diseases (38 members), Communicable Diseases (51 members), and Health Services Access (26 members). These TWGs already were already in place to advise the Ministry on different areas and represent relevant stakeholders. TWGs were tasked with reviewing the technical aspects of the services for potential inclusion and broadly allocating services into priority categories, with each TWG covering between 28–51 services. The second stage involved the set-up of a National Advisory Committee (NAC), whose mandate is to interpret the recommendations of the TWGs. The NAC had 90 members, including stakeholders representing societal interests, development partners and provincial representation, and one representative from each of the TWGs, in order not to be dominated by any specific disease/ service area interest. The third stage involved initiating a high-level Steering Committee (SC) responsible for reviewing the NAC recommendations and approving or revising them.

The TWG, NAC and SG meetings were organised such that each member had equal chances to provide input in the deliberations and TWG members were granted voting power. In other words, stakeholders' values were central in deliberations in various stages of the decision-making process.

11:00 AM –12:30 PM   WEDNESDAY   [Supply And Regulation Of Health Care Services And Products]

Cape Town International Convention Centre | CTICC 1 – Room 2.43

Practice patterns in healthcare

MODERATOR: **Anne Mills**, Department of Global Health and Development, London School of Hygiene & Tropical Medicine

Do Medicare Advantage Plans Select Better PCPs for Network Inclusion?

PRESENTER: **Eran Politzer**, Harvard University
AUTHOR: Bruce Landon

Background

Compared to traditional Medicare (TM), enrollees in Medicare Advantage (MA) use fewer services and receive higher quality care. Favorable selection of enrollees, care management, and utilization management could help achieve these results, but the role of insurers' selective contracting with cost efficient and high-quality providers is unclear.

Methods

Using Medicare claims from 2016 through 2018 on care provided to their TM patients, we compared the costliness and quality of primary care physicians (PCPs), in and out of MA networks, to the means in their region (hospital referral region, HRR). We used data from Ideon to identify the PCPs in each MA network in each region. PCPs' costliness was measured as the difference between the observed annual costs of their TM patients and their predicted costs, based on risk scores and county of residence. Quality was evaluated using an average of eight claims-based measures, drawn from the Healthcare Effectiveness Data and Information Set (HEDIS).

Results

We examined 151,679 PCPs associated with 10 million TM patient-years. We analyzed 3,719 MA network-HRR combinations used by 13.8 million MA beneficiaries. MA plans selected PCPs that were $433 [95% CI: 397,469] less costly per patient (2.9% of baseline costs) but had similar quality, compared to the means in their region. PCPs that were excluded from all MA networks were $1,617 [95% CI; 1499,1734] (13.8%) costlier than their region and their quality was lower by 2.1pp [95% CI: 1.7,2.4] (3%). PCPs in narrow networks were $212 [95% CI: 91,333] (1.4%) less costly than PCPs in wide networks, but their quality was lower by 1.1pp [95% CI: 0.1,2.1] (1.6%).

Conclusions

MA insurers included in their networks more often PCPs who were less costly than the average in their region, suggesting that selective contracting contributed to lower costs in the MA program.

Teams in the Operating Room: Price and Quality Variation in Healthcare

PRESENTER: **Susan Mendez**, University of Melbourne
AUTHORS: Adam Elshaug, Khic Prang, Jongsay Yong, Anthony Scott

How do medical teams influence treatment decisions? There is evidence that the places where doctors work and their relationships with other peers can influence their practice styles determining variation in quality, volume, and costs of healthcare provision. In this paper we

investigate the importance of medical teams, as opposed to individual doctors, in determining variation of care. Teams are defined by surgeons and anaesthetists in a setting where each doctor sets their own prices and negotiates payments arrangements with the insurer.

This project uses claims data from one of the largest private health insurance companies in Australia. The data spans from 2012 to 2019 and it links records from over 1.6 million patients to the doctors who provided their care. The detailed information on 15 million episodes of care allows to risk-adjust for patient complexity and identify repeated interactions of doctor teams across time.

In episodes where a surgeon and an anaesthetist are involved, their combined prices make, on average, over 70% of the episode claim.

Using linear regression analysis, we show that an increase in team-work is associated with lower prices and lower readmissions. Understanding medical relationships is important because repeated interactions might help forming more stable and efficient teams. But it can also aid price coordination.

Enhanced Data Sharing to Support Precision Oncology Innovation: A Qualitative Investigation of Patient Perspectives

PRESENTER: **Samantha Pollard**, BC Cancer
AUTHORS: Anna Hermansen, Morgan Ehman, Dean A Regier

Background: The generation of robust evidence to inform cancer etiology, prevention and targeted treatment strategies is premised on the availability of accurate and complete patient-level data. Within Canada, policies and infrastructure enabling cross-jurisdictional data sharing is limited. With ongoing efforts being undertaken to enable greater access and use of patient data using secured data sharing platforms and federated analytics, there exists an unmet need to determine patient willingness to participate in such initiatives.

Research aim: The current qualitative investigation sought to characterize patient values, expectations, and concerns for enhancing pan-Canadian data sharing infrastructure in support of precision oncology research.

Methodological approach: We conducted virtual focus groups with adults living in Canada, with a current or previous diagnosis of cancer. Participants were recruited through patient organizations, online community platforms, and oncology clinics, across Canadian provinces and territories. In advance of each focus group, participants were provided a brief video developed for this investigation, introducing concepts related to precision oncology and secured data sharing. Each focus group participant was provided an honorarium of $100 CAD. Audio files were professionally transcribed, with transcripts de-identified and reviewed for accuracy prior to initiating qualitative analysis. Transcripts were analyzed using thematic analysis by two qualitative researchers. Following preliminary analysis of each focus group, a member checking survey was developed and circulated to each focus group participant for critical feedback to ensure that the diversity of perspectives was captured in reporting of each discussion.

Results: Participants were recruited between December 2022 and November 2023, with 4 focus groups completed (n=22 participants). Member checking yielded valuable feedback regarding the capture of preference variation across participants. Following the integration of member checking feedback into the analysis, we identified 3 major themes and 8 sub-themes. Broadly, participants were highly supportive of enhancing cross-jurisdictional data sharing infrastructure to improve cancer care and treatment, while seeking to balance expanded data sharing capacity alongside privacy protection. The potential for misuse of data was highlighted as a primary concern to be mitigated through appropriate data governance, oversight, and consent transparency. Participants varied considerably in their comfort with incentivizing individuals to allow their data to be shared, with strong emphasis placed on the need to preserve individual autonomy.

Conclusions: Our work addresses a timely need to determine patient willingness to contribute to cross-jurisdictional secured data sharing initiatives. Motivated by community benefit, our participants strongly support efforts to enhance researcher access to health data to generate evidence for precision oncology. Patients critically considered potential risks and recommended mitigation strategies. The results of this investigation are being used to develop a pan-Canadian secured data sharing platform prototype, and to develop a discrete choice experiment (DCE). The DCE will estimate population-wide preference-based utilities for public willingness to participate in secured data sharing platforms enabling broader use of precision oncology data across Canada.

Private Primary Healthcare Provider Readiness in Strengthening HIV Care in Indonesia

PRESENTER: **Diah Evasari Husnul Khotimah**, USAID Health Financing Activity/ThinkWell
AUTHORS: Donny Hardiawan, Mutia Astrini Pratiwi, Dini Kurniawati, Nurhalina Afriana, Romauli Romauli, Amalia Zulfah Dani Hari Wijaya, Rosa Estetika, Lemi Kurniawan, Nimatun Nurlaela, Merly Indira, Khiswanda Ameliani, Risna Risna, Iko Safika, Hasbullah Thabrany

Background

The number of new HIV infections in Indonesia has declined from 48,300 in 2017 to 41,987 in 2020. As of June 2022, an estimated 403,437 people are living with HIV (PLHIV) in Indonesia. However, only 163,010 (40.4%) were on antiretroviral therapy (ART). 60.6% of PLHIV on treatment receive ART at public hospitals while 25.7% receive it at public primary healthcare (PHC) centers. The remaining 13.6% receive ART from private healthcare providers. Private hospitals make up 59.3% of the total number of hospitals in Indonesia, while private clinics constitute 34.5% of the total PHC providers in the country. The private clinics have great potential to expand access

to ART and lower hospital service delivery costs. This research assesses the potential of strengthening private clinics in increasing access to HIV services for PLHIV.

Method

We conducted a survey in 16 high-HIV-burden cities using a mixed-method design. 147 PHC providers were randomly selected from a list of PHC providers contracted by the National Health Insurance administrator (BPJSK). A quantitative online survey was conducted with the clinical staff at the sample facilities. In addition, 29 focus group discussions were conducted with 42 PHC staff and 13 key informants. The research collected variables on the facilities' capacity to provide HIV counseling, diagnosis, and treatment. A chi-square test was used to examine the difference between the proportion of public PHC centers and private clinics that received capacity building on HIV care but have not provided HIV care.

Results

The survey collected 147 PHC providers, comprising 121 public PHC centers and 26 private clinics. Of the 26 private clinics surveyed, 8% provide counseling, 15% provide diagnostic testing, and only 4% provide treatment. This low coverage was in line with the findings of only 12% of the private clinics had received training on counseling, 15% had received training on diagnostic testing, and 8% had received training on treatment. In contrast, of the 121 public PHC centers surveyed, 74% provide counseling, 89% provide diagnostic tests, and 55% provide treatment. Accordingly, within the sampled public PHC centers, 75% received training on counseling, 79% on diagnostic testing, and 64% on treatment. The proportion of private clinics that have received HIV training but did not provide HIV care was significantly different than that of public PHC centers (66.7% vs. 9.9% for counseling, 75.0% vs. 1.0% for diagnostic tests, and 100% vs. 20.8% for treatment, p-value <.01 for all categories).

Conclusion and recommendations

The number of private clinics that provide HIV care is limited. Despite our small sample size, our findings indicate a lack of HIV care provision at private clinics. We recommend the Government of Indonesia consider expanding HIV care at private clinics to increase the effectiveness and efficiency of PHLIV care. Future studies are needed to assess the possible barriers that may hinder private clinics from providing HIV care and possible support to increase their participation.

Assessing the Effect of the Dual Clinical Practice Policy on Physician Working in the Public Health Sector: A Case Study of Rwanda

PRESENTER: **Pascal Birindabagabo**, University of capatown

Strategies to motivate and retain experienced physicians and specialists in public health facilities are essential in providing quality healthcare services and reducing long waiting lists of patients in referral hospitals. Nevertheless, compared to the competitive pay in the private sector, the low pay in the public health sector has driven health practitioners to move from the public to the private sector or hold multiple jobs in both the public and private sectors to supplement their income. In 2021, The government has enacted the dual clinical practice (DCP) policy to regulate the movements between public and private facilities. The policy had the following objectives: regulating the provision of health care services in public hospitals through a private practice mechanism, improving the quality of health care services by retaining health professionals in public service, and increasing the income generated by public hospitals to improve their financial viability. This study aims to assess the effect of dual practice policy on the retention of qualified health providers, the perception of providers and clients on the quality of services, investigate the feasibility, acceptability of and satisfaction, access and costs of health services, and the impact on revenues of health facilities since the implementation of the dual clinical practice in public health care facilities in Rwanda.

METHODS

A cross-sectional and retrospective study was conducted in six selected public hospitals located in both rural and urban settings including district, provincial, referral, and teaching hospitals. Additionally, we collected data to complement our analysis from different stakeholders that engage with hospitals such as health insurance schemes, medical associations, and the ministry of health. We used mixed methods including both qualitative and quantitative approaches for data collection. A sensitivity analysis was used on key parameters that are supposed to affect the provider's adequate remuneration for attracting and retaining experienced specialist medical providers within the public healthcare delivery system in the country.

RESULTS

The finding from this study suggests that the DCP policy has increased the number of physicians and specialists working hours in public health facilities by 9 hours per week while the outpatient visits have increased between 1 to 9 %. Providers' monthly income incremental range increased from 50,000 to 1,000,000 RWF (median= 374,000 RWF). Also, public health facilities have increased their revenue from 0.1% to 3.6% of the total revenues generated by hospitals since the implementation of the DCP policy. Overall the majority of the physicians were satisfied with their current job (63%), while a sizable portion of them reported being dissatisfied (37%). The respondents' reasons for dissatisfaction included irregularities in performance-based financing (PBF) payments and late and low payments for DCP services provided.

Cape Town International Convention Centre | CTICC 1 – Room 1.43

Socioeconomic maternal and child inequalities in low and middle income countries

MODERATOR: **Anton Avanceña**, University of Texas

The Wealth-Related Inequality in Nutritional Status Among the Children of Tribal Communities in India

PRESENTER: **Rekha S**, Indian Institute of Technology Madras

AUTHORS: Shirisha P, Muraleedharan V R, Girija Vaidyanathan, Umakant Dash

Background

Malnutrition remains a major public health concern in India. Studies indicate that the nutritional status of children belonging to the Scheduled Tribes (ST), the lowest socio-economic category, in particular, is below the national average. In this study, we analyse wealth inequalities in nutritional outcomes within ST communities in two tribal-dominated states of India, namely Odisha and Jharkhand. The study also compares the trends in stunting, wasting and underweight between ST children and Non-ST children in these states.

Methods

We have conducted a trend analysis of the prevalence and inequalities in the nutritional indicators among ST children under age five using three rounds of the National Family Health Survey (NFHS) data [NFHS-3(2005-06),4(2015-16) and 5(2019-2021)]. Differences in the means of different nutrition indicators between the ST and Non-ST groups were tested (using T-test). Wealth-related inequalities were analysed using the Slope Index of Inequality (SII), which measures absolute inequality, and the relative Concentration Index (CIX), which measures relative inequality.

Results

The trend analysis shows that the prevalence of undernutrition remains higher among ST children in India as compared to Non-ST children between NFHS-3 (2005-06) and NFHS-5 (2019-2020) at the national level and in Jharkhand and Odisha. The SII and CIX values show that significant inequalities in malnutrition status exist among children belonging to various wealth quintiles within the ST category in both states. Among the ST category children in Odisha, the prevalence and inequalities (absolute and relative) for stunting exhibit a marked decrease between 2005-06 [SII: -41.1 (-59.2, -23.08); CIX: -7.0 (-12.8, -2.6)] and 2019-21 [SII: -27.2 (-25, -19); CIX: -4.9 (-7.4, -2.5)]. In Odisha, the absolute and relative inequalities for underweight among the ST category children have also decreased by 6 percentage points (pp) and 4 pp, respectively, between NFHS-3 [SII: -27.2 (-47.0, -7.3); CIX: -7.3 (-12.6, -2) and NFHS-5[SII: -21(-28, -13), CIX: -2.9 (-5.2, -0.6)]. Compared to Odisha, the decline in inequalities (absolute as well as relative) with regard to the prevalence of stunting in Jharkhand is lower between NFHS-3[SII:-21(-42.7, -0.74); CIX: -5(-11.5, -0.2)] & NFHS-5[SII: -19(-27, -10); CIX:-3(-5.4, -0.7)]. There is an appreciable decrease in inequalities for underweight in Jharkhand between NFHS-3 [SII: -26.91(-42.7, -0.74); CIX: -3.03(-11.5, -0.2)] and NFHS-5 [SII:-15.34 (-24.13, -6.5), CIX:-2.94(-5.2, -0.67)], but an increase in the prevalence of underweight has been observed among ST children belonging to richest households in the same period. The wasting is found to be significantly prevalent across all wealth quintiles. Trend analysis of inequalities shows that stunting and underweight were more concentrated among ST children belonging to the poorer quintiles in both states.

Conclusion

Our study highlights the importance of monitoring the absolute and relative wealth inequalities in nutritional outcomes because while inequalities across groups may reduce, the prevalence may increase among certain groups. Such observations, therefore, will enable policymakers to focus further on those groups and devise appropriate interventions.

Explaining Socioeconomic Inequalities in Child Vaccination in Ethiopia: Analysis of National Health Surveys

PRESENTER: **Firew Bobo**, Univesity of Technology Sydeny

AUTHOR: Andrew Hayen

Background: Monitoring and addressing unnecessary and avoidable differences in child vaccination is a critical global concern. This study aimed to assess socioeconomic inequalities in basic vaccination coverage among children aged 12-23 months in Ethiopia.

Methods: Secondary analyses of cross-sectional data from the two most recent (2011 and 2016) Ethiopia Demographic and Health Surveys were performed. This analysis included 1930 mother-child pairs in 2011 and 2004 mother-child pairs in 2016. Completion of basic vaccinations was defined based on whether a child received a single dose of Bacille Calmette Guerin (BCG), three doses of diptheria, tetanus toxoids, and pertussis (DTP), three doses of polio vaccine (OPV), and one dose of measles vaccine. The concentration curve and concentration index (CCI) were used to estimate wealth related inequalities. The concentration indices were also decomposed to examine the contributing factors to socioeconomic inequalities in childhood vaccination.

Results: From 2011 to 2016, the proportion of children who received basic vaccination increased from 24.6% (95% confidence interval, CI: 21.4 to 28.0) to 38.6% (95% CI: 34.6 to 42.9). While coverage of BCG, DPT, and polio immunization increased during the study period, the uptake of measles vaccine decreased. The positive concentration index shows that basic vaccination status was favourably concentrated among children from wealthier households CCI= 0.212 in 2011 and CCI= 0.212 in 2016. The decomposition analysis shows that maternal health services such as family planning and antenatal care, socioeconomic status, exposure to media, urban-rural residence, and maternal education explain inequalities in basic vaccination coverage in Ethiopia.

Conclusions: Childhood vaccination coverage was low in Ethiopia. Vaccination was less likely in poorer than in richer households. Addressing wealth inequalities, enhancing education, and improving maternal health service coverage will reduce socioeconomic inequalities in basic vaccination uptake in Ethiopia.

Wealth-Based Inequality in the Continuum of Maternal Health Service Utilisation in 16 Sub-Saharan African Countries

PRESENTER: **Anteneh Asefa**, Institute of Tropical Medicine
AUTHORS: Barbara McPake, Tiara Marthias, Samson Gebremedhin, Lenka Beňová

Background: Persistent inequalities in coverage of maternal health services in sub-Saharan Africa (SSA), a region home to two-thirds of global maternal deaths in 2017, poses a challenge for countries to achieve the Sustainable Development Goal (SDG) targets. This study assesses wealth-based inequalities in coverage of maternal continuum of care in 16 SSA countries with the objective of informing targeted policies to ensure maternal health equity in the region.

Methods: We conducted a secondary analysis of Demographic and Health Survey (DHS) data from 16 SSA countries (Angola, Benin, Burundi, Cameroon, Ethiopia, Gambia, Guinea, Liberia, Malawi, Mali, Nigeria, Sierra Leone, South Africa, Tanzania, Uganda, and Zambia). A total of 133,709 women aged 15 - 49 years who reported a live birth in the five years preceding the survey were included. We defined and measured completion of maternal continuum of care as having had at least one antenatal care (ANC) visit, birth in a health facility, and postnatal care (PNC) by a skilled provider within two days of birth. We used concentration index analysis to measure wealth-based inequality in maternal continuum of care and conducted decomposition analysis to estimate the contributions of sociodemographic and obstetric factors to the observed inequality.

Results: The percentage of women who had 1) at least one ANC visit was lowest in Ethiopia (62.3%) and highest in Burundi (99.2%), 2) birth in a health facility was less than 50% in Ethiopia and Nigeria, and 3) PNC within two days was less than 50% in eight countries (Angola, Burundi, Ethiopia, Gambia, Guinea, Malawi, Nigeria, and Tanzania). Completion of maternal continuum of care was highest in South Africa (81.4%) and below 50% in nine 16 countries (Angola, Burundi, Ethiopia, Guinea, Malawi, Mali, Nigeria, Tanzania, and Uganda), the lowest being in Ethiopia (12.5%). There was pro-rich wealth-based inequality in maternal continuum of care in all 16 countries, the lowest in South Africa and Liberia (concentration index = 0.04) and the highest in Nigeria (concentration index = 0.34). Our decomposition analysis showed that in 15 of the 16 countries, wealth index was the largest contributor to inequality in primary maternal continuum of care. In Malawi, geographical region was the largest contributor.

Conclusions: Addressing the coverage gap in maternal continuum of care in SSA using multidimensional and people-centred approaches remains a key strategy needed to realise the SDG3. The pro-rich wealth-based inequalities observed show that bespoke pro-poor or population-wide approaches are needed.

Keywords: Antenatal care, demographic and health survey, facility-based childbirth, inequality, maternal continuum of care, postnatal care, sub-Saharan Africa

Do Financial Incentives for Smoking Cessation during Pregnancy Reduce Social Inequalities in Health at Birth?

PRESENTER: **Florence Jusot**, Université Paris Dauphine
AUTHORS: Léontine Goldzahl, Noémi Berlin, Ivan Berlin

Financial incentives conditional on quitting risky health behaviors are increasingly being tested in field experiments. Evidence of efficiency mainly depends on the type of health behavior (smoking cessation, weight loss, vaccination uptake etc.) and the incentive schemes (frequency, amounts, etc.). While a social gradient prevails in risky health behaviors, whether financial incentives is an effective tool to reduce social inequalities in health behaviors remains unknown. This paper aims at providing evidence on whether financial incentives conditional on smoking cessation during pregnancy reduce the impact of social inequalities in health at birth.

Maternal smoking during pregnancy is associated with higher risk of miscarriage, fetal death, prematurity and low birthweight (<2500 gr.). Prevalence of maternal smoking during pregnancy remains too high in Europe with large intra-regional disparities (10% in the UK, 22% in France) as well as strong socioeconomic disparities. Studies have demonstrated that financial incentives for smoking cessation during pregnancy (Notley et al. 2019 for a review) increase smoking abstinence and improve the health of the newborn at birth. However, but the impact of financial incentives on the social gradient in maternal smoking remains to explore.

Our analysis is based on data of the Financial Incentives for Smoking Cessation in Pregnancy (FISCP) randomized experiment conducted in France which found that financial incentives more than double continuous abstinence and decrease the likelihood of low birthweight by 6ppts (Berlin et al. 2021). In this paper, we investigate the behavioral responses of low-and high-income pregnant women to financial incentives to quit smoking, and how these translate into a reduced likelihood of low birthweight. ><2500gr).

We find that financial incentives increase prevalence of abstinence from smoking irrespectively of income. High-income women are more likely to quit continuously during their pregnancy than low income women, but low-income women reduce the number of cigarettes smoked when they don't quit. However, financial incentives decrease the likelihood of low birthweight only among newborns of women with low incomes. This is because of the increased risk of low birthweight related to higher tobacco intoxication of low-income women, for whom even non-continuous smoking cessation improves birthweight.

Financial incentives seem to be an appropriate instrument to reduce maternal smoking during pregnancy and low birth weight even among the more deprived.

11:00 AM –12:30 PM   WEDNESDAY   [Supply And Regulation Of Health Care Services And Products]

Cape Town International Convention Centre | CTICC 1 – Room 1.41
Pharmaceutical Pricing

MODERATOR: **Benjamin Montmartin**, Skema Business School

Evidence of Excessive Pricing of Pharmaceutical Ingredients for Medicines Speculatively Repurposed As COVID-19 Therapeutics
PRESENTER: **Melissa Barber**, Harvard University

Background: In the early months of the COVID-19 pandemic, some medicines were speculatively repurposed as investigational therapies. Increased demand for these medicines –hydroxychloroquine, ivermectin, and corticosteroids – led to shortages. The literature on pandemic-related supply challenges has largely focused on behaviour by patients and pharmacies, with little attention paid to markets for active pharmaceutical ingredients (API). This study addresses that gap by quantifying effects of the pandemic on API markets for medicines speculatively repurposed for COVID-19 treatment.

Methods: The synthetic difference-in-differences (SDID) method described by Arkhangelsky (2021) was used to estimate price effects on medicines repurposed for COVID-19 following the WHO pandemic declaration. SDID allows estimation of the effects of demand related to use as COVID-19 treatments, beyond the general effects on API markets. SDID employs synthetic controls, generated by using observed market outcomes for 'donor' medicines (medicines unaffected by COVID-19-specific demand) weighted to match the pre-pandemic trends of the 'treated' group (medicines repurposed for COVID-19). Analyses of shipment-level customs declarations published by S&P was used to construct a novel panel dataset of API prices (USD/kg) for 6 medicines repurposed as COVID-19 treatments and 8 common essential medicines, exported from India and China March 2018 - September 2020. Pharmaceutical markets are highly segmented by income, so data were stratified by importing market category, e.g. high-income countries (HICs) and low- and middle-income countries (LMICs).

Results: 24,508 shipments, representing 90 million kg of API, respectively, were included in the analysis. Data were available for exports from India to HICs and LMICs, and from China to LMICs, but not for China to HICs. Hydroxychloroquine API prices for Chinese exports increased by 722% (95% CI: 488%, 1049%) in the first 3 months after the pandemic declaration compared to the synthetic control (i.e. above general market trends). The effect was smaller among Indian exports: a 76% price increase (95% CI: 28%, 142%) for exports to LMICs and 40% price increase (95% CI: 3%, 90%) for exports to HICs compared to synthetic controls. Price increases for ivermectin API exported from India to LMICs in the first 3 months after the pandemic declaration increased by 234% (95% CI: 138%, 369%). No significant changes for prices were observed for ivermectin exports from India to HICs. Small but significant effects were observed for some corticosteroids to (hydrocortisone, dexamethasone).

Conclusion: This study found evidence of excessive pricing by API manufacturers for certain speculative treatments (hydroxychloroquine and ivermectin) in the first 3 months after the WHO pandemic declaration. SDID analysis suggests that these price increases are unlikely to have been the result of production interruptions alone. Transparency in medicine manufacturing costs can support procurement and guide pharmaceutical pricing policy. Understanding whether price increases are the result of opportunism by manufacturers or genuine production cost increases is necessary for designing appropriate policy responses. Further research might examine the effectiveness of price regulations implemented during the substantial market turbulence in the early months of the COVID-19 pandemic.

Pharmaceutical Pricing and R&D As a Global Public Good
PRESENTER: **Harry Frech**, University of California

Pharmaceutical Pricing and R&D as a Global Public Good

In his Labor Day address, President Biden stated that the U.S. "has the highest drug prices in the world, and there is no reason for it" (Biden 2022). For new branded drugs this is correct. But, we demonstrate a "reason for it."

According to a 2021 RAND Report, US prices for "Brand Name Originator Drugs" are 2.3 times the average found in the other 32 OECD countries. Our purpose is to explain these differences. Viewing the situation through the lens of the theory of global public goods and alliances, developed by Olson and Zeckhauser (1966), we explain the pricing differences and the implications the for the future global supply of innovative new drugs. A similar view is taken by the US Council of Economic Advisors Reports (2018, 2019) and Goldman and Lakdawala (2018). We develop the idea further and implement it empirically.

A commonly held theory postulates that prices are set by drug firms in the US market at the profit maximizing level, while in the rest of the world (ROW), national authorities set prices just above the marginal cost of production, with no payment to incentivize drug R&D. The ROW countries are said to be 100% free riding. We examine this argument theoretically and empirically and find it wanting.

We apply global public good theory to the pricing of branded drugs. We develop the optimal global contribution, e.g. as supported by the Lindahl pricing and show that existing contributions, thus R&D, are suboptimal. Then, we take the theory to the data. First, we define the contribution as the short-term profits or quasi rents on the sales of all branded drugs. Then, we calculate those contributions on a country-by-country basis, based on the pricing data in the Rand Report, and two market-based estimates of marginal cost. We show that the ROW countries are not 100% free riding. While their contributions are less than the USs and are suboptimal, they are not close to zero. Second, we regress the contributions on the size of the country's market (in some versions, other controls as well). We find size to be a powerful determinant of the contribution, as predicted by the model. Size alone explains 92% to 94% of the cross-national variation in contribution, depending on the estimate of marginal cost. Size remains economically and statistically significant, no matter which controls are introduced. We develop several interpretations of the results. Finally, we take a more micro approach and estimate how much of the recent flow of new drugs is attributable to the fact than the ROW countries do contribute to the global public good of drug R&D.

We show why US drug prices are higher than in the ROW countries. We suggest policies to get closer to the global optimum: international agreement and a new unilateral policy for the US.

Reference Pricing and the Generic Competition Paradox

PRESENTER: **Izabela Jelovac**, GATE UMR CNRS 5824

Reference pricing and the generic competition paradox

Background

Empirical observations show that prices of brand-name drugs often increase after patent expires and the entry of generic competitors. This is a surprising result as one generally expects competition to lead to lower prices. Some rationale can explain such paradox, based on market segmentation or on therapeutic poor substitutability. We offer a new and simple rationale, based on the nature of the drug price setting before and after patent expiry. Concretely, before patent expiry, drug producers are granted a monopoly situation to protect their innovation. Health insurers, private or public, act on behalf of their insurees and in many countries, they negotiate the prices of the patented drugs with the monopoly producers. After patent expiry instead, the monopoly situation is not granted anymore so that generic drug producers can enter the market and compete with the brand-name producer. The end of the monopoly justifies the one of the monopsony so that prices are generally not negotiated anymore. Instead, the regulators in many countries encourage generic consumption using reference pricing to reimburse drugs consumption, that is, the health insurance reimbursement amount is based on the cheapest version of the drug available on the market. Consumer can buy more expensive versions against the payment of the price difference.

Research question

What are the circumstances under which the prices of brand-name drugs increase after patent expiry and the entry of generic competitors?

Methods

We use a model of Nash Bargaining to represent the situation before patent expiry. We assume that a regulator (in a public health insurance system) and a monopoly negotiate the price of a brand-name drug. We assume the regulator aims at maximizing the patients' surplus net of the public expenses generated by the health insurance reimbursements. The monopoly producer of the brand-name drug is assumed to aim for profit maximization. After patent expiry, we model imperfect competition between the brand-name producer and a limited number of generic competitors. The competition is analyzed either with simultaneous price settings (Bertrand competition) or considering that the brand-name producer is a leader on the market and decides its price before the generic competitors (Stackelberg competition). A coherent demand structure is maintained across the two models to account for the role of reference pricing and the preference of many for brand-name drugs.

Results

We show that the generic paradox occurs when the firms compete à la Stackelberg after generic entry. The generic paradox can also appear when producers compete à la Bertrand, when the generic drugs are perceived of poor quality compared to the branded drug or

when the regulator is a strong negotiator before patent expiry.

Conclusions and policy implications

We confirm with a robust and standard game-theoretical analysis that drug prices can increase after the entry of generic competitors. One way for competition to lead to lower prices instead is to improve the quality perception of generic drugs by the general population.

The Impact of Price Capping on the Availability of New Drugs in the Philippine Market: An Application of the Gravity Model of Trade

PRESENTER: **Andrea Margreth Santiago Ora-Corachea**, Department of Health
AUTHOR: Joanna Marie Lim

High prices make medicines unaffordable, compromise equitable access to them, and threaten the financial sustainability of public health systems (Espin et al., 2011). In many low- and middle-income countries where the majority of the population buys medicines through out-of-pocket payments, the high cost of medicines relative to the household budget exposes families to the risk of catastrophic health spending (Cameron et al., 2011).

To promote access to medicines while containing rising healthcare costs, governments have adopted different pharmaceutical pricing strategies (Verghese et al., 2019; Wirtz et al., 2017; O'Neill and Crain, 2005). In the Philippines, aside from adopting External Reference Pricing (ERP) to set price ceilings on select medicines, the government implemented several policies to address the high out-of-pocket health expenditure and make quality medicines more accessible. The implementation of the Republic Act No. 9502 or the "Cheaper Medicines Act of 2008" and Executive Order No. 821 series of 2009 gave power to the President to impose maximum retail prices on drugs and medicines upon the recommendation of the Secretary of Health. With the implementation of the policy to lower medicine prices, one would expect stronger growth of demand for medicines. However, an assessment of the implementation of the Cheaper Medicines Act revealed that while medicine prices did fall, the demand response to lower prices was low and did not indicate expanded access (Clarete and Llanto, 2017). Moreover, literatures show that price capping reduces patients' well-being in the form of regulation-induced delays in new product launches, outweighing the benefits of reduced prices (Kessler, 2004), and weakens the financial incentives to pharmaceuticals to undertake research and development.

This paper aims to assess the effect of implementing a medicine price capping policy on the launch timing of new drugs in the Philippine market. The econometric model takes from the basic gravity model with independent variables GDP (in current $), population, and distance. Consistent with the objectives of the paper, two dummy variables were also added in the model: the timing of launch vis-à-vis the implementation of price capping policy and the presence of a manufacturer's headquarter/office in the Philippines.

Results from multiple regression analysis suggest negative and significant associations between the launch lag and the economic size of the trading countries and between launch lag and the presence of manufacturer's headquarters in the Philippines. On the other hand, positive and significant associations were observed between launch lag and the implementation of the price capping policy and between launch lag and the relative market size of the trading countries. These findings present the opportunities to improve the current policy implementation by rethinking how the launch lag affects consumer welfare through impaired access to new drug products.

11:00 AM –12:30 PM   WEDNESDAY   [Demand & Utilization Of Health Care Services]

Cape Town International Convention Centre | CTICC 1 – Auditorium 2
Insurance and healthcare demand

MODERATOR: **Lukas Kauer**, CSS Institute for Empirical Health Economics

Did Implementing a Personalised Disability Reform Benefit People with Disability and Their Primary Carers? Evidence from the Australian National Disability Insurance Scheme

PRESENTER: **Bernice Hua Ma**, Monash University

Since 2013, Australia has launched the National Disability Insurance Scheme (NDIS) to provide personalised formal care to people under 65 years old with a significant and likely permanent disability. The NDIS expanded the available funds but also re-allocated public funds away from National Disability Services and state or territory-based disability programs towards a single national program. While the NDIS attempted to improve the quality of support and better target those with the greatest needs, many people with disability were ruled ineligible to receive support. This study evaluates the short-term impact of the NDIS roll-out in an area on formal services use, caring hours, and carer's employment and social participation for those with a profound or severe disability. Using responses to the 2015 and 2018 Survey of Disability, Aging and Carers (SDAC), we conduct a difference in difference analysis, comparing the change in outcomes of primary carers and the use of formal services of those with a profound or severe disability who lived in areas where some likely gained access to the NDIS between the SDAC survey waves (n=736) to the change in outcomes for their counterparts living in areas where they did not get access to the NDIS until after June 2018 (n=318). We do not find evidence that the availability of NDIS had any short-term impact on the probability to use formal services, nor their frequency. We do not find any impact either on short-term outcomes

for primary carers. Gains from the NDIS roll-out for some may have been offset by lost access to care for others. Policymakers need to reconsider the support to the wider population of people with disability. Also, more specific considerations may be needed to support carers in achieving better outcomes.

Amount of Premium Subsidies, Health Plan Choice and Health Care Demand

PRESENTER: **Noel Ackermann**, University of Lucerne
AUTHORS: Samuel Lordemus, Stefan Boes

We aim to examine to what extent the amount of premium subsidies impact health plan choice and health care demand of low-income individuals. We investigate this question under the current premium subsidy system in Switzerland in which all cantons pay the subsidies through an in-kind transfer scheme. A recent change in the Swiss health insurance act obliges cantons to provide a higher premium subsidy for children in low-income households. This change may come at the cost of lower subsidies paid to other groups of low-income individuals. For this reason, and combined with limited public resources and increasing health insurance premiums, it is of interest to analyze whether subsidies, respectively the amount thereof, impact health plan choices and health care demand.

We tackle the challenge related to data availability by developing a model based on calculations of premium subsidies and canton-specific regulations on payment modalities. We then apply the model to a rich individual-level dataset from the Swiss Household Panel. Our analysis starts with a basic difference in differences approach while reducing the complexity of the subsidy schemes to a general eligibility indicator. Using the panel data structure of the Swiss Household Panel, we further study the dynamics of premium subsidies and their impact on health care utilization. We then gradually expand the basic models by including the subsidy amount based on the model calculations and explore discontinuities and kinks in the subsidy function, which allow for causal inferences on the impact of premium subsidies.

The Effect of Income and Race on U.S. Medicare Advantage Enrollment

PRESENTER: **Adam Atherly**, Virginia Commonwealth University
AUTHORS: Roger Feldman, Eline M. van den Broek-Altenburg, Bryan Dowd

Background: The U.S. Medicare program has a very limited benefit package with high out-of-pocket cost sharing in the traditional fee-for-service (TM) Medicare program. An alternative, Medicare Advantage (MA), offers reduced cost sharing and enhanced benefits, along with limited provider networks and care management. MA has been gaining market share relative to TM among the eligible US population, particularly among racial minorities and lower income populations. Our goal is to explain the differences in MA market share based on income and race.

Data: We combined the Medicare Current Beneficiary Survey from 2007-2020 (data on beneficiary demographics, health, income and other attributes) with data on plan payment levels and measures of market competition. We have a number of study exclusions, including individuals less than age 65, nursing home residents, and full-time workers. The result is a panel dataset that is nationally representative of Medicare beneficiaries who actively choose MA or Traditional Medicare. Total sample size is 62,051.

Methods: We estimate the probability of choosing a Medicare Advantage (MA) plan or Traditional Medicare using a logit model. We control for individual characteristics, including age, gender, health status, income and other factors plus market factors including plan availability, market competition and payment rates. We use a non-linear version of the Oaxaca-Blinder decomposition to distinguish reasons for differences in marketshare by decomposing differences into differences in coefficients (i.e., preferences) and attributes (characteristics).

Key Findings: We find that income had a non-linear effect on enrollment, with a higher probability for the "near poor", 100-200% of FPL than those wealthier and poorer. Age and education were negatively associated with MA enrollment. Overall self-rated health was negatively associated with enrollment, but several chronic conditions such as arthritis and diabetes were positively associated. Differences in both demographics and health characteristics were observed by racial category, but this effect was overwhelmed by changes in preferences. Overall, we found that 81 percent of the difference in marketshare is due to differences in coefficients.

Conclusions: We find that the higher relative enrollment rate for African-Americans is due to both differences in attributes (e.g., income and location) and differences in preferences (coefficients). As enrollment in MA increases for all racial groups, these differences may moderate. Income has a complicated relationship to enrollment because of the Medicaid program, which covers lower income Medicare enrollees (the "dually eligible"). The poorest population, which is Medicaid eligible, has a lower preference for MA enrollment, as does the wealthier population (400% of the Federal Poverty Line and above). The strongest preference for the MA program is among the "near poor" – too wealthy for Medicaid and too poor to afford private supplemental options.

Awareness and Utilization of Public Health Insurance and Special Discount Privileges of Older Filipinos

PRESENTER: **Kayleen Gene Rubio Calicdan**, University of the Philippines Diliman
AUTHORS: Benedict Jr. Munsayac Evangelista, Aleli Kraft, Joseph Capuno, Owen O'Donnell

Although the Philippines is not yet an ageing country, expenditures incurred by the disease-vulnerable elderly is largely shouldered by their families, as households still finance a large proportion (41.5% in 2021) of total health spending in the country. As assistance to older Filipinos, the government extended the coverage of the National Health Insurance Program (NHIP) to all uninsured Filipinos aged 60

years and older. Furthermore, senior citizens can avail of law-mandated discounts on medicines, medicines, medical and dental services, and other benefits catered only to older Filipinos.

Despite these policies, many older Filipinos are still unaware of their government-granted privileges and thus unable to avail them. Furthermore, there are those who do not use their benefit privileges when they avail healthcare services (Paguirigan, 2019). To probe these issues, this study investigates the effects of registering for and owning a Senior Citizen ID (SC ID)—which entitles registered Filipinos aged 60 years and above to avail of discounts and other privileges—in terms of raising awareness and use of health insurance benefits. Further, it seeks to determine the differences in awareness and uses of NHIP benefits between those were already insured before reaching 60 years old and have completed 120 months of premium contributions ("Lifetime" members), and those who were mandatorily covered only upon reaching 60 years of age (referred to as "Mandatory" members).

We used data from the 2018 Longitudinal Study of Ageing and Health in the Philippines (LSAHP), the first nationally representative panel survey of older Filipinos in the country. Using information on pension claims and work history N=5985 older persons aged 60 years and above, we classified the sample into the two NHIP membership categories, and whether they reported to have a SC ID or not. Using logistic regression analysis, we estimate the effects of a Lifetime membership and the ownership of a SC ID on (1) the probability of coverage awareness, and (2) the use of NHIP and discount benefits upon hospitalization, while controlling for socio-demographic factors, health status indicators and location of residence.

We find that while there are more Mandatory members (59%) among older Filipinos, Lifetime members are more likely to be aware of their NHIP coverage by more than 6 percentage points (pps) relative to Mandatory members. We also find that the act of registration and ownership for a Senior Citizen ID raises coverage awareness, as registered senior citizens are 16.3 pps more likely to report having coverage. Despite this, we find that neither being a Lifetime member nor being a registered senior citizen has a significant effect on the probability of utilization of PhilHealth benefits upon hospitalization. This may imply that regardless of membership type or registration status, older persons are able to avail their insurance benefits as hospitals enable them to avail their claims. Furthermore, Lifetime members are less likely to avail their senior citizen discount to minimize their inpatient spending by around 7 pps and registered seniors are more likely to avail the discount by around 20 pps.

11:00 AM –12:30 PM   WEDNESDAY   [Economic Evaluation Of Health And Care Interventions]

Cape Town International Convention Centre | CTICC 2 – Daisy

Economic-Epidemiological Models: Optimizing Lockdowns for the Mitigation of Pandemics

MODERATOR: **Edith Patouillard**, World Health Organization

ORGANIZER: **Katharina Hauck**, Imperial College London

DISCUSSANT: **Tessa Edejer**, World Health Organization

Lives Versus Livelihoods: Trade-Off Analysis of Epidemiological, Macro-Economic and Social Impact to Inform Policy Making on COVID 19 Strategies in Selected Latin American and Caribbean Countries

PRESENTER: **Adolfo Rubinstein**, Institute for Clinical Effectiveness and Health Policy

The global pandemic is not over yet, and it will remain necessary to continue to adapt the public health and social measures (PHSM) to occasional surges of this or other viral pandemics that may arise in the future. Latin America and the Caribbean (LA&C) is one of the regions of the world with the highest death toll, representing more than 25% of the overall deaths. Policy makers need to take into account not only the epidemiological but also the macroeconomic and social impact to base their response and the calibration of their measures to protect both lives and livelihoods, considering social values and trade-offs.

Our interactive SVEIR model ("V" to include a vaccination transition state) , developed for Argentina, Brazil, Jamaica and Mexico, is based on our previous epidemiological modeling work and an economical framework based on DEADALUS, but also including labor informality, a major component of most LA&C economies. To improve the transmission dynamics, we incorporated specific age-strata mixing patterns matrices to represent social interactions and effective contact rates at each of the 4 settings included: home, school, work and community. The econ framework analysed 16 economic sectors, using a simplified version of the OECD input-output matrix to assign the indirect effect of restrictions in individual sectors.

In this study, the economic framework determines the working hours, translated into work-related contacts. Working hours, an output from the economic bucket, are an input for the epidemiological bucket, as a reduction of hours worked in the workplace affects the contact matrix (e.g., work contacts or contacts in the public transport). In addition, we assumed a lockdown fatigue effect, where there is a decrease of adherence as lockdown extends and an increase when there is a greater number of deaths or ICU hospitalizations (a "fear" factor). The simulation of the two models run recursively: the economic model takes the epidemiological output (deaths in the previous week) as an input, whereas the epidemiological model takes the economic output (working hours) as an input. When the priority is to curb the case-curve (a "safety-focused" approach), the economy will have to endure a lengthy lockdown and a likely sizable decline in GDP. Conversely, if the policymaker has a rather "economy-focused" approach, attempting to minimize the economic losses, the

mortality rate might shift upwards. This model also captures social impact metrics such as the increase of poverty, stratifying the outcomes by gender, informality and household income, allowing for policy makers to visualize the trade-offs between different simulated scenarios, from the least restrictive to the most restrictive and stringent PHSM.

In summary, our user friendly, open source, transparent and interactive integrated epi-econ-social model was developed to facilitate policy makers decisions by allowing the user to modify its parameters according to the specific pandemic trajectory, PHSM implemented, policy context and vaccination strategy in each country. Thus, this model 'adjust' for the potential impact and interactions of PHSM and vaccination on epidemiologic and socio-economic outputs.

Jointly Modelling the Epidemiological and Macro-Economic Impact of COVID-19 in South Africa: The Tekanelo Model and Its Role in Planning for the Fourth Wave of COVID-19 Cases in South Africa

PRESENTER: **Heinrich Bohlmann**, University of Pretoria

In order to support economic decision-making in South Africa, we developed Tekanelo, an epidemiologiceconomic modelling suite incorporating epidemiological model outputs regarding different vaccine and variant scenarios to develop shocks imposed on an existing computable general equilibrium model for South Africa.

Tekanelo soft-links outputs from the National COVID-19 Epi Model (NCEM), a stochastic compartmental transmission model that estimates the incidence of COVID-19 cases, hospitalisations, and deaths in South Africa, and an annual recursive-dynamic model of the South African economy, the University of Pretoria General Equilibrium Model (UPGEM). The shocks considered included unavoidable shocks that impact labour supply and productivity; exogenous shocks within the control of local policymakers relating to restrictions on domestic economic activities; and the impacts of external policy and regulatory announcements, including travel bans. All shocks were assumed to apply in year +1 only (with the labour supply impact being the shortest-lived).

The model's baseline was informed, inter alia, by National Treasury's macro-economic projections of with GDP growth by 5.1% in 2021, 1.8% in 2022, 1.6% in 2023, and 1.7% in 2024. In anticipating the fourth wave of COVID-19 cases driven by the Omicron variant (Oct-Dec 2021), the "unavoidable" shocks considered were a 0.1% reduction in labour supply due to mortality rates and long-term illness, with a small macro impact but a significant impact on affected individual households, and a 1% reduction in both primary factor productivity (due to a disruption to capital and labour) and in the required rate of return on investment (due to an adjustment for risk in the capital supply curve), both with a large macro impact and across most industries. The "internal policy" shocks considered were a 10% reduction in hospitality industry capital stock and a 5% reduction in selected service industry capital stock (both due to being held dormant due to restrictions), both with a small macro impact but large impact on directly affected industries. Finally, the "external policy" shocks considered were a 10% reduction each in tourism industry capital stock (due to capital being held dormant given restrictions) and in the tourism export demand curve (due to reduced demand given travel hesitancy), again both with a moderate macro impact but large impact on directly affected industries.

In our analysis of the impact of the fourth wave caused by Omicron, we did not expect a return to the severe level 4 to 5 type of lockdowns that characterised much of 2020, due to the ready availability of vaccinations, high previous exposure to COVID-19, and the damage done to the economy already. Instead, we considered moderate restrictions fluctuating between level 1 to 3 type of restrictions – maintaining a focus on limiting large gatherings – most likely, together with external policy decisions that impact local industries, most notably travel restrictions and/ or regulations that make travel less desirable. Local policymakers agreed with our assessment and kept restrictions to a minimum, while external policymakers, outside of our sphere of counsel, imposed travel restrictions leading to losses similar to those estimated by us.

Measuring the Economic Impact of Alert Level System for COVID-19 Pandemic Response in the Philippines

PRESENTER: **Dr. Elvira de Lara-Tuprio, PhD**, Ateneo de Manila University

Between March 2020 and October 2021, the Philippine government imposed varying levels of community quarantine (CQ) policies in the different regions, provinces, cities and municipalities to monitor and control the spread of COVID-19 in the country. The most restrictive CQ policy, imposed whenever there was an impending surge of cases, put a huge strain on the economy – businesses closed, people lost their jobs and government expenditures for the pandemic response swelled. In November 2021, the government shifted strategies to slowly reopen the economy. The CQ policies were replaced with an Alert Level System that imposed restrictions only on 3Cs: crowded places, closed contact settings, and closed spaces with poor ventilation. Alert Levels, which range from 1 to 5, with 5 being almost equivalent to the most restrictive CQ policy, is determined based on metrics that include average daily attack rate, 2-week growth rate of new cases, healthcare utilization rate and vaccination coverage. Depending on the Alert Level imposed on a given locality, establishments under 3C's may be allowed to operate up to a prescribed percentage of its on-site capacity. Alert Level 1 allows 100% capacity and is equivalent to full opening of economic activities.

With very small case numbers in the latter part of 2021, the country seemed to be on the road to full economic recovery. However, the emergence of the Omicron variant caused a surge far greater than previous surges and temporarily reduced economic activities in January 2022. However, although the case numbers during the Omicron surge were high, the healthcare system was not overwhelmed and hospitalizations remained low.

It was only in March 2022 that the government finally decided to switch to Alert Level 1 in several parts of the country . Yet as healthcare utilization remained low, one might wonder if it was more advantageous to fully open the economy much earlier. Conversely, what would have been the economic impact if NCR and other localities remained under more restrictive Alert Level in March onwards? The latter was a possibility because several mass gatherings occurred during the May 2022 election campaign period.

The FASSSTER SEIR Model, now on its third iteration, was designed and developed as an operational model to assist the Philippine government in evidence-based policy in relation to managing and mitigating the spread of COVID-19 in the country. To answer the above two questions, we developed an economic model that hinges on the FASSSTER model. The FASSSTER model is an SEIR-type compartmental model that incorporates reinfections and the effects of vaccination. The economic model, on the other hand, uses a set of differential equations to describe the variables that measure the economic losses due to COVID-19 infections and death and due to partial restrictions in the economic activities. This paper discusses the development and use of the integrated model in understanding the economic impact of COVID-19 in the Philippines.

Describing Behavioural Response to Pandemic Threat Using Economic Data and Dynamic Input-Output Models

PRESENTER: **David J Haw**, Imperial College London

The COVID-19 pandemic saw lasting disruption to the economy. Learning from this period is crucial when planning for the eradication or mitigation of future outbreaks. We offer an integrated modelling approach whereby airborne pathogen transmission and economic activity are represented dynamically and are interdependent, building on a previously developed model DAEDALUS. Our aim is to incorporate economic impact into pandemic preparedness and outbreak response.

Our initial modelling involved the use of sectoral gross value added (GVA) as an explicit measure of sector closure, from which heterogeneous contact patterns were derived in a mechanistic way. This method does not account for behavioural change such as mask wearing or other non-pharmaceutical interventions (NPIs). In our new framework, economic activity (measured via sector-stratified GVA) is treated as an indirect measure of all changes in transmissibility, including contact patterns and NPI use. We construct a feedback function such that both mandated business closures and behavioural changes in response to perceived threat are contributors to the force-of-infection, and calibrate this feedback to data from the COVID-19 pandemic in the UK, from March 2020 to July 2021. This allows for the study of counterfactual scenarios without any arbitrary assumptions regarding epidemiological parameters.

We extended DAEDLAUS from a static to a dynamic input-output model of the economy operating in monthly time periods, monitoring changes in all components of supply and demand with respect to a pre-pandemic equilibrium. In particular, we monitor inventories in order to ensure that consumption demands are satisfied while the economy is not in an equilibrium state. This allows for 2 approaches: mitigation strategies that are optimised for gross domestic product (GDP), constrained in such a way that they are economically feasible in both the short and long term and at a sector-stratified level, or strategies derived such that the economy be balanced (i.e. a new equilibrium achieved) after a prescribed time period.

We present this framework via a retrospective analysis of the "roadmap" to end lockdown in the UK, comparing actual and optimized re-opening of the economy. This allowed us to calculate the societal costs in terms of deaths and economic output foregone. We also use our results to calculate a "pandemic possibility frontier", showing outcomes of alternative re-opening scenarios that trade-off deaths, hospitalizations and economic losses.

11:00 AM –12:30 PM   WEDNESDAY   [Economic Evaluation Of Health And Care Interventions]

Cape Town International Convention Centre | CTICC 2 – Orchid
Economic Evaluation of Maternal and Child Health

MODERATOR: **Anagha Killedar**, University of Sydney

Early Evidence on the Economic Aspects of Glycaemic Control in Labour (GILD): A Feasibility Study with Embedded Economic Evaluation

PRESENTER: **Elizabeth-Ann Schroeder**, university of Oxford
AUTHORS: Nia Wyn Jones, Kate Walker, Eleanor Mitchell, Susan Ayers, Lucy Bradshaw, Georgina Constantinou, Tasso Gazis, Shalini Ojha, Phoebe Pallotti, Rachel Plachcinski, Michael Rimmer, Natalie Wakefield, Stavros Petrou
Objectives:

Gestational Diabetes Mellitus (diabetes in pregnancy, GDM) is known to be associated with an increased risk of adverse outcomes for a mother and her infant during pregnancy and birth, including pre-eclampsia, a greater risk of assisted delivery, and stillbirth. The incidence of GDM is rising with the increasing prevalence of obesity. There is evidence that 'tight' glycaemic control (target 4-7 mmol/L) during labour requiring treatment with intravenous insulin reduces the risk of adverse outcomes, however, this increases the risk of maternal hypoglycaemia, a risk to the mother. Hourly intrapartum testing is intrusive for mothers and resource intensive for health

care professionals. Conversely, permissive glucose levels in the mother may be detrimental to the baby. The National Institute of Health Research commissioned scoping research (GILD) to design the feasibility of a randomised clinical trial to compare the clinical and cost-effectiveness of permissive versus intensive intrapartum glycaemic control during labour in pregnancies complicated by diabetes.

Design

A mixed-methods study was developed across four work packages. The health economics aimed to provide early evidence on the economic aspects of glycaemic control in labour and an assessment of how to estimate and express cost-effectiveness. The parameters for economic evaluation considered a health system perspective with a time horizon from randomisation to six weeks postnatal, and neonatal developmental outcomes at age 2 years, to capture the longer-term sequalae of GILD on neonatal hypoglycaemia.

Methods:

The methodological approach explored the economic costs associated with GILD; an assessment of the broader resource use and health-related quality outcomes; identification of sources of unit costs; identification of routine data sources that could validate self-reported resource utilisation data; and an assessment for expressing cost-effectiveness for mothers and infants separately and a composite measure for cost-effectiveness for a mother-infant dyad. Parents' views and experiences were sought via the PPI advisory group.

Findings:

To assess short-terms cost effectiveness, routine datasets could be linked and supplemented with bottom up data collection using a clinical report forms; to provide key resource use data, unit costs and parameters for measuring resource, cost and scale-up uncertainty. Maternal and neonatal costs and outcomes would be reported separately using natural units for the estimation of cost-effectiveness. Methodological and modelling related approaches could combine the presentation of cost-effectiveness and/or cost-utility for a mother-baby dyad. Preference based measures are reported in the literature for maternal quality of life. Translating potential benefits into QALY metrics for the baby is currently constrained by lack of validated utility measures in perinatal and early childhood contexts, due to an absence of an available validated multi-attribute utility measure for infancy and partly because of methodological challenges surrounding aggregation of disparate benefits for both mothers and children in a single metric. To combine disparate outcomes for mothers and children in a single preference-based outcome measure will be a challenge for a future economic evaluation, however modelling approaches can examine this in terms of the parameter estimates reviewed and the design of the model structure.

<Results and Recommendations will be available for iHea Congress 2023.>

Cost-Benefit Analysis of Midwifery-Led Care for Low-Risk Pregnancies

PRESENTER: **Filipa Sampaio**, Uppsala University
AUTHORS: Andreia Gonçalves, Christine McCourt, Ana Paula Prata

Background: Midwifery models of care (in which a known midwife or a small group supports a woman throughout the maternity continuum)[1] are associated with several benefits for mothers and babies and no identified adverse effects, when compared with medical-led or shared models of care. Most high-income countries with universal health systems recommend midwifery-led models for the care of low-risk pregnant women. Portugal is an exception to this. National guidance is omissive about models of care[2] though standard practice is a medical-led care model, despite available qualified midwives and the critical lack of family-doctors for the overall population. This study aimed to determine the cost-benefit of implementing a midwifery-led care model versus the current medical-led model in the Portuguese context.

Methods: A decision decision-tree was implemented in Excel to estimate the cost-benefit of midwifery-led care compared to medical-led care for low-risk pregnancies in the Portuguese setting. The model reflected the period of pregnancy through delivery and estimated the costs and health outcomes in monetary terms for both interventions, from the perspective of the National Health Service. The eligible population were low-risk pregnant women, though for the purpose of this study, the total number of deliveries in Portugal was used as a proxy to the number of eligible pregnant women as the best available estimate. The model includes four possible pregnancy outcome measures, namely: "fetal loss", "pre-term birth", "spontaneous vaginal delivery", "instrumental delivery" and "caesarean section". Data on the effectiveness of the intervention (midwifery-led care) was sourced from robust published literature and data on the current standard of care (medical-led care) was sourced from the 2019 birth registry data from the Portuguese National Institute of Statistics to match the latest available data. Costs were measured in 2022 Euros. Results were expressed as net monetary benefits (NMB). NMB corresponded to the difference between health monetary benefits and intervention costs, where the intervention with the largest NMB was preferred. Uncertainty and sensitivity analysis will be performed to test the robustness of input parameters and assumptions.

Results: Preliminary results have shown that midwifery-led care for low-risk pregnancies yielded NMB of over € 43.3 million and medical led care of € 19.7 million, indicating that midwifery-led care was the preferred option.

Conclusions: A midwife-led care model is value for money in the Portuguese setting, compared with the status quo, ie. medical led care. This evidence aims to support decision-makers in investment of public money in the implementation of a midwife-led care model for low-risk pregnancies.

Health and Economic Outcomes of a Universal Early Intervention for Parents and Children from Birth to Age Five: Evaluation of the Salut Programme Using a Natural Experiment

PRESENTER: **Filipa Sampaio**, Uppsala University

AUTHORS: Jenny Häggström, Richard Ssegonja, Eva Eurenius, Anneli Ivarsson, Anni-Maria Pulkki-Brännström, Inna Feldman

Background: The aim of this study was to investigate the health and economic outcomes of a universal early intervention for parents and children, the Salut Programme, from birth to when the child completed five years of age.

Methods: This study adopted a retrospective observational design using routinely collected linked register data with respect to both exposures and outcomes from Västerbotten county, in northern Sweden. Making use of a natural experiment, areas that received care-as-usual (non-Salut area) were compared to areas where the Programme was implemented after 2006 (Salut area) in terms of: i) health outcomes, healthcare resource use and costs around pregnancy, delivery and birth, and ii) healthcare resource use and related costs, as well as costs of care of sick child. We estimated total cumulative costs related to inpatient and specialised outpatient care for mothers and children and financial benefits paid to mothers to stay home from work to care for a sick child. Two analyses were conducted: a matched difference-in difference analysis using the total sample and an analysis including a longitudinal subsample including mothers who gave birth in both pre- and post-measure periods .

Results: The longitudinal analysis on mothers who gave birth in both pre- and post-measure periods showed that mothers exposed to the Programme had on average 6% (95% CI 3-9%) more full-term pregnancies and 2% (95% CI 0.03-3%) more babies with a birth weight $\geq$ 2500 grams, compared to mothers who had care-as-usual. Savings were incurred in terms of outpatient care costs for children of mothers in the Salut area ($826). The difference-in-difference analysis using the total sample did not result in any significant differences in health outcomes or cumulative resource use over time.

Conclusions: The Salut Programme achieved health gains as a health promotion early intervention for children and parents, at reasonable cost, and may lead to lower usage of outpatient care. Other indicators point towards positive effects, but the small sample size may have led to underestimation of true differences.

Scaling-up an Intersectoral School-Based Sexual Education Programme in South Africa: A Budget Impact Analysis

PRESENTER: **Funeka Bango**, University of Cape Town

AUTHORS: Linda-Gail Bekker, Susan Cleary

Background: Adolescent pregnancy is a major global social and public health challenge associated with significant consequences. The factors contributing to this challenge are multidimensional and represent an interplay between multiple and interdependent personal and situational elements. Improving adolescent sexual health requires partnership and collaboration across sectors. School-based sexual health education (SBSHE), a collaborative effort between the health and education sectors, is an essential strategy for adolescent pregnancy prevention. Collaboration between multiple sectors can leverage the understanding of public health challenges and deliver impact across several goals within the sectors involved. However, funding intersectoral interventions can be challenging. Adequate financing for these interventions requires pooling resources across sectors to ensure efficiency and sustainability. The dominant single-sector approach is a barrier to joint budget commitments and impedes the prioritisation of intersectoral interventions. Budget impact analysis (BIA) can strengthen intersectoral collaboration, promote cross-sectoral investments, and optimise resource allocation. This study estimated the budget impact of scaling up a gender-specific SBSHE intervention implemented within a cluster-randomised trial. The SKILLZ Health for Girls (SKILLZ) programme is an after-school programme that uses interactive sports-based lessons to build social and health aptitude in adolescent girls.

Methods: A BIA was conducted following the recommended guidelines. To support budgeting mechanisms that promote intersectoral collaboration, a broader public sector budget perspective, that of the National Treasury, was adopted. Using three scenarios, a static three-year budget impact model was developed based on population and epidemiological data from country demographics and national surveys to assess the impact of the national scale-up of the SKILLZ programme in addition to the existing SBSHE programme. The cost of scale-up was compared to projected cost offsets from averted unplanned pregnancies. The cost of the intervention was assessed as implemented within the trial. Due to uncertainty regarding the intervention's impact, an analysis of budget neutrality to demonstrate the threshold at which the intervention costs would be equivalent to the savings from averted unplanned pregnancies was conducted. Child delivery costs are a key subset of healthcare costs resulting from unplanned pregnancy. These costs were therefore assessed from two levels of care and used to estimate the cost offsets in the analysis. To evaluate the robustness of the results, a full range of one-way sensitivity analyses were done across all variables included in the model.

Results: The estimated number of learners reached ranged from 262 646 to 1 511 751, resulting in resource impact between $11 632 592 and $66 955 457 for three years. The least costly scenario represents 22% of the projected budget for supporting the current SBSHE programme for three years. Despite the limitation of only considering a subset of cost offsets associated with delivery, the analysis suggested that if 15% of adolescent births were averted, the intervention scale-up would be cost-neutral.

Conclusion: This study demonstrates methods for conducting an intersectoral BIA. It also illustrates the substantial health system cost savings that can be achieved by implementing intersectoral interventions.

Cost Effectiveness of Eczema Care Online (ECO trials): Two Online Interventions Supporting Self-Care for Eczema in Children and Young People

PRESENTER: **Tracey Sach**

AUTHORS: Holly Clarke, Mary Onoja, Miriam Santer, Julie Hooper, Ingrid Muller, Taeko Becque, Beth Stuart, Matt Ridd, Amanda Roberts, Amina Ahmed, Mary Steele, Kate Greenwell, Sylvia Wilczynska, Hywel Williams, Joanne Chalmers, Paul Leighton, Sandra Lawton, Gareth Griffiths, Jacqueline Nuttall, Sinead Langan, Lucy Yardley, Paul Little, Kim S Thomas

Background

Eczema is a common skin disorder that leads to poor quality-of-life through sore or bleeding skin, itching and poor sleep. Most people with eczema benefit from daily use of moisturisers (emollients) for dry skin and topical corticosteroids for inflamed skin and eczema flares. If not well-controlled it is commonly because treatments are not used appropriately, which in part reflects that people often receive conflicting or insufficient advice about how and when to use treatments.

Two web-based information programmes to support self-management of eczema: (1) ECO-PC: for parents/carers of children with eczema (aged 0-12 years); and (2) ECO-YP: for young people with eczema (aged 13-25 years) have been developed. Two randomised controlled trials with nested economic evaluations were undertaken with the aim to estimate the cost-effectiveness of ECO-PC and ECO-YP compared to usual care alone for children and young people with eczema from an NHS perspective.

Methods

Intervention costs to the NHS and participant's wider use of the NHS (including healthcare visits and prescriptions) because of their eczema were collected via general practitioner medical notes review for the 12-month study period plus 3-month pre-baseline period. All resource use is valued using published UK unit costs in £Sterling 2021. The cost of all reported resource use was calculated for each participant for the 12-month period and a mean cost per participant per trial group calculated.

Quality-Adjusted Life Years (QALYs) were estimated using utility scores elicited with the proxy CHU-9D in ECO-PC and EQ-5D-5L in ECO-YP collected at baseline, 24 and 52 weeks. A cost utility analysis (CUA), using a regression-based approach and adjusted for baseline and pre-specified confounder variables, was conducted for each trial separately, combining estimated mean costs and QALYs for each intervention group in an incremental analysis to compare with a decision makers willingness to pay of £20,000 (£30,000) per QALY. As the time horizon is 12 months in all analyses, costs and benefits were not discounted.

A secondary cost-effectiveness analysis (CEA) for each trial and both trials combined was undertaken, estimating incremental cost per 2-point change on Patient-Oriented Eczema Measure (POEM).

Non-parametric bootstrapping was used to determine the level of sampling uncertainty surrounding the mean ICERs by generating 10,000 estimates of incremental costs and benefits. These estimates were used to produce Cost-Effectiveness Acceptability Curves. Sensitivity analysis was undertaken to explore the impact of missing data comparing a complete case analysis (CCA) to multiple imputation (MI).

Results

Both ECO-PC and ECO-YP were found cost-effective in the base case analysis (CUA-CCA), secondary analysis (CEA-CCA) and sensitivity analysis (CUA–MI). ECO-YP was dominant compared to usual care in all analyses, with an incremental cost saving ranging between £9 and £26 per participant and a small positive QALY change ranging between 0.0103 and 0.0157 per participant in the different analyses. ECO-PC was also dominant except in the CUA-CCA which had an adjusted incremental cost of £12,466 per QALY.

Conclusion

The ECO digital interventions aimed at improving self-management of eczema in children and young people have been found to be effective, low-cost and cost-effective.

Cost Effectiveness Analysis of Preventative Therapy for Child Contacts of Patients with Multi-Drug Resistant Tuberculosis in South Africa

PRESENTER: **Tommy Wilkinson**, University of Cape Town

AUTHORS: Edina Sinanovic, Anneke Hesseling, Arne von Delft, James Seddon

Background:

Multidrug-resistant (MDR) tuberculosis (TB) in children is a major global health concern, with an estimated 30,000 children developing disease annually. While improvements in treatment and diagnostics have led to better outcomes, MDR-TB remains a complex and challenging problem for health systems. As a cause and result of poverty, TB in children has major equity implications and the assessment of interventions in the fight against childhood MDR-TB needs to incorporate outcomes beyond efficacy and system efficiency. The World Health Organization (WHO) provides clear guidance on TB preventative therapies (TPT) for children exposed to drug-susceptible TB, however there is uncertainty regarding appropriate TPT strategies for children who are exposed to MDR-TB.

Addressing this uncertainty is particularly relevant for low and middle-income, and high-TB burden countries given economic and health system constraints and financial implications of large-scale TPT programs. There is limited localized evidence on key economic parameters such as costs, quality of life and household expenses associated with MDR-TB treatment and prevention.

TB-CHAMP is a phase three RCT assessing the efficacy of TPT for children exposed to MDR-TB in five sites in South Africa. Final trial results are expected in late 2023 and will inform updates to WHO guidance and national TB program guidance. The MDRTBkids survey collected data on socioeconomic status, household income, expenditure associated with accessing care, and health related quality of life in 50 households in South Africa containing children treated for MDR-TB. The Provincial Health Data Centre (PHDC) is an innovative solution to coordinate disparate health data across South Africa's Western Cape Province, linking available prescribing, diagnostics, inpatient and primary care information to improve understanding of health utilisation and outcomes.

The proposed approach to model the expected cost and cost effectiveness of provision of TPT for children exposed to MDR-TB in the South African context from a health system perspective utilizing clinical trial, patient survey, and real-world evidence from routine data systems will be presented.

The decision analytic model structure will be presented utilising efficacy estimates from the TB CHAMP protocol and cost profiles for both the provision of TPT and treatment of MDR-TB disease from the health system perspective. Preliminary analytical results will be discussed with key expected cost drivers identified.

TPT offers an important intervention to address MDR-TB in children, however the cost effectiveness of the intervention, including impact on vulnerable households, is an essential element to be considered for policy adoption. The results are expected to inform global guidance on appropriate approaches to childhood MDR-TB prevention.

11:00 AM –12:30 PM   WEDNESDAY   [Economic Evaluation Of Health And Care Interventions]

Cape Town International Convention Centre | CTICC 2 – Protea

Cost-Effectiveness of Participatory Community Mobilisation Interventions

MODERATOR: **Jolene Skordis**, University College London

ORGANIZER: **Hassan Haghparast-Bidgoli**, University College London

DISCUSSANT: **Fern Terris-Prestholt**, UNAIDS

Systematic Review of the Effects, Costs and Cost-Effectiveness of Community-Led Strategies for Communicable Diseases

PRESENTER: **Kathleen McGee**, London School of Hygiene & Tropical Medicine (LSHTM)
AUTHOR: Pitchaya Indravudh

Background

Control of infectious diseases is a global health priority and a target of the 2015-2030 Sustainable Development Goals. Advancement of primary health care is important for meeting goals targeting communicable disease control as well as universal health coverage. A fundamental component of primary health care is community participation. We conducted a systematic review of community-led approaches for communicable disease prevention and management.

Methods

We searched seven electronic databases using terms for community-led strategies and communicable diseases. We included studies based in low-and-middle-income countries reporting effects, costs, and cost-effectiveness of community-led strategies for communicable diseases. We extracted health and economic estimates as well as characteristics describing the level of community participation at each programmes stage

Results

Our search strategy yielded 10709 articles from databases. We included 32 articles from 15 randomised trials and 10 economic studies. Disease areas covered HIV, tuberculosis, malaria, neglected tropical diseases, among other conditions. Strategies for community participation included resource identification and mobilisation and design and implementation of communicable disease strategies, including service delivery, education and behaviour change, vector control, and environmental alterations. Community participation was highest at design and implementation stages compared with stages for monitoring and evaluation and scale-up

Randomised trials reported moderate quality evidence that community-led strategies impacted behavioural, social, and environmental risk factors, access and use of vaccines and prophylaxis, access and use of diagnostics and treatment, disease incidence and prevalence, and survival. Differences in intervention effects were highly heterogeneous and driven by the type of outcome, comparator, and

intervention. Facilitators of intervention effects included improved coverage of communicable disease strategies through community-driven approaches as well as intervention at community level. Evidence on costs and cost-effectiveness were varied. While some studies demonstrated low provider costs, studies rarely reported societal costs or accounted for in-kind community costs. Few studies found that community-led strategies were likely to be cost-effective, though evaluations were all trial-based.

Conclusion

Evidence on the effects, costs, and cost-effectiveness of community-led approaches were mixed but suggest their importance in contributing to improved coverage of communicable disease strategies. We identified the following gaps from this review that can be applied to future community-led research: (i) outcomes related to capabilities and empowerment were rarely used, meaning broader benefits and potential for sustainability may not be captured, (ii) costing studies often did not account for in-kind community costs, (iii) all economic evaluations were trial-based, meaning long-term outcomes as well as sustained impacts were not modelled.

A Cross-Sectoral Framework for Evaluation to Assess the Value for Money of a Self-Care and Self-Help Intervention

PRESENTER: **Naomi Kate Gibbs**, University of York
AUTHOR: Jessica Ochalek

In low- and middle-income countries (LMICs), it is not uncommon for interventions to have effects across a range of dimensions, such as, health, poverty alleviation, education, and others. Furthermore, the landscape for funding interventions in LMICs can be complex with a mix of government ministries and donors investing in vertical programs or the provision of a single intervention. The economic evaluation of programs or interventions that have costs and effects shared across sectors can present specific challenges.

One proposed approach for dealing with costs and outcomes falling outside the healthcare sector is for analyses to take a 'societal perspective', where all costs and outcomes are included in the analysis regardless of who incurs them. However, this approach implicitly assumes there are no budget constraints on public sectors and therefore fails to account for the opportunity cost of expenditure (Claxton K, Walker S, Palmer S, 2010). The Second Panel on Cost-Effectiveness in Health and Medicine recommends presenting outcomes in the form of an 'impact inventory' where these are disaggregated by sector and reporting a summary measure (e.g., incremental cost-effectiveness ratio, net monetary benefit, or net health benefit (Sanders et al., 2016). However, this also does not account for opportunity costs. Extending this to organize evidence around the costs, effects and opportunity costs associated with an intervention in a cross-sectoral framework enables resource allocation decisions to be informed in a way that explicitly and transparently accounts for the trade-offs across sectors.

We illustrate an application of a cross-sectoral evaluation framework to assess the value for money of the IMPACT intervention. The intervention is multifaceted and includes funding facilitators employed by The Leprosy Mission (TLM) Nepal to set up the self-help groups in their rural communities. Groups elect peer leaders who undergo training, including around basic accounting, and are mentored by TLM facilitators. Each group is given assistance to open a bank account, facilitated to participate in saving credit schemes, and provided with seed money to establish enterprises. Group participants with leprosy are provided with tools and equipment to undertake self-care.

The effectiveness of IMPACT is assessed in the SHERPA study, and we use the resulting effectiveness data from SHERPA, and then identify additional data that are needed to populate a full cross-sectoral impact inventory. We discuss the potential value of incorporating additional data requirements in the design of randomized controlled trials to assess impact. We use an impact inventory template based on the framework proposed by Walker et al (2019) and an application of the framework to evaluating cash transfers in Malawi (Ramponi et al, 2021), demonstrating how this can be adapted for use in informing cross-sectoral evaluations of other interventions. We also show how this can inform the design of trials with a view to ultimately assessing the value for money of the interventions being evaluated.

Cost-Effectiveness of Participatory Women's Groups Scaled up By the Public Health System to Improve Birth Outcomes in Jharkhand, Eastern India

PRESENTER: **Hassan Haghparast Bidgoli**, University College London, Institute for Global Health

Background: An estimated 2.4 million newborn infants died in 2020, 80% of them in sub-Saharan Africa and South Asia. To achieve the Sustainable Development Target for neonatal mortality reduction, countries with high mortality need to implement evidence-based, cost-effective interventions at scale. Our study aimed to estimate the cost, cost-effectiveness, and benefit-cost ratio of a participatory women's groups intervention scaled up by the public health system in Jharkhand, eastern India.

Methods:The intervention was evaluated through a pragmatic cluster non-randomised controlled trial in six districts. We estimated the cost of the intervention from a provider perspective, with a 42-month time horizon for 20 districts. We estimated costs using a combination of top-down and bottom-up approaches. All costs were adjusted for inflation, discounted at 3% per year, and converted to 2020 International Dollars (INT$). Incremental cost-effectiveness ratios (ICERs) were estimated using extrapolated effect sizes for the impact of the intervention in 20 districts, in terms of cost per neonatal deaths averted and cost per life year saved. We assessed the impact of uncertainty on results through one-way and probabilistic sensitivity analyses. We also estimated benefit-cost ratio using a benefit transfer approach.

Results: Total intervention costs for 20 districts were INT$ 15,017,396. The intervention covered an estimated 1.6 million livebirths across 20 districts, translating to INT$ 9.4 per livebirth covered. ICERs were estimated at INT$ 1,272 per neonatal death averted or INT$ 41 per life year saved. Net benefit estimates ranged from INT$ 1,046 million to INT$ 3,254 million, and benefit-cost ratios from 71 to 218.

Conclusion: Our study suggests that participatory women's groups scaled up by the public health system are highly cost-effective in improving neonatal survival and have a very favourable return on investment. The intervention can be scaled up in similar settings within India and other countries.

Costs and Cost Effectiveness of Community-Led Models of HIVST Distribution in Malawi and Zimbabwe

PRESENTER: **Collin Mangenah**, CeSHHAR Zimbabwe (Centre for Sexual Health, HIV & AIDS Research)

Background

Community-led HIV self-testing (HIVST) involves communities periodically leading distribution independently or campaigns integrated with the local public health system. Detailed economic evaluations were conducted alongside trials evaluating community-led HIVST distribution from the providers' perspective in Malawi and Zimbabwe.

Methods

In Malawi, community health groups led 7-day HIVST awareness campaigns plus distribution as part of a pragmatic cluster-randomised trial of 30 group village heads and their catchment areas. Community-led distribution plus standard of care (SOC) was compared to SOC (facility-based HIV testing services) alone. In Zimbabwe, 40 'village groups' were randomly allocated to unpaid community-led HIVST, with communities developing and implementing HIVST models for distribution over four weeks, or existing door-to-door distribution by salaried agents. In Malawi, the incremental costs per person tested HIV-positive were estimated. For Zimbabwe, a cost minimisation analysis compared costs per person tested with an HIVST kit for community-led distribution with paid distribution at two time points; 1) new (<1 year's implementation) and 2) paid distribution as implemented two years prior.

Results

In Malawi HIV positivity was higher in the community led HIVST arm (2.6%, 104/3960) than the SOC arm (1.7%, 67/3920; adjusted RD 1.2%, 95% CI 0.3% to 2.0%; p=0.008). Total programme costs were $138,624 ($5.70 per test) for community-led HIVST intervention and $263,400 ($4.57 per test) for SOC. The incremental cost per person tested HIV positive was $324 but increased to $1,312 and $985 when adjusting for previously diagnosed self-testers or self-testers on treatment, respectively. Community-led HIVST demonstrated low probability of being cost-effective against plausible willingness-to-pay values, with HIV positivity a key determinant. In Zimbabwe, HIVST uptake for the community-led arm though lower was not significantly less effective: 1,205 (21.6%) surveyed participants took up HIVST, versus 1,532 (27.5%) in the paid distributor arm, adjusted OR (aOR) 0.71 (95% CI 0.50 to 1.01), p=0.06. Total distribution costs were US$285,065 (US$10.25 per test) and US$231,212 (US$6.29 per test) for community-led and new paid distributor programs respectively. When newly introduced (two years prior), the cost per HIVST kit distributed was $14.52 for the paid distributor model demonstrating the learning effects as programmes mature. In both countries the bulk of the costs in the respective model arms were for human resources (48.1% and 25.3% respectively in Malawi and 46% and 39% respectively in Zimbabwe) and HIVST kits (24.6% and 46% respectively in Malawi and 37% and 23% respectively in Zimbabwe).

Conclusions

Community-led HIVST can complement existing HIV testing both at the facility and via paid distributors at low additional unit cost. Evidence also shows costs likely fall over time as programmes mature. However, adding community-led HIVST to the SOC was not likely to be cost-effective, especially in contexts with low prevalence of undiagnosed HIV.

11:00 AM –12:30 PM   WEDNESDAY   [Health Care Financing & Expenditures]

Cape Town International Convention Centre | CTICC 1 – Room 1.64

From Resources to Beneficiaries: Applying a Novel Resource Tracking & Management (RTM) Framework to Inform System Diagnosis and Solutions in Nigeria, India and Bangladesh

MODERATOR: **Manjiri Bhawalkar**, Bill and Melinda Gates Foundation

ORGANIZER: **Mursaleena Islam**, ThinkWell

DISCUSSANT: **Nirmala Ravishankar**, ThinkWell

From Resources to Beneficiaries: An Introduction of an End-to-End Resource Tracking & Management Framework

PRESENTER: **Mursaleena Islam**, ThinkWell

PHC system development is falling short in many low- and middle-income countries (LMICs) due to various reasons, but particularly due to issues in PHC financing. This is happening despite the global recognition of the importance of the PHC within the health care system and the political commitments from countries and global communities to build a strong PHC. On one hand, there is an insufficient investment in health and health care development in many LMICs due to economic development constraints such that PHC has to compete with other health related investments such as secondary and tertiary care and other priority programs within the health care system. On the other hand, there is a great need to improve the use of the existing financial resources made available to PHC. PHC is underfunded in many countries, but the reality is that often the funds made available for PHC are not used efficiently, effectively, and equitably.

The objective of this presentation is to introduce a comprehensive resource tracking and management (RTM) framework. The framework can be used in analyzing PHC resources from five components that determine effective financing for primary health care, namely the resource mobilization, allocation, utilization, productivity, and targeting. Resource mobilization affects resource availability for sustainable impacts at a large scale; Resource allocation, utilization and productivity affect efficiency and effectiveness of health service delivery; and resource targeting is about government responsibility and accountability for health investments that benefit poor and vulnerable populations.

The analysis of RTM provides critical information to policymakers for evidence-based policy development and its implementation. This is especially needed for the effective and efficient functioning of the primary health care system and achievement of global health related goals. The RTM framework adds value by bringing disparate resource tracking efforts into one comprehensive structure. This enables policymakers to see the overall resources envelope and resource flows as a continuum from the sources of financing to the beneficiaries. This provides a comprehensive picture of how resources are mobilized, deployed, and utilized to achieve intended outcomes.

The RTM framework has multiple uses. The resource RTM framework emphasizes that resource tracking is not just about getting the financial numbers and statistics, it is about the policy issues, analysis, interpretation, and overall storyline behind these numbers and statistics, which is critical for the health financing system diagnosis and problem identification, priority setting, and actionable solution development for improvement.

From Resources to Beneficiaries: The Application of the RTM Framework in Nigeria

PRESENTER: **Hong Wang**, Bill and Melinda Gates Foundation

Aim of the RTM framework. Nigeria was not successful in meeting the health targets for the Millennium Development Goals on certain indicators and the country's coverage rates for certain interventions in maternal and child health have remained at a stalemate for decades. The RTM framework was used to understand how much the country's financial resources translate into health services for its people.

How can the RTM framework be used to identify the bottlenecks in using government funds for primary healthcare in Nigeria? Public health financing has been historically low in Nigeria. The RTM framework implies that if appropriate resources are mobilized, allocated, utilized, used productively, and targeted appropriately, then financing should have a great impact on health. Using this framework provides a theoretically sensible approach to understand how much resources are translated to public health services, ideally for the targeted people, i.e., the poor.

Key components of the RTM framework and what they revealed. The study used five components – resource mobilization, resource allocation, resource utilization, resource productivity and resource targeting, which essentially depicts the whole continuum of health financing.

Each of the five components revealed the following:

- Resource mobilization – Nigeria spends around 5% of general government expenditure on health. Out-of-pocket expenditure accounted for 75% of total health expenditure in 2016. In terms of resource mobilization, the taxation system could be improved to collect more funds for the government instead of relying so heavily on oil exports.
- Resource allocation – From a survey, it was found that 80% of primary healthcare facilities receive less than the minimum funds they require to function, which results in the facilities needing to charge high prices for the services they provide. Budget execution was also found to be an issue as the government funds were released too late in the later for utilization and so were returned.
- Resource utilization – The country has faced issues with budget implementation for a long time. Recurrent budgets, which primarily include salaries, are normally fully implemented.
- Resource productivity – Despite Nigeria having a high level of human resources, the resource productivity is quite low. Data collected from a sample of public primary care facilities in a few states showed that there was a marked absenteeism of service providers (29% were absent at the time of data collection) and knowledge measurement using clinical vignettes on 7 conditions

of those present produced low scores. Only 25.2% of primary healthcare facilities in Nigeria had the minimum set of medical equipment, set by the Ministry of Health. Essential drugs were not found widely available.

- Resource targeting – A health survey conducted in 2013 showed that the majority of people choose to avail health services at facilities other than the public primary healthcare ones, which means the primary healthcare facilities are not attracting the targeted people.

Suggested reforms based on RTM framework. The application of the framework suggested some necessary reforms, including fiscal policy strengthening, better demand-side financing, incentivized health financing pilots, stimulating shifts in financing across primary, secondary and tertiary levels.

From Resources to Beneficiaries: The Application of the RTM Framework in India

PRESENTER: **Manjiri Bhawalkar**, The Global Fund to Fight AIDS, Tuberculosis and Malaria

Why the RTM framework? A core function of the health system of any country is health financing, which can enable progress toward universal health coverage. Globally, millions of people are unable to access health services due to the cost, while many receive poor quality services while paying out-of-pocket. Many countries like India have low government financing for health. A paradigm shift is needed from health resource tracking to a more thorough resource management and tracking framework which includes the mobilization, allocation, utilization, better productivity and targeting of resources along the continuum of health financing, all of which are the components of the RTM framework.

How can the RTM framework be used to identify the bottlenecks in using government funds for primary healthcare in India? Public health financing has been historically low in India. There seems to be a lack of synergy between the health financing strategy and approach and the health policies. A rapid assessment based on the RTM framework was conducted, the aim of which was to identify the bottlenecks of mobilization, allocation, and use of government funds for primary healthcare in the country and to propose potential policy and operational modifications that could improve the efficiency and effectiveness of said funds.

How was the RTM framework used? The study began with a rapid assessment of the expenditure on primary healthcare in the country, which used five components – resource mobilization, resource allocation, resource utilization, resource productivity and resource targeting, which essentially depicts the whole continuum of health financing.

Each of the five components targets to answer the following questions:

- Resource mobilization – what is the potential for increasing resources for health?
- Resource allocation – how are the funds allocated to different programs at both national and sub-national levels, and what determines the allocation to primary healthcare?
- Resource utilization – are the allocated funds being properly utilized and what are the bottlenecks?
- Resource productivity – are the resources being transformed to services effectively and is there scope for improvement or more efficiency?
- Resource targeting – is the public spending reaching the intended target, i.e., the poor?

The rapid assessment included analysis of health budget and expenditures of all states for 8-9 years, in-depth analyses of primary healthcare expenditure trends and patterns in major states, deep dives into two major states to look into public financial management aspects and systemic issues, identifying issues relating to policy, system and capacity through documentation of budget, allocation and expenditure management practices in the states with top utilization rates, and benefit incidence analysis.

Key issues. The assessment revealed that the country's failure to meet its goal expenditure in health shows that desired results would not be attained if there are arbitrary policy goals and outcomes are not clearly stated, and that in countries like India, commitment to improve expenditures in health would need to factor in the fiscal capacity and space of the state and central government. It was apparent that the states did not prioritize health as much as the central government.

From Resources to Beneficiaries: The Use of the RTM Framework to Improve Resource Utilization and Fund Flows for PHC Facilities in Bangladesh

PRESENTER: **Najibullah Syed**, ThinkWell

What is the objective of the activity? ThinkWell applied Resource Tracking and Management (RTM) Framework on Bangladesh's primary health care to analyze resource flows for primary health care facilities particularly district and sub-district (upazila) health facilities of the Directorate General of Health Services (DGHS), Health Services Division (HSD), Ministry of Health and Family Welfare (MOHFW), Government of Bangladesh. This is to analyze the facility level bottlenecks and identify solutions for improvement in each component of RTM framework: resource mobilization, resource allocation, resource utilization, resource productivity, and resource targeting. The findings are expected to inform 5th Health Sector Programme 2024-2029, which is currently being designed by MOHFW.

What does the activity involve? The activity takes a mixed methods approach to apply RTM framework on Bangladesh's primary health care. For the quantitative analysis, the team gathered cross sectional data on budget allocation, disbursement, expenditures, and service utilization data for FY22. The findings from the analysis of sixty district facility level data have been presented. The data of sub-

district (upazila) level facilities are being collected. For the qualitative analysis, the ThinkWell team selected twenty-four health facilities (eight district and sixteen sub-district/*upazila* level facilities) covering both high and low performing units. The health facility managers of these are being interviewed to rank their challenges, gathered through a round of national and sub-national level KIIs, FGDs, and consultation workshops, to efficient budget utilization and get their perspective on potential solutions, as a part of co-developing solutions. These solutions will be further fleshed out through regional workshops and validated through national workshops.

What has been found so far? The preliminary findings show some key insights as follows:

- *Resource mobilization:*
    - MOHFW budget is 5.5% of national budget and 0.82% of GDP in FY2022.
    - Increasing OOPE (69% in 2020) on health signifies the need for more public expenditure on health.
    - Primary health is least prioritized and constitutes only 25% of Total Health Expenditure (THE), followed by secondary (38%), and tertiary (37%) care.
- *Resource allocation:*
    - Allocation of operating budget and development budget is not linked to local needs, health outcomes and impact.
    - Medical and Surgical Requisites (MSR) budget line item was introduced recently to facilitate spending based on local needs. However, the facility managers are constrained by distribution rate within budget codes.
    - MSR comprises around half of the total district facility's budget and drives the total budget utilization of the facilities.
- *Resource utilization:*
    - Multiple factors influence resource utilization at health facilities: complex PFM processes and delegation of financial powers are two key broad areas.
- *Resource productivity:*
    - Large variance of outpatient visits across facilities with similar level of budget expenditures in 60 district facilities in FY22
    - MSR budget provides fund allocation based on previous year's performance; even in cases of high MSR budget utilization link to out-patient visits at district hospitals is limited.
    - Budget allocation is not output-based.
- *Resource targeting:*
    - Health expenditure burden is significantly higher for the poorest households that require targeted policy attention to create access to healthcare for this segment.

11:00 AM –12:30 PM   WEDNESDAY   [Health Beyond Health Care Services: Health Behaviors]

Cape Town International Convention Centre | CTICC 1 – Room 2.44-2.45
Evaluation of Interventions to Change Health Behaviours

MODERATOR: **Eleonora Fichera**, University of Bath

It Takes a Village: A Pilot Study Encouraging Women to Use Maternal Care through Community Involvement
PRESENTER: **Aleksandra Jakubowski**, Northeastern University
AUTHORS: Aaron Abuosi, Irene Kuwolamo, Raymond Aborigo

Maternal mortality remains a challenge in Ghana, where 310 women per 100,000 live births die during pregnancy or childbirth [DHS, 2017]. The World Health Organization's recommendation for a healthy pregnancy and childbirth is to initiate antenatal care (ANC) in the first trimester, maintain contact with health providers throughout pregnancy, and deliver the baby in a health facility. Barriers to meeting these recommendations include poor access to high quality healthcare, cultural factors (such as perception that ANC is unnecessary), and lack of financial and non-financial support for pregnant women.

We piloted a cross-randomized intervention to 1) educate communities about ANC and supporting women during pregnancy, and 2) improve quality of ANC.

Study took place in 32 villages in the Upper East Region of Ghana, half of which (16) received community education that focused on initiating ANC in first trimester, rationale for routine ANC services, and supporting women during pregnancy. Women from the study villages who initiated ANC in one of five study facilities were randomly assigned to standard ANC (60% probability) or enhanced ANC (40% probability) that included monthly phone calls and a scheduled home visit with the family.

We enrolled 283 women, 51% of whom lived in villages that received community education and 43% of whom (122) were assigned to enhanced ANC model. The average age of women in the sample was 27 years, 38% of women had no education, nearly all (99%) were married, 16% were in polygamous households.

Approximately half (151/283 or 53%) of women initiated ANC in the first trimester, 56 women (20%) initiated in 5th month of pregnancy and 23 women (8%) initiated in 6th month. Majority of women (184/283 or 65%) attended ANC alone, while 29% (81/283) attended

ANC with their partners. Only 32 women in the sample (or 12%) recalled attending a community meeting that discussed ANC. We found no evidence that the community education intervention affected timing of ANC initiation or women coming to ANC with their partners (a form of support).

Nearly all women randomized to enhanced ANC model reported receiving calls (112/122 women or 92%) and home visits (107/122 women or 88%). One control woman (<1%) also recalled receiving calls and home visit. Women who received enhanced ANC services were 22.7 percentage points (pp) more likely to develop a birth plan (p<0.01, control mean 61.5%), 30.1 pp more likely to develop a birth plan with family members (p<0.001, control mean 49.7%), and 21.5 pp more likely to use a birth plan (p<0.001, control mean 59.0%). Women who received enhanced ANC also knew more pregnancy danger signs and received more of the recommended ANC services.

Our results suggest that the community education intervention had limited impact. More intensive version of the intervention may be needed to alter health behavior around ANC initiation and social norms around partner involvement. The enhanced ANC model appears to have improved quality of ANC by helping women and their families prepare for the upcoming birth, knowing danger signs of pregnancy, and receiving more recommended services.

Using an Economic Incentive Nudge Package to Improve Caregiver Wellbeing during COVID-19 in South Africa: Results from a Pilot Randomised-Controlled Trial (CWeL)

PRESENTER: **Darshini Govindasamy**, MRC South Africa
AUTHORS: Stanley Carries, Zibuyisile Mkhwanazi, Lovemore Sigwadhi, Makwande Nyirenda

- Background: The mental and financial strain linked to unpaid caregiving has been amplified during the COVID-19 pandemic. In sub-Saharan Africa, carers of adolescents living with HIV (ALHIV) are critical for maintenance of optimum HIV treatment outcomes. However, the ability of caregivers to provide quality care to ALHIV is undermined by their ability to maintain their own wellbeing due to lack of finances and poor mental health. Nudges are a behavioural economics strategy used to influence healthcare decision-making by targeting behavioural barriers. Nudges such as cash incentives and SMS reminders are linked to improved health and wellbeing. There is a lack of evidence on whether these nudges could promote caregiver wellbeing during COVID-19.

- Objectives: To compare the feasibility, acceptability and preliminary effectiveness of an economic incentive nudge package (cash + motivational SMS) for improving caregiver wellbeing.

- Methods: We conducted a pilot individual-randomised controlled trial (November 2021-March 2022), with N=100 caregivers of ALHIV (10–19-year-olds), sampled from HIV clinics in Durban, KwaZulu-Natal. Participants were randomly assigned to the intervention or control arm. The intervention arm (n=50) received an unconditional cash incentive (~ $23 USD) via mobile banking services and a positive wellbeing SMS per month, over a three-month period. The control arm (n=50) received one standard SMS encouraging linkage to care. The intervention was co-designed with our caregiver advisory board. The nudge targeted three behavioural economic principles (aspiration framing, altruism, loss aversion), drawing on facilitators of wellbeing in this setting. Participants were interviewed at baseline and end-line (12 weeks) to collect socio-demographic, health, and wellbeing data. The primary outcome was change in wellbeing measured using the Mental Health Continuum Short-Form. Caregivers (n=8) in each arm underwent in-depth interviews to understand lived experiences and perceptions of the intervention. An intention-to-treat analysis was conducted. Qualitative data were analysed using the framework method.

- Results: Baseline characteristics of the sample were: median age 42 years, 87% female, 73% with depressive symptoms, 88% living with HIV, 51% residing in severe food insecure households, and 49% with wellbeing scores suggestive of flourishing. Retention was higher in the intervention (84%) vs. control (73%) arm. Our linear regression model showed that the intervention vs. control arm was associated with a non-significant increase in wellbeing (β=2.56, 95%CI: -3.76 to 8.88, p=0.422), after adjusting for age and sex. Most participants indicated the cash was used to purchase household food items ["When I went to withdraw the money, I went to buy two 5kg's of chicken and 10kg mealie meal and 2litres of oil. I then gave them at home" PID (3031)] Caregivers highlighted how the SMS enhanced their sense of belonging and acceptance ["Those messages brought comfort and made me feel like a human being.." PID (3013)]. Whilst most appreciated the cash incentive, some indicated that the duration was too short. Few participants had challenges in retrieving the cash due to misplacement of the pin.

Conclusions: Economic incentive nudge packages show promise for promoting carer wellbeing and are acceptable. This strategy could be leveraged for COVID-19 recovery plans.

An Evaluation of the Impact of a National Minimum Unit Pricing of Alcohol Policy on Alcohol Behaviours

PRESENTER: **Gretta Mohan**, Economic and Social Research Institute, Dublin, Ireland

Alcohol has long been established as a major contributor to the global burden of disease, injury, and mortality, with significant social and economic costs. Measures that increase the price of alcohol have consistently been shown to be the most effective policies to reduce alcohol-related harms. Scotland, a nation with one of the highest levels of alcohol related harm and mortality, pioneered the implementation of national legislation which sets a Minimum Unit Price (MUP) on alcohol sales. In 2018, a legally binding minimum

price of 50 pence (~US$0.66) per UK unit of alcohol sold was introduced. Wales followed suit in 2020, and the Republic of Ireland in 2022; while other governments such as England, Northern Ireland and New Zealand consider such policies.

Several studies have examined initial impacts of MUP in Scotland, finding decreases in household purchases of alcohol (Anderson *et al.*, 2021; Jané-Llopis *et al.*, 2021; O'Donnell *et al.*, 2019). On the other hand, So *et al.*'s (2021) analysis of Emergency Department attendances found no significant effect on alcohol-related attendances. These mixed findings merit further evidence gathering. Moreover, greater consideration of the policy impact across different socio-economic groups is needed, because while it is designed to help the most vulnerable in society, it could also be regressive.

This paper provides a robust quantitative evaluation as to the effect of the MUP in Scotland on individual's own reported alcohol behaviours using longitudinal data, considering effects on different groups which have hitherto not been explored in the extant literature. Two research questions are examined:

1. **Did MUP on alcohol sales in Scotland affect individual's drinking behaviours?**
2. **Did the effects of MUP differ for different groups e.g., low-income households, young people, and gender?**

A quasi-experimental research design is employed, using observational data on over 21,500 participants of *Understanding Society*. Difference-in-difference regression is used to infer the effect of MUP, comparing the pre-intervention (2015-17) and post-intervention (2019-2021) change in alcohol behaviours of participants from Scotland (the 'Treatment' group) relative to a 'Control' group of those from Northern Ireland and the North of England. The primary outcome of study is the Alcohol Use Disorders Identification Test (AUDIT-C) score, from which positive alcohol harm and high alcohol harm are identified. The frequency of alcohol consumption, number of drinks, and heavy episodic drinking are also examined as outcomes. Regression estimates adjust for the demographic, socioeconomic and health characteristics of respondents, as well as time-fixed effects.

The estimation results unveil no statistically significant effects of MUP on reported alcohol scores and behaviours. Furthermore, differential effects for various subgroups of the population were not evident from the estimation.

We conclude that the policy was not associated with a change in individual's reported alcohol consumption behaviours. Additionally, it does not appear to be the case that some groups were more affected by the policy than others. Such evidence can inform policy development in the jurisdictions for which it has been implemented, as well as for those contemplating such legislation. A higher price floor may be required to stimulate an effect.

How Does Minimum Unit Pricing for Alcohol Impact Food Purchases in Scotland? Dynamic and Heterogeneous Effects of Minimum Unit Pricing

PRESENTER: **NI GAO**, University of Aberdeen
AUTHORS: Paul McNamee, Anne Ludbrook

Background: The Scottish Government passed legislation to implement a minimum unit pricing (MUP) for alcohol on 1st May 2018. The policy sets a floor price of 50 pence per unit of alcohol, below which, one unit of alcohol cannot be legally sold. MUP may lead consumers to re-budget their expenditure on food and alcohol. On one hand, alcohol may be a substitute to food such that consumers spend more on food and less on alcohol. On the other hand, consumers may trade down to cheaper food with lower quality to maintain their consumption of alcohol. Only one study examines the impact of MUP on food purchases. It is still unknown whether MUP changes over time and whether it places a disproportionate impact over the distribution of food purchases?

Objective: i) to examine the dynamic effect of MUP on food purchases; ii) to examine the heterogeneous effect of MUP over the distribution of food purchases.

Methods: Using large scale household purchases microdata, Kantar Worldpanel, we included 1987 households in Scotland and 6064 households in the north of England, following monthly food purchases from April 2017 to May 2019. We focused on food expenditure, purchase volume, calories, fruit and vegetables, fish, carbohydrate, meat, sugar, *sugar excluding alcohol*, *sugar including alcohol only*, fat, saturated fat, salt, fibre, and diet quality index (DQI). Using difference-in-difference method with multiple time points, we examined the dynamic effect of MUP on food purchases. Using changes-in-changes method, we examined the heterogeneous effect of MUP over the distribution of food purchases.

Results: MUP significantly reduces purchase on *sugar including alcohol only* by 1.36 gram per person per week per month in Scotland. Such significant effect lasts for eight months. In the 3rd month following MUP, MUP significantly increases food expenditure, purchase volume, fruit and vegetables, carbohydrate, meat, salt, fibre, and DQI. However, such effect becomes insignificant in the following months. Over 12 months following MUP, MUP has no significant effect on calories, fat, total sugar, *sugar excluding alcohol*, and fat.

The heterogeneous effect of MUP over the distribution of food purchases is insignificant. Particularly, we find a U-shaped relationship over the distribution of food expenditure and meat: MUP reduces food expenditure between 50th and 65th percentiles; MUP reduces meat by the largest amount between 25th to 50th percentiles. We find an inverted U-shaped relationship over the distribution of DQI: MUP

increases DQI between 25th to 70th percentiles whilst decreases DQI above 75th percentiles. MUP dramatically reduces purchases on fish, total sugar, *sugar excluding alcohol* and *sugar including alcohol only* among those above 80th percentiles.

Conclusion: MUP has long-lasting negative effect on *sugar including alcohol only* but insignificant dynamic effect on other food purchases. MUP has heterogeneous but insignificant effect on the distribution of food purchases. Such insignificance implies the small financial shock from MUP would be negligible over the entire distribution of food purchases. Our results do not support the hypothesis that MUP may lead to buying less and buying cheaper product of the same type ('trading down').

Changes in Prices for Ultra-Processed Foods after the Implementation of Front-of-Package Warning Labels in Mexico

PRESENTER: **Juan Carlos Salgado Hernandez**, INSP and UNC-Chapel Hill
AUTHORS: Mishel Unar-Minguia, Lilia Susana Pedraza Zamora, Lizbeth Tolentino Mayo, Simon Barquera

In Mexico, the law of front-of-package warning labels (FOP-WL) for packaged food came into effect in October 2020. Prices of foods subject to this law can change due to reformulation costs, product differentiation and competition degree after reformulation, or price strategies by food producers. The study's objective is to assess changes in prices after the FOP-WL implementation for a set of ultra-processed packaged foods (i.e., slide bread, sweet bread, cereals, salty snacks, and yogurt) in Mexico. We used monthly price data at the product level from 55 cities in Mexico (January 2019-December 2021) and FOP-WL data (2020 and 2021). For each food category, we ran linear brand fixed-effect models controlling for the time trend, seasonality, and the country's economic activity, where we assessed price changes based on the interaction between the FOP-WL implementation and the number of FOP-WL at the product level in 2021. Over time, we found an increase in products with fewer FOP-WL. We found no price changes in cookies and cereals and price increases by 1.4 % across slide bread with no FOP-WL. For other food categories, we only found price reductions after the FOP-WL implementation across products with the lowest number of FOP-WL in the respective food categories (price reductions by 11.9% in sweet bread with two FOP-WL, 2.9% in salty snacks with one FOP-WL, 3% in yogurt with FOP-WL). These price reductions can encourage the substitution within food categories from products with more FOP-WL (and thus less healthy products) to products with less FOP-WL. The price reduction across products with less FOP-WL can be the result of the higher competition degree arising from the higher presence of these products after the FOP-WL implementation across.

Persistence or Reversal? the Micro-Effects of Time-Varying Financial Penalties on Risky Driving Behaviours.

PRESENTER: **Duncan Mortimer**, Monash University
AUTHORS: Anthony Harris, Jasper Wijnands, Mark Stevenson

Many financial incentives are time-varying due to the presence of time-limits, benefit ceilings and/or penalty thresholds. The potentially perverse effects of providing and then withdrawing financial incentives are now well-known. Whether or not these potentially perverse effects extend to other patterns of temporal variation remains unclear. The present study investigates the impact of temporal variation on the overall effectiveness of financial penalties for risky driving behaviours. Based on secondary analysis of data from a randomised field experiment, we find evidence for reductions in the target behaviour (relative to control) rather than habit persistence when penalties were temporarily 'switched-off'. These behavioural reversals during 'off' weeks in a (significant) minority of participants were large enough to completely offset the positive effects of financial penalties during 'on' weeks. Reductions in the strength of financial penalties further undermined their effectiveness; leaving affected participants (and society) worse off than if we had done nothing at all. For safe driving and perhaps also for other behaviours where intrinsic and extrinsic motivations come into conflict, efforts to limit the potential for 'switch off' and maintain the strength of financial penalties (for example, by using personalised and adaptive design) should yield improvements in their effectiveness and cost-effectiveness. The FEEDBACK trial builds on these findings to design and trial financial incentives that are calibrated and personalised to (a) limit the potential for 'switch off', and (b) ensure that the incentive remains active and relevant for safer drivers. We summarise findings regarding the effects of 'switch off' and discuss design and implementation of financial incentives in the FEEDBACK trial.

11:00 AM –12:30 PM   WEDNESDAY   [Health System Performance]

Cape Town International Convention Centre | CTICC 1 – Room 2.61-2.62
Assessing the Productivity of Medical Spending: Methods and Applications

MODERATOR: **Karen Eggleston**, Stanford University

DISCUSSANT: **Joseph Newhouse**, Harvard University; **Marcia Weaver**, University of Washington; **Jeonghoon Ahn**, Ewha Woman's University

A National Health Account for the United States

PRESENTER: **David Cutler**, Harvard University
AUTHORS: Kaushik Ghosh, Trivellore Raghunathan, Susan Stewart, Andrew Wang

Estimating medical care productivity is a central economic challenge. While many countries measure total medical spending, productivity is difficult to determine. This is because productivity involves estimating the health outcomes associated with spending, not

just the dollars spent. To surmount this, proposals have periodically been made in the United States and other rich countries to establish a satellite account for health. Such an account would display medical spending alongside health outcomes, and thus enable productivity estimation. This paper develops a satellite account for the United States health sector and uses it to measure the productivity of medical care in the United States.

Building a satellite health account requires data on population health and medical spending matched to clinical characteristics and sociodemographic factors. We use data from a variety of national surveys to measure these quantities. Aggregate spending is measured from various claims data sets. Population health is determined from overall mortality combined with survey information on difficulty with physical activities, sensory impairments, and how much health interferes with social interactions.

To measure productivity, we disaggregate total medical spending and population health to 80 conditions that are prevalent and severe enough to affect population health. We do this because condition-specific productivity is easier to measure than productivity for the population as a whole. In particular, we assume that medical care for each condition affects the health of people with that condition but not the prevalence of other conditions. That is, care for a heart attack influences the length and quality of life for people with a heart attack, but not whether the person develops cancer. The exception to this is certain conditions that we identify ex ante as risk factors for other conditions. With this assumption, we can measure the health improvement associated with medical care by the change in health outcomes, adjusted for changing demographics. We can do the same for medical spending. Empirically, we use propensity score models to do the demographic adjustment, comparing people with each condition to a similar group without the condition.

Our prior analysis for the US elderly population ("A Satellite Account for Health in the United States," *American Economic Review*, 2022) shows high average productivity of medical care spending alongside substantial heterogeneity in productivity across conditions. We are currently extending the analysis to the entire population.

While our empirical results are specific to the United States, our process for forming satellite health accounts is feasible in many countries. Indeed, several countries have asked for advice in setting up satellite health accounts.

How Much Are Medical Expenditures Worth? an Analysis Based on Millions of Individuals and Thousands of Cost-Effectiveness Studies

PRESENTER: **Eli Liebman**, University of Georgia
AUTHORS: Abe Dunn, Lasanthi Fernando

In the U.S., health care spending as a share of GDP has risen from 5 percent of GDP in 1960 to 19.7 percent in 2020, while life expectancy at birth has increased from 70 years to 79 years. A number of prominent health economics papers argue that if gains in life expectancy are due to technological improvements in medical care, then the increase in health care costs may reflect welfare improvements even if they are simultaneously a major contributing factor to overall cost growth. While many economists believe that these costly improvements yield outcomes that may be "worth it," it is more difficult to determine the precise benefit of the technological improvement.

Measuring the value of medical innovation is notoriously difficult, due to a variety of factors (e.g., moral hazard and asymmetric information, and underlying health status). This paper takes a different approach to tackle this measurement problem. The premise is that the extensive medical care literature has addressed the key measurement concerns, often using randomized control trials to measure the effectiveness of treatments. Using the Tufts Cost-Effectiveness Analysis Registry (CEAR) database of over 8,000 cost effectiveness studies spanning the period between 2007 to 2018, we leverage the knowledge accumulated in the medical care literature to assign measurable characteristics of quality to specific treatments. We match these treatments to a large commercial medical claims database with millions of enrollees to account for how treatments for certain conditions are diffusing and changing over time.

While the cost-effectiveness literature could shed some light on the value of medical innovation, in practice this requires synthesizing the results of thousands of cost-effectiveness studies. This paper handles this challenge by (1) classifying the treatments in each study so they can be matched across medical studies; (2) developing a methodology to compute average quality for each treatment; and (3) matching these treatments with medical claims data for millions of commercially-insured individuals. This newly combined data set provides a unique and rich source of information for understanding and measuring price growth and innovation in the health care sector.

Much of the literature has focused on changes in observed health outcomes (e.g. changes in mortality rates), so we focus on conditions with health outcomes that may be difficult to observe, where we feel our methodology contributes the most to the existing literature. Specifically, we focus on 11 conditions (Asthma, Atrial Fibrillation, Cystic Fibrosis, Hypertension, HIV, Hepatitis C, Multiple Sclerosis, Osteoporosis, Rheumatoid Arthritis, Schizophrenia, and Venous Thromboembolism).

We find significant heterogeneity across conditions in terms of quality improvements and price increases. For example, Hepatitis C has seen both large cost increases and quality improvements. On net we find that the transition to new treatments in Hepatitis C is welfare enhancing. Meanwhile, rheumatoid arthritis, during our sample period, has not seen much diffusion of higher quality new treatments; there have been large within-molecule price increases, reducing welfare for those with rheumatoid arthritis.

Outcome-Adjusted Health-Care Price Index for the United States: Comprehensive Estimates in a Period Life-Expectancy Framework

PRESENTER: **Abe Dunn**, Bureau of Economic Analysis

AUTHORS: Lasanthi Fernando, Jonah Joffe, Danielle Michael, Anna Voronyuk, Christopher J.L. Murray, Joseph Dieleman, Marcia Weaver

Introduction. The objective of a price index is to compare prices today for a given basket of goods and services, with prices in the past for the same basket. The official health-care price index reported by the US Bureau of Economic Analysis (BEA), similar to most price indices, is measured in purchased items such as prescription drugs and hospital admissions, which are inputs into patient treatments. With technological change and shifts in treatment practices, however, the items in the basket also change, making it difficult to distinguish price increases from changes in technologies and practice patterns. The BEA and health economists have a long-standing interest in developing an "outcome-adjusted" price index that measures price in terms of spending on treatment for a condition or cause, and quantities in terms of outcomes for a condition or cause that are consistent over time.

Methods. We built on Cutler and colleagues seminal research on a quality-adjusted price index in a period life-expectancy framework. We used results on mortality and years lived with disability (YLDs) from the Global Burden of Disease, Injuries, and Risk Factor Study and on spending from the Disease Expenditure project from 1996 to 2016 for each cause and age group. Importantly, the disease classification of these two sets of results have been developed side-by-side, creating an opportunity to match outcomes to spending and calculate an outcome-adjusted price index. Within age groups, we distinguished changes in the number of cases from changes in outcomes per case and spending per case. For each cause, the cause-replaced mortality per case is used to calculate life-expectancy and cause-replaced YLDs per case is used to calculate health-adjusted life-expectancy (HALE). For both estimates, "cause-replaced" means replacing the 2016 result with newer technologies and practices for the 1996 result. Cause-replaced spending per case and mortality per case is used to calculate lifetime spending. Spending was converted to 2016 US dollars ($) using the gross domestic product price index.

Results. In preliminary results, period life-expectancy increased by 1.46 years from 1996 to 2016, and HALE increased by 0.87 years. Period lifetime spending increased by $103,522 or $119,457 per health-adjusted life-year gained. Causes with the largest gains in life-expectancy were ischemic heart disease (0.47 years), HIV/AIDS (0.27 years), stroke (0.23 years), and diabetes mellitus (0.21 years). Causes with the largest gains in HALE were ischemic heart disease (0.25 years), HIV/AIDS (0.21 years), diabetes mellitus (0.14 years), and road injuries (0.06 years). Causes with the largest increases in lifetime spending were skin and subcutaneous diseases ($12,843), urinary diseases and male infertility ($9,773), other neurological disorders ($6,812), and falls ($5,516). Using $100,000 as the dollar value per health-adjusted life-year gained, prices increased by 19 percent more than the broader economy; using $150,000, prices fell by 20 percent.

Conclusion. In contrast to a price index based on purchased items, an outcome-adjusted price index shows a small price increase or a lower price of health care relative to the broader economy depending on the value of a life year.

Health Care Spending Effectiveness in South Korea from 2010 to 2019

PRESENTER: **Sungchul Park**, Korea University

AUTHOR: Karen Eggleston

Rapid health spending growth poses a fiscal challenge in many economies. Conventional measures of expenditure growth, however, do not account for the improvements in health outcomes associated with the changing capabilities of medical care. This difficulty of measuring the productivity of medical spending relative to changes in the social determinants of health has been addressed by recent developments in health economics methods (Cutler et al. 2022, Weaver et al. 2022) measuring condition-specific spending and outcomes. Yet to date, no economy outside of the United States has estimated the net value of expenditures, or health care spending effectiveness, by medical condition for the entire population.

The Republic of Korea (South Korea) represents an important case for several reasons: 1) the rapidity of Korea's socioeconomic and demographic transitions, 2) significant increases in survival, 3) large increases in expenditures under its single-payer health system, and 4) recent investment in health technology assessment and other initiatives designed to inform policymakers about how to improve the productivity of the health sector and prevent unsustainable expenditure increases from crowding out higher-value public expenditures.

Specifically, Korea to date lacks any measure of whether health expenditure increases are "worth it" in terms of the value of gains in survival and health-related quality of life. The aim of this study is to fill that gap by developing estimates of health care spending effectiveness for Korea to quantify spending per unit of health gained overall and for four major categories of health conditions between 2010 and 2019.

This study utilizes data from the database of the Korean National Health Insurance Service, the single insurer in South Korea, covering the entire population of over 51 million. Data collected in the process of managing insurance eligibility, collecting premium contributions, paying claims for medical services, and providing health screening services for adults and infants are linked into the National Health Insurance Database (NHID). In this study, we used the NHID to obtain and analyze age- and sex-specific health care spending overall and for four major categories of disease (heart disease, stroke, neoplasms, and mental disorders) from 2010 to 2019.

Our preliminary analyses show significant heterogeneity across conditions, with the largest proportionate health gains from neoplasms, heart disease, and stroke. Several indicators justify the spending effectiveness for neoplasms in Korea. For example, compared to the OECD average, Korea's age-standardized five-year survival rates for breast cancer (87%), colon cancer (72%), and lung cancer (25% in 2010-14), were higher and grew faster over the most recent decade for which data is available. Also, improvements in the case-fatality rates for heart disease and stroke support conclusions of spending effectiveness for those conditions. By contrast, mental health conditions showed little improvement over the study period. These findings provide suggestive evidence that the growth in health care spending in Korea may lead to commensurate health improvements, but the magnitude of the spending effectiveness differs by medical condition.

11:00 AM –12:30 PM   WEDNESDAY   [Economic Evaluation Of Health And Care Interventions]

Cape Town International Convention Centre | CTICC 2 – Nerina

Infectious & vector borne diseases

MODERATOR: **Eve Worrall**, Liverpool School of Tropical Medicine

Cost of Childhood Severe Pneumonia Management in Selected Public Inpatient Care Facilities in Bangladesh: A Provider Perspective

PRESENTER: **Lisa Gold**, Deakin University
AUTHORS: Marufa Sultana, Jennifer Watts

Background

Childhood severe pneumonia is the leading cause of under-five deaths in Bangladesh. Management of severe pneumonia commonly relies on hospital care and is associated with substantial resource usage. With limited available literature, reliable cost estimates are crucial to understand the economic costs associated with severe pneumonia management. The objective of this study was to estimate the provider cost of childhood severe pneumonia and to assess rural-urban cost variations, cost variation by type of facilities, and to predict cost drivers.

Method

This study was nested in a cluster randomized trial conducted by icddr,b in Bangladesh. Children (up to 5 years of age) with severe pneumonia were enrolled between November 2015 and March 2019. This analysis considered sixteen control clusters that provided usual care management (hospital care) covering both urban and rural areas. A healthcare provider perspective was adopted to estimate cost of one episode of childhood severe pneumonia. A bottom-up micro-costing approach was employed to collect detailed cost data at the individual patient level from each of the included facilities (n=8). Data were collected using a structured questionnaire, a review of patient record, and by interviewing relevant facility staff. All costs were converted to US dollars (USD) using 2019 price year (1 USD = 84.5 BDT). Descriptive analysis measured mean cost, cost variation across facilities, and clinical variables. Logged linear regression model assessed potential cost predictors and sensitivity analysis determined major cost drivers.

Results

Data on 1,252 enrolled children were analysed, of which 64% were male and 63% were under one year of age. Medical personnel and medicines were the most commonly used resources. Mean provider treatment cost per case was US$48 (95% CI: US$46, US$50) with a mean length-of-stay (LoS) of 4.8 days (SD±2.5). Mean costs per case were significantly higher for urban (vs. rural) located facilities (mean difference US$43, 95% CI: US$40, US$46). Considering facility level, mean costs per case for tertiary, secondary and primary level care were US$66, US$22, US$23, respectively (P<0.001). No cost variation was found for age, sex, malnutrition status or hypoxemic status. LoS, level and location of facility and case referrals were the main predictors of provider costs. Sensitivity analysis showed that LoS and personnel costs were the major cost drivers.

Conclusion

Childhood severe pneumonia management is associated with substantial resource usage, mainly driven by personnel cost. Early treatment availability at lower levels of facility and at rural locations may reduce the overall costs for treatment. Therefore, implementing timely and low cost culturally acceptable new management strategies are recommended to reduce the provider cost burden.

Cost-Effectiveness of Mass Drug Administration Compared to School-Based Preventive Chemotherapy for Hookworm Control in Dak Lak Province, Vietnam

PRESENTER: **John Paul Caesar Robles delos Trinos**, The Kirby Institute, UNSW Sydney
AUTHORS: Dinh Ng-Nguyen, Luc E Coffeng, Clare Dyer, Naomi Clarke, Rebecca Traub, Kate Halton, Virginia Wiseman, Caroline Watts, Susana Nery

Background: School-based targeted preventive chemotherapy (PC), the main strategy for soil-transmitted helminths (STH) control, excludes other at-risk populations including adults and preschool children. Mass drug administration (MDA), covering all age groups, would bring additional health benefits but also requires greater investment. This cost survey and cost-effectiveness analysis compared MDA with school-based targeted PC for STH control in Dak Lak, Vietnam, where STH are endemic.

Methods: A cost survey was conducted in 2020 to estimate the total and per person economic and financial cost of each strategy. Monte Carlo simulation accounted for uncertainty in cost estimates. The primary effectiveness measure was hookworm-related disability-adjusted life years (DALYs) averted, and secondary measures were hookworm infection-years averted and moderate-to-heavy intensity hookworm infection-years averted. A Markov model was used to determine the incremental cost-effectiveness ratio (ICER) of MDA compared to school-based targeted PC using a government payer perspective and a ten-year time horizon. One-way and probabilistic sensitivity analyses (PSA) were performed. Costs are reported in 2020 USD ($).

Findings: The economic cost per person was $0·27 for MDA and $ 0·43 for school-based targeted PC. MDA in Dak Lak will cost $471,623 per year, while school-based targeted PC will cost $116,590. Over 10 years, MDA is estimated to avert an additional 143,546 DALYs; 4,019,262 hookworm infection-years, and 765,844 moderate-to-heavy intensity hookworm infection-years compared to school-based targeted PC. The ICER was $24·22 per DALY averted; $0·87 per hookworm infection-years averted, and $4·54 per moderate-to-heavy intensity hookworm infection-years averted. MDA was cost-effective in all PSA iterations.

Interpretation: In areas where hookworm predominates and adults suffer a significant burden of infection, MDA is cost effective compared to school based targeted PC and is the best strategy to achieve global targets.

How Much Does It Cost to Treat Malaria and Who Bears the Cost? a Cost-of-Illness Study in Uganda

PRESENTER: **Katherine Snyman**, London School of Hygiene & Tropical Medicine (LSHTM)
AUTHORS: Catherine Pitt, Joyce Aber, Angelo Arturia, Samuel Gonahasa, Jane Frances Namuganga, Joaniter Nankabirwa, Emmanuel Arinaitwe, Catherine Maiteki, Moses R Kamya, Grant Dorsey, Sarah G Staedke

Introduction: The burden of malaria remains high, and illness has previously been shown to impose a large economic burden on households and public health care providers. Cost-of-illness studies can guide development of efficient and equitable malaria control programs and decisions on allocation of scarce resources. However, in Uganda, which has the third highest number of cases worldwide, no nationally representative cost-of-illness studies have been conducted since 2012.

Objective: This study aims to: (1) evaluate the societal and provider cost per malaria episode, (2) assess the equitable distribution of the economic burden of malaria and, (3) extrapolate these findings to estimate the national cost of malaria illness in Uganda.

Methods: We collected data for a cost-of-illness study from November 2021 to May 2022 across 32 districts (25% of Uganda). Provider data were collected from 10 randomly selected public health facilities in 10 districts, and household data were collected from 64 health facility catchment areas, selected to be nationally representative. These facilities and catchment areas are surveillance sites for the LLINEUP2 trial, a study to evaluate the impact of bed nets distributed through the 2020-2021 national campaign. Provider costs for diagnostics, drugs, health worker time and overheads were collected from health facility registers, administrative records and observations; a time-in-motion study was also conducted. Care-seeking behavior and household costs of malaria treatment including out-of-pocket payments and productivity losses were collected from cross-sectional surveys conducted in 3,200 households across all 64 LLINEUP2 communities. We estimated household-level and individual-level access to and quality of treatment and cost burden. To assess equity, multivariate regression analysis and concentrations curves were used to assess magnitudes and significance of differences across geographic, socio-economic and age subgroups. Finally, we combined these estimates with publicly available National Malaria Control Program secondary data sources to estimate the total national economic burden of malaria treatment and how this burden is shared across providers/households and across households of different wealth quintiles.

Results: Of the 16,189 household members included in the survey, 614 had a fever in the past two weeks; 379 had sought treatment for fever. Preliminary results indicate that mean societal economic cost of an uncomplicated and severe malaria episode were $15.41 and $31.70, respectively. Households incur 42% and 53% of illness costs for uncomplicated and severe malaria episodes, respectively. Initial analyses suggest mean cost to households per episode varied significantly by age of patient, region and household SES. Amongst those who sought treatment, poorer households incur slightly lower costs than less poor households (standard concentration index: 0.108; p-value:0.017) and patients over 16 years old incurred higher costs than patients under 15 years (coef. 8.52 USD; p-value:<0.001). Analysis will be completed in December 2022.

Conclusions: Malaria illness costs remain high and patients incur roughly half of malaria episode costs, indicating there is room for more support from the public health service. The results will inform resource-allocation decisions about malaria control by providing an average cost of malaria treatment, which can be applied in economic evaluations and for policymaking in Uganda and across Africa.

Economic Evaluation of *Wolbachia* Deployment to Prevent Dengue in Colombia

PRESENTER: **Donald S. Shepard**, Brandeis University
AUTHORS: Samantha R. Lee, Yara A. Halasa-Rappel, Carlos W Rincon Perez, Arturo Harker Roa

Introduction

Wolbachia, a self-sustaining bacteria introduced into wild mosquitoes, was shown to reduce symptomatic dengue cases by 77.1% in a cluster-randomized trial in Yogyakarta, Indonesia. The World Mosquito Program (WMP) deployed *Wolbachia* in several endemic urban areas in Colombia: Medellín, Bello and Itagüí (from 2015-22) and Cali (since 2020). Colombian policymakers are considering potential

expansions of *Wolbachia* deployments to 11 priority cities, which accounted for a third of Colombia's reported 2010-2019 dengue cases. The authors performed an independent economic analysis of options.

Methods

Projected costs of *Wolbachia* deployment were based on each city's potential deployment area (built-up areas only) times a projected unit cost (US$87,625/kilometer^2). Unit costs were adapted from WMP's initial experience in Colombia, adjusted to shorten Wolbachia implementation to 24 months and to reduce projected overhead costs of WMP's technical and project management support to 15% of direct costs (typically accepted by the Bill & Melinda Gates Foundation).

Estimated disease burden numbers began with 2010-2019 reported cases in SIVIGILA (Colombia's epidemiological surveillance). Interpreting these data, a 3-expert panel provided consensus estimates by three categories of setting and reporting of cases seen: (1) in the formal health system and correctly reported, (2) in the formal health system but either not reported at all or not classified as dengue cases, and (3) outside the health care system that still pose a disease burden to the community.

Costs of treating dengue illness were based on SOAT (official benchmark insurance tariffs), RIPS (administrative insurance claims) and SUFICIENCIA (insurance premiums). The duration of protection (10 years) used the WMP's earliest deployments (Australia). Costs and benefits were calculated as present value per person in 2020 US dollars.

Results

The average symptomatic dengue case cost US$202.11 in the health care setting, and US$116.90 overall (including cases in non-medical settings). The distribution of cases across the above categories was (1) (29% consisting of 2% severe and 27% non-severe), (2) 31% (11% not reported and 20% mis-diagnosed) and (3) 40%, respectively.

In present value per person over 10 years in Cali, *Wolbachia* deployment would avert 0.0037 DALYs, cost US$4.36, offset $9.31 ($9.06 in health care costs and $0.25 in conventional vector control costs), for a negative net present value cost of US$4.95. The negative national net cost and resulting negative ICER indicate a net savings. *Wolbachia* deployment is projected to return US$6.62 for every dollar invested (benefit-cost ratio) with a short payback period of only 1.70 years. Across the 11 cities, the benefit-cost ratios range from 10.60 (Bucaramanga) to 1.62 (Cartagena) and average 5.61. *Wolbachia* saves sufficient healthcare costs to offset the costs of deployment in 9 of the 11 priority cities.

Conclusion

While *Wolbachia* is highly economically favorable and cost saving, its aggregate present value deployment cost could pose fiscal challenges. Investment costs range from $1.4 million in Armenia (300,000 population) to $9.7 million in Cali (2,200,000 population). Through staged deployment and combined local, national, and donor funding, however, Colombia should be able to implement this promising technology in several priority cities.

11:00 AM –12:30 PM   WEDNESDAY   [Demand & Utilization Of Health Care Services]

Cape Town International Convention Centre | CTICC 1 – Room 2.41-2.42
Preferences and willingness-to-pay for care and insurance

MODERATOR: **Charles Hongoro**, Human Sciences Research Council

Patient Preferences for Total Knee Replacement Surgery in Australia: A Discrete Choice Experiment
PRESENTER: **Yuanyuan Gu**, Macquarie University
AUTHORS: Mutsa Gumbie, Kompal Sinha, Henry Cutler

Background: Osteoarthritis is one of the most debilitating diseases in affluent countries, causing substantial functional impairments in about 43 million individuals globally. Total knee replacement (TKR) is a cost-effective treatment option for people with advanced knee osteoarthritis. In Australia, over 50,000 people underwent TKR in 2017/18, at a cost estimated to be over one billion Australian dollars. While the standardisation of the joint replacement clinical pathways has noted improved outcomes at lower costs, personalisation of TKR surgery based on patient preferences may provide value. The purpose of this study is to perform a discrete choice experiment (DCE) to elicit patient preferences for the attributes associated with the patient care pathway for TKR surgery in Australia.

Methods and design: DCE attributes were identified and selected through a literature review and patient interviews. The D-efficiency design was used to construct 12 choice sets, each with two hypothetical care pathways. The data was collected through online survey with a sample size of N=100 in the pilot phase and N=1000 in the main study. Australians aged between 40 and 80 years old with chronic knee pain and/or arthritis who seek TKR surgery as a treatment option in public hospitals were eligible to participate. A few econometrics models are estimated including the conditional logit and mixed logit. The value assigned to each attribute is measured by the willingness to wait.

Results:

The following eight attributes were considered in the DCE: type of surgical procedure (conventional/robotic-assisted), wound closure method (staples/absorbable sutures/skin adhesive with self-adhering mesh), waiting time for surgery, post-operative pain, improvement in physical function, length of stay in hospital after surgery, chance of needing another operation within 10 years to replace their implant, and the risk of severe complications. Preliminary results indicate that patients prioritise improvement in physical function and are willing to wait 30 months for a treatment that substantially rather than mildly improves the physical function. Post-operative pain also has a significant impact on the choice and patients are willing to wait 24 months for a treatment that causes mild instead of severe post-operative pain. Patients consider risk factors in their choices, although they are more concerned with the possibility of having a revision surgery than the risk of severe surgical complications. Patients prefer absorbable sutures the most and staples the least as the wound closure method. The type of surgical procedure and length of stay in hospital after surgery are the least relevant factors. This is likely attributable to the fact that the prospective benefits of robotic-assisted surgery, that include quicker return to physical function and decreased post-operative pain, have already been factored into other attributes.

Implications: This is the first study to quantify Australian patients' preference for TKR surgery and trade-offs between outcomes associated with conventional and robotic-assisted surgery. To deliver effective patient-centered care, TKR surgery should be aligned with patient preferences. This study will provide evidence and insights into the demand-side of TKR surgery.

Preferences for Long-Term Care Among Older Adults in China: A Discrete Choice Experiment

PRESENTER: **Leng Anli**
AUTHORS: Elizabeth Maitland, Stephen Nicholas, Jian Wang

Background: Knowing long-term care preferences will improve people-centered health care, better inform service providers and policy makers of older adults' preferences for long-term care and enhance the quality of long-term care. In China, little is known about older adults' preferences for long-term care.

Objective: We examine the preferences for long-term care among older adults in China.

Methods: Data on 2035 over 50-year-old adults' long-term care preferences were collected by discrete choice experiment conducted across 12 Chinese provinces selected by the stratified random sampling method in August 2022. Each scenario described four attributes: forms of long-term care, contents of long-term care, quality of life and out-of-pocket payments. Forms of long-term care consisted of four levels: home-based self-directed care (care provided by family members at home), home-based formal care (care provided by nursing staff at home), community-based formal care (care provided by nursing staff in a community day-care center), nursing-institutions-based formal care (care provided by nursing staff in a nursing institutions) and medical-institutions-based formal care (care provided by nursing staff in a medical institution). Contents of long-term care consisted of basic living care, medical care and hospice care levels. Preferences were derived using a mixed logit model and latent class model. The marginal willingness to pay was estimated from regression coefficients.

Results: All four attributes significantly influenced older adults' decision for long-term care, with quality of life was the most important attribute, followed by the forms of long-term care. Older adults were willing to pay US$418 per month (95%CI US$389-US$450) to improve quality of life from a bad level to a good level. Compared with home-based self-directed care, older adults were less willing to pay US$68 per month (95%CI US$41-US$94) for home-based formal care, US$52 per month (95%CI US$27-US$77) for community-based formal care, US$182 per month (95%CI US$153-US$211) for nursing-institutions-based formal care and US$128 per month (95%CI US$102-US$153) for medical-institutions-based formal care. Older adults preferred basic living care to hospice care. The predicted uptake of the optimal long-term care scenario (home-based self-directed care, basic living care, good quality of life and US$72 per month) in our study was 70.77%. Older adults who lived in urban areas and had better knowledge of the long-term care insurance system displayed a higher probability to choose long-term care. Older adults who had more children and a stronger traditional cultural concept were less likely to prefer long-term care with formal care in institutions.

Conclusions: Quality of life obtained in long-term care is what older adults preferred. Home and basic living care provided by caregivers was still the preferred option for a majority of seniors. This suggests that we should not only strengthen the training of professional caregivers to improve the quality of basic life care services, but also strengthen the training of non-professional caregivers, such as family members. Our study also provides caregivers and policy makers the empirical evidence in providing long-term care services meeting older adults' preferences and to improve quality of long-term care.

Prediction of Factors Influencing Adults' Likelihood of Accepting Any COVID-19 Vaccination and Their Willingness to Pay – a Large Nation-Wide Discrete Choice Experiment Health Economics Study from India

PRESENTER: **Jeffrey Pradeep Raj**, Seth GS Medical College
AUTHORS: Thenmozhi Mani, Melvin Joy, Sukant Pandit, Charuta Godbole, Dhruve Soni, Jeyaseelan Lakshmanan, Nithya Jaideep Gogtay

Background: Corona Virus Disease 2019 (COVID-19) caused by the novel severe acute respiratory syndrome corona virus 2 (SARS-CoV-2), had its origin in Wuhan, China in December 2019 before it spread globally affecting millions casing death and severe morbidity. The World Health Organization declared it a pandemic on 11 March 2020. Vaccines were considered as one of the chief prevention

strategies to check the spread of the contagion and end the pandemic. However, vaccine uptake was not as brisk as expected right from the roll out. One commonly encountered reason was vaccine hesitancy where concerns regarding attributes of the vaccines such as its effectiveness, risk of adverse events, and cost among other factors affected decision making.

One of the ways to identify these factors is to conduct a discrete choice experiment (DCE). DCE is a quantitative technique that elicits individual preferences regarding goods or services, (in this case, a COVID-19 vaccine), wherein the idea of preferences can be broken down into separate characteristics – called "attributes" (such as safety, effectiveness, cost *etc.*,) which are assumed to vary across diverse levels (e.*g.*, the levels for the vaccine's effectiveness could be 50%, 70% or 90%).

Objectives: To identify the key attributes of COVID-19 vaccine for its acceptability and their willingness to pay (WTP) for a COVID-19 vaccine in the face of an ongoing pandemic by the general population of India

Methods: After IEC approval, digital informed consent was obtained from all respondents. A pan-India digital cross-sectional survey with a target sample size of 10,000 was conducted among those over 18 years, any gender, and residing in India for at least six months. The questionnaire given out digitally comprised of two sections namely (a) demography including socio-economic class (assessed by BG Prasad scale), and (b) DCE. The DCE section had six pairs of hypothetical vaccines wherein the 6th pair was used as a trap question with one of the vaccine pair being unambiguously better than the other. Those who failed the trap question were excluded

Results: Of 10,000 respondents, 1241 failed the trap question and 8759 responses were finally analyzed. The mean (SD) age was 36.32 (12.61) and 61.03% were men. The most important attribute was effectiveness followed by the duration of protection and Indian origin vaccine. Cost of the vaccine was a significant but least important attribute. The participants were willing to spend approximately INR 1549 (20.12 USD) and INR 587 (7.62 USD) per dose to take vaccines that provided 90% protection and a protective duration of 5 years when compared to those vaccines with an effectiveness of 50% protection and a protective duration of 6 months respectively. The significant predictors of vaccine hesitancy were male sex, upper and middle socio-economic class, and presence of comorbidities such as diabetes, heart problems or asthma.

Conclusions: Most important attributes that influence decisions were effectiveness, duration of protection & indigenous vaccines. When in a pandemic, and while seeking to achieve close to 100% vaccination, understanding these individual health economic issues becomes imperative.

12:30 PM –1:30 PM   WEDNESDAY   [Social Events]

Cape Town International Convention Centre | CTICC 1 – Jasminum & Strelitzia restaurants
Lunch and Poster Viewing

12:30 PM –1:30 PM   WEDNESDAY   [Social Events]

Cape Town International Convention Centre | CTICC 1 – Ballroom West
Lunch and Poster Viewing

1:30 PM –3:00 PM   WEDNESDAY   [Supply And Regulation Of Health Care Services And Products]

Cape Town International Convention Centre | CTICC 1 – Room 1.41
Pharmaceuticals in Low and Middle Income Countries

MODERATOR: **Anne Mills**, Department of Global Health and Development, London School of Hygiene & Tropical Medicine

WAGSTAFF AWARD WINNING PAPER: Procurement Institutions and Essential Drug Supply in Low and Middle-Income Countries
PRESENTER: **Lucy Xiaolu Wang**, Max Planck Institute for Innovation and Competition
AUTHOR: Nahim Zahur
Ensuring essential drug supply treating major infectious diseases in low and middle-income countries (LMIC) is a global challenge, with complicated issues regarding supply chain management, local production capacity, and intellectual property (IP) rights. International procurement institutions have played important roles in reducing coordination failures in drug supply by pooling procurement and coordinating delivery within and across regions. Despite wide recognition of the merits of pooled procurement, there is limited understanding of the tradeoffs involved. Understanding these institutions is increasingly important, as the COVID-19 pandemic has led to major concerns about the resilience of drug supply chains for equitable access in LMIC.

This paper systematically analyzes the efficiency and tradeoffs across procurement institutions involved in supplying anti-HIV, antimalaria, antibiotics, and tuberculosis drugs. We study procurement outcomes, including price, delivery, and procurement lead time, using a rich dataset of drug purchases covering 106 LMIC during 2007-2017. We distinguish four major types of procurement institutions by the level of pooling involved in the drug supply process. Two institutions specialize in cross-country procurement pooling: the Global Fund's Pooled Procurement Mechanism (PPM) and the United Nations (UN). In contrast, Central Medical Stores pool procurement mainly within a country. Finally, countries can always directly purchase drugs from manufacturers.

Our baseline model uses variation over time in outcomes for the same drug-country pair. We assume that unobservables affecting outcomes are uncorrelated with the choice of procurement institutions, conditional on extensive fixed effects at the drug-country and year levels and observable controls. We find that pooled procurement institutions lower prices: pooling internationally is most effective for small buyers and more concentrated markets, and pooling within-country is most effective for large buyers and less concentrated markets. Pooling can reduce delays, but at the cost of longer anticipated procurement lead times. Finally, pooled procurement is more effective for older-generation drugs, compared to intellectual property licensing institutions that focus on newer, patented drugs.

We corroborate the baseline findings using multiple identification strategies. To address the concern that learning-by-doing may generate endogeneity, we propose an instrumental variable strategy that exploits correlation in the choices of procurement institution across drugs for the same country, and for the same drug across countries. Second, to test for selection arising from more general forms of omitted variable bias, we perform the Altonji-Elder-Taber (AET) test generalized by Oster (2019). Finally, we estimate a reduced-form demand function to address the possibility that the differences across procurement institutions may be driven by heterogeneity in demand elasticity. Our results rule out the concerns and remain robust to these new strategies.

We further examine the interplay between pooled procurement and other institutional factors (e.g., large donors) and management practices (e.g., tiered pricing, payment terms, purchase order frequency) used in the supply of drugs in LMIC. Overall, these additional analyses strengthened our robust results on procurement institutions.

Our paper shows that the optimal mixture of procurement institutions depends on the trade-off between costs and urgency of need, with pooled international procurement institutions particularly valuable when countries can plan well ahead of time.

COVID-19 and Markets for Pharmaceutical Raw Materials: Estimating Price and Volume Effects and Disparities By Country Income Category

PRESENTER: **Melissa Barber**, Harvard University

Background: The COVID-19 pandemic sent a shockwave across global pharmaceutical supply chains. Production capacity was affected by factory closures, raw material shortages, and a reduced workforce. Despite widespread concerns about medicine shortages due to disruptions in manufacturing and supply chains, there is no literature assessing the impact of COVID-19 on markets for pharmaceutical raw materials. This study evaluates the effect of COVID-19 on the price and volume of active pharmaceutical ingredients (APIs) exported from India and China, the leading exporters globally.

Methods: Key essential medicines were defined as medicines included on WHO's 'core essential medicines' list. Data on price, volume, shipment origin, and shipment destination of APIs for these medicines were extracted from shipment-level import/export declarations published by a commercial trade database (S&P). A linear mixed-effects model with interruption and random intercepts was used to estimate the effect of COVID-19 on API export prices (USD/kg) and volume (kg). In this model, market trends for each drug after the WHO pandemic declaration (March 2020-June 2021) are compared to their pre-trends (March 2018 – March 2020). The model adjusts for shipment origin (China or India), time, and the income category of the country receiving the import. To adjust for autocorrelation and heteroskedasticity, standard errors were adjusted using the Newey-West method.

Results: 19,830 individual shipments representing 76 million kg of API met the inclusion criteria and were included in the analysis. API prices for WHO core essential medicines increased by 3% annually (95% CI: 2%, 4%) in the pre-trend period, but volume remained constant (0%, 95% CI: 0%, 0%). Following the WHO pandemic declaration, API prices increased by 210% (95% CI: 5%, 813%) on average compared to pre-trends across exports from both countries, controlling for other covariates. Volume effects were highly uncertain but positive (+5484%, 95% CI: 3%, 302,321%). In the pre-trend period, API prices for exports to low- and middle-income countries (LMICs) were 31% lower (95% CI: -32%, -29%) compared to exports to high-income countries (HICs); the pandemic did not have a significant ($p < 0.05$) effect on price differences between HIC and LMIC export destinations. In contrast to price, the volume pandemic-market interaction was significant, with the volume of exports to LMICs after the pandemic declaration decreasing by 10% (95% CI: 2%, 18%) compared to exports to HICs, adjusting for all other model covariates.

Conclusions: Analysis of API supply chains and pricing is critical in targeting policy responses within the supply chain. In this study, we found evidence of significant price increases following the COVID-19 pandemic declaration for key essential medicine APIs exported from India and China. Another key finding is the pandemic's disproportionate negative effect on the volume of API imports to LMICs compared to HICs, suggesting either higher price sensitivity among LMIC buyers or prioritization by suppliers to fulfill HIC orders. These findings contribute to the evidence base on how medicine markets react to supply and demand shocks and will be useful in designing potential reforms to diversify production, strengthen health systems, and protect supply chains for medicines.

Return on Investment of Post-Market Surveillance to Combat Substandard and Falsified Antimalarials and Antibiotics: Tanzania Case Study

PRESENTER: **Sachiko Ozawa**, University of North Carolina at Chapel Hill

AUTHORS: Colleen R Higgins, Adam Mitangu Fimbo, Emmanuel Nkiligi, Yonah Hebron Mwalwisi, Michael Deats, Pernette Bourdillon Esteve, Rutendo Kuwana

Introduction: Monitoring medicine quality through post-market surveillance is integral to removing substandard and falsified medicines from the market. Yet there is a lack of economic evidence to finance post-market surveillance in low- and middle-income countries. This study estimates the return on investment (ROI) of post-market surveillance conducted by the national medicines regulatory authority of Tanzania.

Methods: We estimated the ROI by costing activities related to post-market surveillance and modeling the benefits of removing substandard and falsified medicines. Micro-costing was used to estimate the costs of personnel and materials for surveying, testing, and removing substandard and falsified antibiotics and antimalarials from the market based on data from the Tanzania Medicines and Medical Devices Authority. Benefits were estimated by simulating the health and economic effects of reducing the level of substandard and falsified antibiotics and antimalarials over five years, compared with the counterfactual among African countries not conducing post-market surveillance. The agent-based Substandard And Falsified Antimalarial Research Impact (SAFARI) model was modified to examine the impact of post-market surveillance on malaria, lower respiratory infection (LRI), and urinary tract infection (UTI).

Results: Five years of post-market surveillance resulting in a 10% reduction in prevalence of substandard and falsified medicines was estimated to have a ROI of $238-$270 for every dollar invested. Post-market surveillance was simulated to avert 2.6 million substandard and falsified treatments for malaria, nearly 690,000 for LRI and 430,000 for UTI in Tanzania over five years. This prevented nearly 19,000 malaria and LRI deaths. Average annual cost of post-market surveillance was estimated at around $372,000. It cost $91 to avert one death through post-market surveillance.

Conclusion: The ROI of post-market surveillance activities that lead to an improvement in overall antibiotic and antimalarial quality through Tanzania's national medicine regulatory authority is exceptionally high. Medicines regulatory authorities should be bolstered financially to conduct regular and effective post-market surveillance.

Why Does Financial Hardship from Private Sector Drugs Occur When Public Sector Drugs Are Free? Analysis of Linked Patients, Public Facilities and Private Pharmacies in the State of Odisha, India

PRESENTER: **Annie Haakenstad**, Institute for Health Metrics and Evaluation, University of Washington

AUTHORS: Anuska Kalita, Bijetri Bose, Winnie Yip

In India, drug spending is a key cause of catastrophic health expenditure (CHE). In Odisha – a state with the second highest rate of CHE across India – 65% of CHE is due to spending on drugs. This is puzzling because pharmaceuticals are provided free-of-charge in government-run facilities. Over 70% of public sector outpatients obtain private drugs.

In this study, we tested three hypotheses as to why public facility users incur financial hardship from obtaining drugs from private pharmacies. First, we assessed whether lack of drug stocks could force public healthcare users to purchase drugs from the private sector. Second, we analyzed whether public facility drug stocks are responsive to the stocks of nearby private pharmacies. Finally, we examined whether patients are more satisfied when they obtain private sector drugs. Private pharmacies tend to stock branded drugs while public facilities tend to stock generics, so they are not perfect substitutes.

In 2019-2020, we collected data from more than 35,000 households, 500 public health facilities and 1000 private pharmacies across Odisha. We linked 919 outpatient visits to the facility visited based on facility name. We linked public sector health facilities and private pharmacies based on GPS coordinates. Using these linked datasets, we assessed whether the distance between a public facility and its nearest private pharmacy was associated with the facility's stock of drugs and whether patients opted to obtain private sector drugs. We assessed whether a patient's satisfaction rating of perceived quality and met needs were associated with whether they obtained private drugs.

More than half of patients obtained drugs from the private sector even where more than 90% of essential medicines were in stock. The proximity of private pharmacies also matters – public facilities closer to private pharmacies have a smaller share of essential medicines in stock (p=.006). Stocks also decline as the reported role of the pharmacy in providing basic healthcare increases, as measured by the share of patients the pharmacists give advice to (p=.059). The stocks at a facility are associated with whether a patient obtains private drugs only in locations where a private pharmacy is less than a kilometer away (p=.036). Finally, obtaining private drugs is associated with higher patient satisfaction ratings of perceived quality and met need at hospitals (p=.005; p<.001), but lower ratings at basic primary care facilities in Odisha (p<.001; p<.001).

Our analysis suggests that stocks of public sector drugs play a small role in the use of the private sector for pharmaceuticals – only where private pharmacies are close are patients and facilities actively making a decision based on public stocks and the possibility to substitute with private sector drugs. However, some patients are obtaining private sector drugs regardless of drug stocks, with patients at hospitals more satisfied when they obtain drugs from private pharmacies versus public sector drugs. Addressing public drug stocks alone will be

insufficient to reduce CHE due to drug spending – patient preferences and the incentives of providers must be also taken into account to reduce financial hardship.

1:30 PM –3:00 PM   WEDNESDAY   [Health Beyond Health Care Services: Social And Related Determinants]

Cape Town International Convention Centre | CTICC 1 – Room 1.44
Inequality in access to healthcare and health outcomes

MODERATOR: **Veloshnee Govender**, Department of Sexual and Reproductive Health, World Health Organization

Socioeconomic Status and Access to Mental Health Care: The Case of Psychiatric Medications for Children in Ontario Canada

PRESENTER: **Jonathan Zhang**, McMaster
AUTHOR: Janet Currie

We examine differences in the prescribing of psychiatric medications to low-income and higher-income children in the Canadian province of Ontario. The analysis takes advantage of an expansion to universal public drug coverage followed by a contraction in access, coupled with rich administrative data that includes physician identifiers. Our most striking finding is that conditional on diagnosis and medical history, low-income children are more likely to be prescribed antipsychotics and benzodiazepines than higher-income children who see the same doctors. These are drugs with potentially dangerous side effects that should be prescribed to children only under narrowly proscribed circumstances. Low-income children are also less likely to be prescribed SSRIs, the first-line treatment for depression and anxiety. Hence universal drug coverage for children did not eliminate differences in prescribing practices between low-income and higher income children, suggesting that addressing these differences would require additional interventions including changing prescribing behaviors of individual providers.

Inequalities in Access to Reproductive, Maternal, New Born and Child Health Services: An Application of Delivery Channels Framework in the Indian Context

PRESENTER: **Shirisha P**, IIT madras
AUTHORS: Girija Vaidyanathan, Muraleedharan V R

Inequalities in access to Reproductive, Maternal, New Born and Child Health Services: An Application of Delivery Channels Framework in the Indian Context

Background:

Several studies have highlighted an improvement in the coverage of reproductive, maternal, new born, and child health (RMNCH) services at the all-India level and within individual states. In this paper, we compare and contrast the trends in inequalities in the coverage of RMNCH services between a poor (high focus state of Chhattisgarh; CG) and a non-poor non-high focus state (Tamil Nadu; TN), between 2005-06 and 2019-21, using the Delivery Channels Framework.

Methods

We utilize three rounds of nationally representative surveys (National Family Health Survey- NFHS-3rd, 4th and 5throunds conducted in 2005-06, 2015-16 and 2019-21, respectively) for our analysis. The interventions were classified into four groups (accounting for 17 indicators of coverage of RMNCH) according to their predominant delivery channels: community-based, health facility-based, environmental, and cultural. The data for wealth quintiles were derived from information on household asset indices. To study the trends and differentials of inequalities across wealth quintiles we have used two summary indices. - absolute inequalities using the slope index of inequality (SII), and relative inequalities using the concentration index (CIX). The values of SII and CIX lie between -1 and +1 and can be multiplied by 100. A positive value implies a pro-rich pattern and a negative value implies a pro-poor pattern, whereas a value of '0' implies no inequality. The estimations were done at 95% confidence interval (CI) and p <0.001.

Results

The trends of inequalities suggest that the coverage of community-based interventions are relatively less unequal, compared to the other delivery channels. However, the richest group has the highest coverage, except in TN. The highest inequality in coverage was observed for environmental interventions, particularly with respect to the coverage for "use of clean fuels" [SII: 92.25 CI(92.14,92.36); CIX: 35.87 CI(35.77-35.97); NFHS-5]. TN has fared well above the national average between NFHS-3(2005-06) and 5(2019-21) for coverage of health facilities based interventions. Inequalities in the coverage of interventions delivered through health facilities have reduced (significantly) in both TN, CG and India. In TN the coverage of health facility-based interventions (such as Antenatal care -[SII:-1.40 (-4.16-1.3); CIX:-0.17(-0.65,0.31)]; NFHS-5(2019-21)] shows a significant pro-poor pattern as compared to CG [ANC visit SII:10.2(5.9-14.4); CIX:2.62 (1.51,3.73); NFHS-5(2019-21)]. The coverage of culturally driven interventions has increased over the years (highest in

CG). And, the trends of inequality of culturally driven interventions indicate that its coverage is higher among the women from poor households, especially in TN [e.g. SII: -21.64 (-36.1-, -7.19); CIX: -6.71 (-11.03- -2.38); in case of exclusive breastfeeding in TN NFHS-5].

Conclusion

Adoption of delivery channel framework is useful to assess and monitor progress of RMNCH services. This framework therefore allows policy makers to focus on interventions that require reduction of inequalities in the coverage and their effectiveness.

Semiparametric Modelling of Deprivation-Specific Variations in Income-Related Inequalities in Diabetes in India

PRESENTER: **Sujata Sujata**, Indian Institute of Technology Mandi
AUTHOR: Ramna Thakur

We construct an index of multiple regional deprivation for the Indian state of Punjab at the district level, test its efficacy by analyzing inequalities in diabetes associated with regional deprivation and individual-level wealth, and measure deprivation-specific wealth-related inequalities in diabetes. We use data from multiple sources and apply factor analysis to construct the Punjab Index of Multiple Deprivation (PIMD). Deprivation-related and wealth-related inequalities in diabetes are measured using the concentration index, and PIMD-specific wealth-related inequalities in diabetes are measured using a non-parametric extension of the concentration index. Our results suggest a significant concentration of diabetes among richer individuals and in better-off areas, with wealth-related inequality being significantly stronger than the deprivation-related health inequality. The throughout positive estimates of the varying inequality index indicate that diabetes is significantly concentrated among richer individuals at all levels of regional deprivation, but better-off areas exhibit stronger inequalities in diabetes.

Socio-Economic Inequality in Healthcare Utilization: Evidence from Health Shocks

PRESENTER: **Wolfgang Frimmel**, Johannes Kepler University Linz
AUTHOR: Felix Glaser

Health equality is an essential objective in public healthcare systems. Yet one observes substantial socio-economic inequality in the utilization of healthcare services. Understanding the determinants behind this inequality is therefore critical to enhancing health equality in our societies. In this paper, we analyze the SES gradient in healthcare utilization after suffering a health shock by decomposing the raw gap into health demand and health supply factors.

We use high-quality administrative health register data for the entire population in Upper Austria, providing detailed information on hospitalizations including diagnoses, length of stay, treatments, departments and readmissions. Subsequently, we follow patients on their pathway through the healthcare system by utilizing information on the outpatient sector and prescriptions for medication. We compare patients with high and low SES who are otherwise identical in important individual characteristics, diagnosed disease, within-hospital treatment, prior health status and health behavior, the timing of hospitalization as well as hospital and GP fixed effects.

Overall, we find that the raw socio-economic differences are reduced substantially by up to 50 percent once accounted for individual characteristics, time trends and the exact diagnosis. Accounting for health status and health behavior prior to the health shock further reduces the SES gap and even eliminates the difference entirely for certain components of healthcare utilization. Among cancer diagnoses we find significantly shorter hospital stays for high-SES patients but no differences in the number of services, short-term mortality and readmissions once controlling for prior health status and behavior. This indicates that for a given diagnosis, hospitals do not treat cancer patients differently according to their socio-economic status. However, the SES gradient widens after patients leave the hospital. High-SES patients reduce the number of medication prescriptions and are more likely to consult specialist doctors rather than GPs. Mortality significantly increases for low-SES patients and the gap widens over time. For cardiovascular diseases we do not find a SES gradient during the initial hospitalization and doctor-visiting behavior, although high-SES patients tend to improve their health status more and reduce their drug prescriptions.

We estimate the socio-economic gradient in healthcare utilization during and after hospitalization. Our results indicate that after suffering a health shock, there is no evidence for an SES health supply gradient. However, differential health behaviors are reinforced after the shock. High-SES patients tend to benefit from their overall better health status, leading to better long-term health outcomes.

1:30 PM –3:00 PM   WEDNESDAY   [Supply And Regulation Of Health Care Services And Products]

Cape Town International Convention Centre | CTICC 1 – Room 1.64
Determinants of Provider Supply

MODERATOR: **Joanne Spetz**, University of California San Francisco

Supply, Stress, Satisfaction, and Shortages Among Registered Nurses in California

PRESENTER: **Joanne Spetz**, University of California
AUTHORS: Lela Chu, Lisel Blash

Background: Since the start of the COVID-19 pandemic, numerous concerns about the nursing workforce have been reported worldwide. As the United States (US) prepared for surges of patients with each wave of the pandemic, there were fears of shortages of registered nurses (RNs) prepared to work in intensive care units. In addition, nursing education programs reported that their students were unable to continue their clinical education due to worries about infection risks within hospitals. Education programs struggled to modify their programs amidst the limitations caused by the pandemic. At the same time, anecdotal reports suggested that some RNs decided to quit working to reduce the risk of infection with SARS-Cov2 and to recover emotionally from the high stress of working during the pandemic. These changes could undermine the progress made over the past 20 years toward a balanced nursing labor market in the United States.

Research Aim: This study used data from two unique surveys conducted in California to assess the current and future supply and demand of RNs and to learn how the coronavirus pandemic is affecting this essential workforce.

Methods: Data from the 2022 Survey of California Registered Nurses and the California Board of Registered Nursing 2020-2021 Annual School Survey were analyzed to examine RN supply in California, where nearly 15% of US nurses live. Additional data from the California Board of Registered Nursing's licensing records, the California Department of Finance, and the California Department of Health Care Access and Information were used to project demand for RNs. Bivariate and multivariate analyses were used to examine relationships between nurse reports of stress, illness, and employment with intention to leave nursing and to change employers. Supply projections were based on a stock-and-flow model and demand projections were based on historic RN employment and rates of health care utilization by population age group.

Principal Findings: Preliminary data indicate that RN employment has remained stable over the past four years but that many older RNs have left nursing. In addition, a large proportion of older RNs intend to retire or quit within the next two years. Many RNs report that childcare and school closures have made it difficult to work, and that they feel their employers do not care about their well-being or recognize their contributions. Decreases in new enrollments and graduations from RN education programs over the past two years have led to a reduction in the supply of RNs compared with previous projections. A shortage of RNs is estimated to exist in 2022. As the number of applications continues to rise, RN education enrollments are projected to surpass pre-pandemic levels within the next two years, which will lead to a closing of the shortage by 2029.

Conclusions: Given the current shortage of RNs, employers need to redouble their efforts to retain RNs and develop career paths for newly-graduated RNs. They also need to rapidly develop and implement strategies to mitigate the potential harm caused by these shortages.

Flows into and out from Nursing Schools over the Business Cycle

PRESENTER: **Takuya Hasebe**, Sophia University
AUTHOR: Koyo Miyoshi

Background and Objective: Qualitatively and quantitatively stable supply of health care service is important. A large body of literature has documented cyclical movements in health outcomes such as mortality, and some empirical studies attribute such movements to fluctuations in staffing in nursing care facilities over the business cycle. These studies discuss short-term impacts of the business cycle on the quality of health care service since fluctuations mainly occur within the current pool of health professionals. Our research aims to add to the literature by exploring how the macroeconomic conditions affect the flows into and from schools for professional training, which has potential long-term influences through expansion and shrinkage of the pool of health professionals as well as changes in skill composition of the pool. Our empirical research focuses on nurse training school in Japan, which has experienced the persistent shortage of nursing staffs like many other countries.

Methods: We estimate the impacts of the business cycle on the admission into and graduation from nurse schools using data aggregated at the prefecture level from 2007 through 2021 in Japan. Our main data come from "Survey on Admissions into Nurse Schools and Work Statuses of Graduates" conducted by Ministry of Health, Labour and Welfare. The main outcome variables are the numbers of applicants to, enrollments in, and graduates from nurse training schools. We further divide those numbers by the type of nurse training schools such as 4-year university, 3-year vocational school, and assistant nurse training school. We merge these data with the prefecture-level unemployment rate, which is used as the proxy of the macroeconomic conditions, as well as other prefecture characteristics. Since our outcome variables are count data, we employ a (pseudo-)Poisson regression model with prefecture fixed effects and prefecture specific linear trends.

Results: Our preliminary results show that overall, the flows into nurse training schools responds to changes in macroeconomic conditions. Specifically, the total numbers of applicants and enrollments are countercyclical. Both applicants and enrollments increase as the unemployment rate rises. The increases in applications mainly occur at assistant nurse schools and 3-year vocational schools, but not at 4-year universities. The enrollments increase with the unemployment rate at 4-year universities as well as 3-year vocational schools and assistant nurse training schools. On the other hand, the overall number of graduates from nurse training schools is not significantly responsive to changes in macroeconomic conditions. However, the breakdown analysis shows that the increase in the number of

graduates from 4-year universities with the unemployment rate is offset by the decrease in the graduates from 3-year vocational schools decreases.

Discussions: Our preliminary results indicate that the economic downturns potentially expand the pool of nursing professions by increasing the inflow into nurse training schools. The increase from the outflow from 4-year university during economic downturns could have qualitatively positive impacts on the pool although further analysis is necessary for careful policy discussions.

The Effects of Pension Reforms on Physician Labour Supply: Evidence from the English National Health Service

PRESENTER: **George Stoye**, Institute for Fiscal Studies
AUTHORS: Carol Propper, Max Warner

Background: Rising life expectancies have raised concerns about the sustainability of generous defined benefit pension schemes around the world, including in the public sector. As a result, many developed countries have introduced reforms to make public sector pension schemes less generous. Critics of these reforms suggest that reducing the generosity of schemes – effectively reducing pay – will lead to the loss of staff from affected sectors, and reduce the quality of public services provided by these workers. Doctors are public workers in many countries around the world, and such reforms therefore have the potential to impact medical labour supply across many public health systems. However, there is currently little empirical evidence on the impact of such reforms.

Objectives: This paper provides new evidence on the impact of such reforms on the labour supply of publicly employed senior doctors (known as consultants) in England. Specifically, we study the impacts of a reform in 2015 that moved most doctors working in the English National Health Service from a final salary pension scheme to a less generous career average scheme. Exploiting a staggered roll-out of the scheme across narrowly defined age-bands based on month of birth allows us to estimate the causal impact of changes to total renumeration on doctor labour supply, and to provide new evidence on the wider impacts of reforms to public sector pension schemes.

Methods and Results: We use the universe of administrative hospital payroll records from the English National Health Service to study the impact of the reform. The roll-out of the scheme was staggered across date of birth groups, allowing us to exploit differences in the timing that staff were moved onto the new scheme across narrowly month-of-birth cohorts. Using this timing to estimate a difference-in-differences model, we examine the impact of the reform on the extensive and intensive margin of doctor labour supply. We examine heterogeneity between different groups of doctors and sources of income to identify the mechanisms behind changes in labour supply.

We show that the labour supply of senior doctors increased on the extensive margin as a result of the reform, with doctors less likely to leave the NHS up to six years after the reform. There was no impact on the number of hours worked. Preliminary results suggest that the increased participation was primarily driven by the fall in pension wealth, rather than the change in labour supply incentives.

Conclusions: These results show that doctors do change their labour supply in response to financial incentives. Shifts to more affordable pension schemes do not necessarily reduce the labour supply of existing staff.

Sex-Based Differences in French Self-Employed Gps' Response to Declining Local Medical Density: A Panel Data Approach

PRESENTER: **Bruno Ventelou**, CNRS - Aix Marseille Univ
AUTHORS: Alain Paraponaris, Julien Silhol

Objectives

French self-employed general practitioners (GPs) are free to set up wherever they want and are freely accessible by patients. GPs' consultations are reimbursed at 70% by the National Health Insurance (100% if patients subscribe a complementary health insurance). Their uneven distribution across the territory may jeopardize the principle of equal access to primary care, particularly in medically underserved areas. This paper focuses on how GPs cope with changes in the healthcare supply in their practice areas and on how the adjustment process may be heterogenous across genders.

Methods

We estimate the equation of the GPs' log-income with the help of original panel data from the Permanent Demographic Sample (French National Institute of Statistics and Economic Studies) made of a representative sample (sampling rate=4.4%) of 2,898 self-employed GPs followed from 2009 to 2017. Physician's gender, age, children, location of the office, gross earnings (including, in addition to consultation fees, salaries earned in nursing homes or consultancy income, if any), partner's income, extra revenues (like rental or investment income) are matched with figures on GPs density at the smallest available health-territory level.

Results

A 10% drop in the local medical density results in a 1.7% increase (p<0.01) in GPs' earnings taken from the private practice, with control for other sources of income (R2=0.9). For male GPs, it gives rise to a 2% increase in their earning (p<.01) whereas for female GPs there

is no statistically significant adjustment. When the sample is restricted to childless male and female GPs, there is no remaining difference between men (+1.9%, p>0.01) and women (+2%, p<0.01), revealing potential distorting effects coming from the presence of kids. The former result for male GPs is robust to the consideration of children who, whatever their age, lead male GPs to have higher income. For female GPs, new born (respectively children aged 4 to 18) reduce (increase) the income taken from private practice, which is still insensitive to changes in medical density. Robustness checks are proposed to refine the results according to the medical density in 2009, especially focusing on underserved areas.

Discussion

A drop in the GPs density should increase the workload of the GPs still practicing in the area, at the risk of not adequately meeting the demand for care. Yet, not only departures of GPs do not seem to be strictly balanced by the endorsement of an increased workload (proxied with their earnings from private practice) by their remaining colleagues but the adjustment deeply differs across genders. Family considerations still prevent women from adjusting their labor supply in a manner comparable to that of their male counterparts.

1:30 PM –3:00 PM   WEDNESDAY   [Health Care Financing & Expenditures]

Cape Town International Convention Centre | CTICC 1 – Room 2.44-2.45

The Distributional Effects of Primary Care Financing – a Cross Country Comparison from Zambia, Tanzania and Brazil

MODERATOR: **Josephine Borghi**, London School of Hygiene & Tropical Medicine (LSHTM)

DISCUSSANT: **Chitalu Chama-Chiliba**, University of Zambia; **Everton Silva**, University of Brasilia

Inequalities in the Distribution of PMAQ Funding across Municipalities Lessons from Brazil

PRESENTER: **Claudia Pereira**, Fiocruz
AUTHORS: Everton Silva, Jorge Otávio Maio Barreto, Garibaldi Dantas Gurgel Junior, Timothy Powell-Jackson, Josephine Borghi

Introduction: Brazil adopted in 2011 its first pay for performance scheme at the national level through a program called PMAQ, translated as National Program for Improving Primary Care Access and Quality. The programme involves allocating primary health care funds to municipalities based on the performance of family health teams within the municipality. Municipalities decide whether and how much funding to pass on to family health teams, meaning there is variation in the design of the performance incentive across municipalities. The primary goal of the programme was to achieve sustainable development goals related to maternal and childcare indicators. The goal of this study is to investigate inequalities in the distribution of PMAQ funding across municipalities as compared to input-based primary care funding– exploring the municipal level characteristics associated with higher levels of PMAQ/input-based funding. We also explore whether there is any evidence of a displacement of routine municipal funding associated with receipt of PMAQ funds.

Methods: Concentration indices will be generated for each source of funding (PMAQ or input-based). Inequalities will be examined in relation to rural/urban; size; number of family health teams; baseline/previous cycle level of primary care funding excluding PMAQ; baseline performance scores in 2011; PMAQ incentive design choices made by municipalities (referred to as clusters) to generate equity gap/ratios. Time series regression models will be used to determine municipal level characteristics, such as socio-economic status, scheme design, number of family health teams, baseline funding levels, rural/urban location, PMAQ design cluster associated with higher levels of PMAQ/input-based funding.

Expected Results: The study will determine whether PMAQ is pro-rich or pro-poor and how this compares in terms of distributional equity to input-based financing. It will also help to understand which contextual and PMAQ characteristics were associated with higher levels of funding equity.

The Influence of Health Facility Characteristics on Performance Based Financing Effectiveness: A Secondary Data Analysis of the Zambian Pilot

PRESENTER: **Miguel Pugliese-Garcia**, London School of Hygiene & Tropical Medicine
AUTHORS: Chitalu Chama-Chiliba, Melisa Martinez-Alvarez, Josephine Borghi
Background

Performance-based financing (PBF), supply side financial incentive schemes aimed at enhancing the quality and coverage of health services, have gained popularity across countries globally, yet their effects vary widely across settings. Context, the characteristics and circumstances that surround and interact with an intervention and its implementation, is widely acknowledged as key to explain the heterogeneity in PBF effects. Previous studies have highlighted how a challenging context, for example the lack of resources and staff at baseline in facilities, may lead to inequalities in PBF outcomes. While the importance of context has been highlighted in multiple

occasions, no previous reviews have explored its influence on PBF implementation and effectiveness, and only a few quantitative studies have explored this influence.

Objective

The objectives of this study are, in their first place, to understand how the health system context influences the implementation and effectiveness of PBF interventions in LMICs, and how this may lead to inequalities between these facilities. Second, quantifies the relative influence of contextual factors in the health system on the effectiveness of PBF to improve the quality of antenatal care using data from one case study; the PBF pilot in Zambia.

Methods

This study used, first, a systematic review peer-reviewed databases and grey literature. The review results were then used to guide the analysis of data collected for the impact evaluation of the Zambian PBF pilot. The second part of the study uses a combination of difference-in-differences and subgroup analysis to explore the effect of PBF on the quality of antenatal care.

Results

PBF implementation and effectiveness were influenced by contextual factors across all building blocks of the health system. The availability of resources for facilities and the capacity of health workers and managers were the factors featuring most prominently. Contextual factors influencing PBF implementation were commonly connected to the capacity of the district and central levels and facility managers, while factors influencing effectiveness were more related to the ability of facilities to provide services. The analysis of the Zambian PBF pilot indicates that PBF may have improved the quality of antenatal care more in facilities that had better resources (i.e., readiness score). However, differences were not significant based on the capacity of the health workers and health centre management.

Conclusions

Our review highlights the importance of facility resources and health worker capacity to PBF effectiveness. It also suggests the central role of HC managers and districts capacity on PBF implementation and effectiveness. The results from the analysis of Zambian pilot data highlight the need for collecting contextual factors in a structured, comprehensive way that allows for more detailed analysis. These findings can help guide future assessments of context and deciding what data to collect and report.

Examining the Inequalities in Paying Health Facilities Directly in Tanzania: The Case of Results-Based Financing and Donor-Health Basket Funds

PRESENTER: **Peter Binyaruka**, Ifakara Health Institute
AUTHORS: Josephine Borghi, Ottar Maestad

Introduction: To enhance system performance, Tanzania embarked on two direct health facility financing programmes, the result-based financing (RBF) from 2015/16, and direct payment of the donor- health basket funds (HBF) from 2017/18. Since these programmes pays health facilities of different characteristics, there is a need to monitor inequalities in payments whether it favours the better-off and widening the resource gaps between facilities. There is currently little understanding on payment inequalities between providers over time, and what drives any existing inequalities. We aimed to fill this evidence gap using data from two programmes in Tanzania.

Methods: We used data from 75 public primary healthcare facilities implementing RBF and HBF in eight districts in Mwanza region, Tanzania. These data included quarterly RBF payment data (2016–2018) and annual HBF payment data (2017/18 –2019/20). Baseline facility-level and area-based characteristics, as explanatory variables, were obtained from the RBF impact evaluation data. We generated descriptive statistics for payment data and baseline facility characteristics. To quantify the degree of socioeconomic-related inequality in payments, we computed concentration indices over time. Payment inequalities across all explanatory variables were obtained by regressing payment data against baseline facility and area-based characteristics controlling for time and district fixed effects.

Results: The concentration indices for quarterly RBF payments were significant (p<0.01) and fluctuated between 0.22 in 2017 quarter 3 and 0.16 in 2018 quarter 3; while the concentration index for HBF payment was 0.28 (p<0.05) in 2017/18, 0.28 (p<0.01) in 2018/19, and declined slightly to 0.27 (p<0.01) in 2019/20. Overall, RBF and HBF payments were pro-rich over time (favouring facilities serving non-poor population) due to positive and significant concentration indices. Facilities serving non-poor population received relatively higher payments than those serving poorer populations, with a slight indication of catching up over time. Based on regression results, RBF payments were significantly higher among health centres than dispensaries (p<0.01), facilities serving the least poor population than facilities serving poorer population (p<0.05), and facilities having higher insured people than few insured people (p<0.05). HBF payments were significantly higher among health centres than dispensaries (p<0.01), among facilities with higher staffing level than low staffing level (p<0.05), facilities offering 24 hours delivery care (p<0.05) and facilities located far from district headquarter (p<0.05).

Conclusions: Countries implementing direct facility financing programmes should monitor inequality in payments over time in order to inform the redesigning of the programme where necessary to avoid furthering inequalities and enhance overall system performance.

Cape Town International Convention Centre | CTICC 1 – Room 1.61
Patient management and health outcomes

MODERATOR: **Susan Mendez**, University of Melbourne

Longitudinal Discontinuity in General Practice and the Circumstances Related to Patients Shift of Their GP

PRESENTER: **Troels Kristensen**, University of Southern Denmark

Background: Greater discontinuity with a GP has been shown to be associated with increased use of health services and deteriorating patient outcomes. However, the majority of studies of continuity have included limited patient samples and short observation periods and did not include circumstances related to inhabitants change of their GP.

Aim: The aim of this study is to explore discontinuity of care and duration of care across age groups of all Danish citizens listed in one or more general practices during a 12 years' period. Furthermore, to analyze the association between the numbers of individual shifts and citizen characteristics as well as identified circumstances related to citizens' shifts of GP clinic. Finally, it is an aim to explore links between discontinuity and use of health services.

Methods: This study uses a unique register data set for the population of Danish inhabitants who had at least one spell and were alive for the period from January 1st ,2007 to December 31st ,2018 to explore discontinuity of care across all registered shifts and age groups 0-14,15-24,25-34, ...,75-84,85+ years. Next, this study analyzes the link between longitudinal discontinuity of care, personal characteristics including use of health services, social security groups and circumstances related to inhabitants' shift of GP using regression analysis. For instance, the circumstances which may explain why people change their GP include: 1) Inhabitant choice a new GP when moving address 2) Child<15 follows parent, 3) change of insurance group 1-9, 4) placed under prison system, 5) institutionalized, 6) Moved abroad.

Results: The population of patients who were alive until 2022 and had spells at Danish GP clinics included 5,548,767 citizens of whom 50.3% were female. The average number of shifts was 1.53 with 0 (p5) and 5 (p5) during the 15 years. The average duration was 7.08 years. 42.92% had a duration of less than 5 years of whom the majority was younger adults and elderly. Circumstances related to discontinuity were primarily closure of the clinic, moving address, transfers. 31.4% of all citizens did change GP or clinic, 29.49% had 1 shift, 17.8% had 2 shifts and 6.1% had 5 shifts or more between 2007-2022. The age group who changed most was between 15-24 years (86.9%>0), but also a large part of elderly between 75-84 (90.2%>0) changed GP one or more times. The age group which changed GP the least was between 35-44 years (64.47%>0). The applied citizen characteristics and circumstances were able to explain 35.2% of the variation (R2). The majority of individual level patient characteristics were significant. Some covariates such as "age" and "move not registered" were negatively associated with the number of shifts. In contrast, e.g., "institutionalized" and "in prison" was positively linked. Finally, our preliminary results confirm that use of health care services are linked to discontinuity of care.

Conclusions: There are both informative and less informative circumstances related to inhabitants change of GP clinic. However, this does not prohibit, that personal characteristics and circumstances may help explain movements in GP patient population lists.

Impact of the 2017 Women's Health Initiative Report on the Use of Hormone Replacement Treatment: A Repeated Cross-Sectional Study from Randomized Assignments

PRESENTER: **Chen-Han Chueh**, National Yang Ming Chiao Tung University
AUTHORS: Pei-Kuan Ho, I-Ting Wang, Wai-Hou Li, Ming-Neng Shiu, Yi-Wen Tsai

Background:

The Women's Health Initiatives (WHI) study in 2002 reported that the overall health risk of using hormone replacement therapy (HRT) exceeded the benefits. This information shock caused significant reductions in the use of HRT worldwide. In September 2017, a longer follow-up of the WHI study showed that HRT utilization was not associated with risk of all-cause, cardiovascular, or cancer mortality.

Objective:

This study examines the short-term impact of the 2017 WHI report on outpatient visit for menopause and the use of HRT in Taiwan.

Methods:

This study examined the change in HRT use over six months – three months before and after the WHI report announcement. A repeated cross-sectional study was conducted through the random assignment of study samples for each month. This study population consisted of 1,869,050 women aged 50 to 60 years who were fully covered by the National Health Insurance in 2017. The study population was randomly assigned into six sub-populations, one for each month. From each month, 10,000 women were randomly selected from each month's sub-population, ending with a total study sample of 60,000 women. The 2017 WHI information shock is a binary variable representing two states: before and after the information shock. A two-part model was used to analyze the use of HRT for any outpatient

visit for menopausal syndrome and any prescription of HRT. Descriptive statistics were used to examine the differences between study samples across six months. Logistic regressions were performed to examine the impact of the publication of the WHI study on outpatient visit and the use of HRT, respectively. The same procedure was also conducted in 2002 to test the robustness of the result.

Results:

The randomized assignment robustly created homogenous study samples for each month, with no difference in demographic factors and medical history. In 2002, the publication of the WHI study significantly reduced outpatient visit for menopause (OR: 0.69, 95% CI: 0.64-0.76) but not the use of HRT (OR: 2.00, 95% CI: 1.55-2.57), which is consistent with the literature. The publication of the WHI study in 2017 did not show a significant effect on outpatient visit (OR: 1.20, 95% CI: 0.85-1.70) nor the use of HRT (OR: 1.02, 95% CI: 0.48-2.21).

Conclusion:

Although the publication of the WHI study in 2017 showed that there was no significant association between HRT utilization and long-term all-cause and cause-specific mortality, this positive information did not affect the outpatient visits for menopause and the use of HRT in Taiwan.

Mobile Consultation and Laboratory Examination in the Rural Forestry Area of Sampit Regency in Central Borneo: A Top-Down Approach to Increase Monitoring Rate and Create Cost Savings

PRESENTER: **Aditya Darmasurya**, BPJS Kesehatan

Background:

PROLANIS is a Disease Management Program (DMP) for hypertension and diabetes mellitus patients in Indonesia's national social security program. In the vast forestry area of Sampit regency in Central Borneo, the number of PROLANIS-DMP members monitored regularly was low. Most of the members live in forestry areas with limited access to primary health care providers and laboratory facilities. Lack of monitoring lead to potential severe complications, increased referrals to specialists, thus increased health costs. Due to this issue, the Indonesia's Social Security Administering Body for Health (BPJS Kesehatan) enacted a top-down approach by mobile consultation and laboratory examination for PROLANIS-DMP members in the rural forestry areas of Sampit regency in Central Borneo since January 2020. A team of doctors, nurses, and laboratory technicians went mobile to villages in the forestry areas on a monthly basis. They performed clinical examinations and conduct laboratory tests to the members. How were the effects of this intervention on the monitoring rate of PROLANIS-DMP members in Sampit regency? Did the intervention create cost savings?

Objectives:

To assess the effects of mobile consultation and laboratory examination intervention on the monitoring rate and cost savings of PROLANIS-DMP members in the forestry areas of Sampit regency in Central Borneo.

Methods:

This was a non-experimental big data analysis study by observational descriptive method. The study utilized BPJS Kesehatan electronic database including data on patients contact to health care providers and referrals to hospitals in Sampit regency from January 2018 to December 2021. The obtained data series were classified into data of PROLANIS-DMP members living in the urban areas as a control group and members living in rural forestry areas.

Results:

Data of 828.080 national security members in Sampit regency from January 2018 to December 2021 showed 12.813 members were diagnosed with diabetes mellitus and 8.769 members were diagnosed with hypertension. From that amount, 68,93% members lived in forestry areas, while 31,07% lived in urban areas. In year 2018 and 2019 before the intervention, the average percentage increase of registered PROLANIS-DMP members in the forestry area was 6,9% per month. After the intervention, the average percentage increase of registered PROLANIS-DMP members in the forestry area was 19,49% per month. Regarding monitoring rate, before the intervention the monitoring rate was 48,04% or an average of 199 PROLANIS-DMP members being examined by doctors and were laboratory tested on a monthly basis. After the intervention, the rate increased to 72,94% or 362 PROLANIS-DMP members were monitored regularly. There was a 26,22% decrease of referral rate after the intervention creating estimated cost savings per year as much as 314.424.360 rupiahs.

Conclusion:

Mobile consultation and laboratory examination increased the numbers of PROLANIS-DMP members monitored regularly in the rural forestry areas of Sampit regency, Central Borneo. The referral percentage was reduced hence creating estimated 314.424.360 rupiahs of cost savings. The study suggested how a top-down approach brought significant effects for disease management program outcome in a rural forestry area setting.

Key words:

mobile consultation, laboratory examination, disease management program, monitoring rate, cost saving

Using Automated Predictive Analytics to Target Older Medical Patients at High Risk of Hospital Readmission for a Care Coordination Program: An Observational Study with a Regression Discontinuity Design

PRESENTER: **Yushan WU**, Centre for Health Systems & Policy Research, Chinese University of Hong Kong

AUTHORS: Eng-Kiong Yeoh, Chi Tim Hung, Yingxuan Wang, Elsie Hui, Hong Fung, Ka Chun Chong, Shi Zhao, Ho Man Shum

Background: Predictive models have been suggested to integrate into regular workflows via electronic health record (EHR) to identify high-risk patients for interventions in a timely manner, but similar applications in interventions to reduce hospital readmissions among elderly patients are lacking.

Objective: To investigate whether a care coordination program, targeted based on an EHR-based automated predictive model, was associated with reduced emergency department (ED) visits and unplanned hospital readmissions.

Design: Leveraging the threshold for program enrolment (hospital readmission risk score >= .17), a regression discontinuity analysis was applied to examine the effect of the program. Hospital administrative dataset of all public hospitals from 2009–2011 was used. The effect of the program in different patient subgroups was also examined.

Setting: Hong Kong.

Patients: Patients aged 60 years and above who were discharged from a medical ward

Measurements: Changes in patients' risk of ED visits and unplanned hospital readmissions within 3 months of discharge.

Results: The data included 641 492 inpatient episodes. The program was associated with a 9.38% reduction in absolute risk of ED visits (95% CI, 5.15% to 13.66%; $P < .001$) and an 8.93% decrease in risk of unplanned readmissions (95% CI, 4.08% to 13.82%; $P = < .001$) within 3 months of discharge. The associations varied across subgroups, with no statistically significant reduction found among social security recipients, patients aged 85 years and above, and heart disease patients.

Limitations: Data after 2012 was excluded to rule out effect from another post-discharge program.

Conclusions: The use of an automated predictive model to identify high-risk patients for care coordination program was associated with reduced risk of ED visits and unplanned readmissions in high-risk older medical patients.

Hospital Procedure Deserts, Hospital Capital, and Inpatient Health Outcomes

PRESENTER: **Shane Murphy**, University of Connecticut

Hospital closures and restrictions on performing certain health procedures in hospitals with low volumes has created increasingly large areas within the United States where those procedures are unavailable to patients. This is especially the case for cardiac procedures such as catheterization, valve replacement, and bypass surgery. When these areas are significant in size, they may be called "procedure deserts". This paper estimates the health cost of new procedure deserts which form after hospitals close and when hospitals are observed to no longer offer procedures which remain in use elsewhere. These health effects are observable at hospitals which stop offering procedures by observing differential outcomes in patients who would be likely to receive a procedure using matching techniques. They are also observable at hospitals surrounding the procedure desert, especially in patients who live within the desert. This is the case both when the procedure desert includes providers which do not offer procedures and when deserts do not have any providers. Hospitals near a new procedure desert see an increase in volume for the procedure and an improvement in outcomes among patients receiving the procedure. However, that improvement is only found in larger, wealthier hospitals. Data from 2005-2015 in ten states - Arkansas, Arizona, California, Florida, Iowa, Massachusetts, Nebraska, New Mexico, New York, and Washington - gives a data set including 1,500 hospitals across 132 months. New procedure deserts, especially those resulting from hospital closures, are not exogenous. We attempt to get around this issue by using changes in demographics and policy environments as instruments to give an estimate of these effects. We find our estimates to be robust to these instruments, suggesting that new procedure deserts resulting from further closures and consolidations will continue to have profound effects on inpatient health outcomes. We also find that these effects are different from the effects of closures which do not result in procedure deserts.

Cancer Care Pathways for Individuals with Severe Mental Disorders: Evidence of Disparities?

PRESENTER: **Coralie Gandré**, Institut de recherche et documentation en économie de la santé

AUTHORS: Anna-Veera Seppanen, Fabien Daniel, Magali Coldefy, Sophie Houzard, Christine Le Bihan

Cancer care pathways for individuals with severe mental disorders: evidence of disparities?

Background

The premature death of persons with severe mental illness (SMI) has been called a scandal and their excess mortality, in particular by cancer, has been well documented with recent studies suggesting it may be influenced by care-related factors. However, there is still a

dearth of research resorting to linked data between community and hospital care to comprehensively document cancer care pathways for people with SMI in different national settings, using large sample sizes, consensual indicators of care quality within the context of clinical guidelines and a control group.

Aim

Our objectives were to assess cancer care pathways from diagnosis to death for individuals with a pre-existing SMI compared to individuals without, at a national scale in France, using breast cancer – one of the most prevalent cancers – as an illustrative example.

Methods

Based on the scientific literature, healthcare disparities were defined as differences in access to and quality of healthcare which are not due to clinical appropriateness and patient needs. An exhaustive population-based data-linkage study, using administrative health claims at the national level, was carried out with a matched case-control design: women with SMI and incident breast cancer were matched with three controls without SMI presenting similar demographics, initial breast cancer type and year of incidence. We then compared cancer care pathways and their quality for cases and controls using a consensual set of indicators covering diagnosis, treatment, follow-up, and mortality, after adjustment on individual socio-economic and clinical characteristics as well as on the type of hospital providing the initial breast cancer treatment. To examine mortality outcomes, we carried out a competing risk analysis using a subdistribution hazard model, considering death from breast cancer as the primary event and deaths from other causes as the competing risk while adjusting for covariates.

Findings

Cases were 1,346 women with preexisting SMI and incident breast cancer over a two-year period. After adjusting for covariates, cases had less intensive but more invasive care with lower odds to undergo the main diagnostic tests, lumpectomy, adjuvant chemotherapy and radiotherapy as well as hormone therapy, but higher odds for mastectomy than their controls. Suboptimal quality in cancer pathways was observed for both groups, but to a higher extent for cases, especially for not receiving timely care after diagnosis and post-treatment follow-up. Breast cancer mortality, considering competing risks of deaths, was significantly elevated in women with SMI (aHR=1.39; 95%CI: 1.03-1.87).

Conclusions and implications for policy and practice

These findings highlight disparities in cancer care pathways for individuals with SMI as well as specific aspects of the care continuum (such as diagnostic processes) which could benefit from targeted multi-faceted interventions to reach equity of outcomes, in particular in terms of mortality. Providing increased quality of care for the SMI population group indeed has the potential to make up for some of the structural health inequities they face throughout their life.

The Impact of Miscarriage on Self-Harm and Mental Health Outcomes Among First-Time Pregnant Women: Evidence from a UK Linkage Study

PRESENTER: **Corneliu Bolbocean**, University of Oxford
AUTHOR: Stavros Petrou

Background: There are no previous reports in the literature on the relationship between miscarriage and self-harm outcomes, defined as any act of intentional self-injury or poisoning regardless of suicidal intent. Furthermore, the effect of miscarriage on mental health outcomes or psychiatric disorders is not well understood.

Objective(s): To estimate the impact of the first known miscarriage on short, medium and long-term mental health and self-harm outcomes using linked, routinely collected health records from over 600 general practices in the UK.

Data and Methods: In a random sample of 1.2 million women, we identified all first pregnancies in the UK between 1 January 2004 and 31 December 2017 using linked primary care and hospital records. Each first pregnancy was categorized into two mutually-exclusive groups: miscarriage vs continued pregnancy using robust medical definitions (ICD-10 and Read codes). Women with histories of self-harm, mental health or psychotropic medication were excluded from the study population.

We exploited the biological fact that up to 80% of all miscarriages are caused by random, non-viable chromosomal anomalies which implies that the first pregnancy that ends in miscarriage is largely an exogenous shock to fertility. We used selection on observables methods (logistic regression, the augmented-inverse probability weighting estimator, and coarsened matching) to estimate treatment effects and odds ratios. As a sensitivity analysis, we utilised entropy matching and provided bounds for the effect using a partial identification approach proposed by Oster. Disparities by socioeconomic status (measured using the Townsend Index of Socioeconomic Deprivation) were quantified using the Wagstaff and Erreygers concentration indices.

Results: Preliminary results show that miscarriage was associated with a significantly increased odds of self-harm (adjusted odds ratio 2.31), depression (adjusted odds ratio 1.54), anxiety (adjusted odds ratio 1.42), post-traumatic stress disorder (adjusted odds ratio 1.15) and use of psychotropic medication (adjusted odds ratio 1.12) at 6 months follow-up. These effects typically did not persist longer than a

year's follow-up after the first pregnancy. Adverse effects after 1 year follow-up from the first miscarriage are likely masked by the higher incidence of postpartum adverse outcomes in the comparator group or may be related to subsequent fertility outcomes of miscarrying women. The effects of miscarriage on the outcomes considered were not distributed equally across the socioeconomic deprivation measure. Specifically, women from least deprived area were less likely to experience adverse outcomes compared to women from more deprived areas. Miscarriage was also found to increase the total count of outcomes considered up to 1 year, particularly among women from more deprived areas.

Conclusions: Miscarriage is associated with increased odds of self-harm, depression, anxiety, post-traumatic stress disorder, and antidepressant use up to one year. The implications are especially important for pregnant women who face barriers to equitable health care further endangering women that face high pregnancy-related morbidity and mortality. Exploring the impact of miscarriage on socioeconomic outcomes is potentially a fruitful direction for future research.

1:30 PM –3:00 PM   WEDNESDAY   [Economic Evaluation Of Health And Care Interventions]

Cape Town International Convention Centre | CTICC 2 – Nerina
The Impact of Nurse Home Visiting – from Infants and Children to Elderly

MODERATOR: **Helene Könnecke**, Institute for Health Economics and Clinical Epidemiology, University Hospital of Cologne

ORGANIZER: **Anica Kramer**, University of Bamberg

Estimating the Impact of the Family Nurse Partnership Home Visiting Programme on Early Maternal Investments and Child Development in England
PRESENTER: **Gabriella Conti**, Department of Economics and Social Research Institute, University College London
AUTHOR: Andrea Salvati

A growing body of research suggests that inequalities in the quantity and quality of parental investments during the first 1000 days of life are a major determinant of early gaps in human capital development. In the attempt of narrowing these gaps, a growing number of home visiting programmes have been established worldwide with the goal of fostering the home environment and improving parental skills and behaviours. In this paper, we use data from a randomised controlled trial called Building Blocks to evaluate the short- and long-term impact of the Family Nurse Partnership (FNP) home visiting programme on children's and mothers' outcomes in England. Originally developed in the USA as Nurse Family Partnership (NFP), FNP involves up to 64 structured home visits to young first-time mothers performed by trained family nurses from early pregnancy until the child's second birthday. Starting from 2007, an adaptation of the programme was implemented in England.

We set out to replicate the impact evaluation originally carried out by Robling et al. (2015, 2022) using a state-of-the-art machine learning approach which allows to estimate treatment effects along with a data-driven selection of control variables. We find that FNP had a positive and long-lasting effect on the cognitive and non-cognitive development of the child from toddlerhood until the age of 6. These effects are potentially generated by an improvement in the quality and quantity of parental investments. We find that mothers in the treatment group tend to have higher social support, higher self-efficacy, to be in better relationships, and to suffer less from the stress arising from their parental role. Treated mothers also display improved socio-economic outcomes, with higher rates of employment and education. Our results are consistent with the original findings of Robling et al. (2015, 2022).

While these results are suggestive, they are not enough to establish a cause-effect relationship between parental inputs and child outcomes. To this end, in the next steps of our project we plan to carry out a dynamic mediation analysis aimed at separately identifying the share of impact due to an improvement in maternal inputs (indirect effect) and the one due to other unobservable factors (direct effect). We also plan to develop and estimate a production function of child skill development to shed light on the dynamic relationships between maternal investments and child cognitive development.

The Impact of Qualified Nurses on Visits of Primary Care Physicians and Hospital Admissions
PRESENTER: **Anna Werbeck**, RWI - Leibniz Institute for Economic Research
AUTHOR: Dörte Heger

Demographic change is affecting rural regions beyond proportion. An ageing population with increasingly high care needs meets a rapid decline of primary care physicians in rural Germany. This shortage of general physicians increases the workload for remaining practitioners and at the same time puts at risk equal to access to care for the population.

The concept of expert nurses offers an approach to alleviate the burden of care. Expert nurses are nurses with additional formal education to provide them with more competencies. Those expert nurses are appointed with the aim of supporting primary care physicians and providing regular care and monitoring to older individuals with chronic conditions. An expert nurse could reduce the workload of primary physicians by offering services as regular blood sampling, blood pressure measurement and wound care. Moreover, through regular visits of the chronically ill patients, they can detect sudden decline of health and prevent deterioration by early intervention. Also,

in close exchange with the general practitioner, they are appointed to, expert nurses can monitor potentially problematic health developments and thus prevent premature hospital stays that mainly serve monitoring purposes. The current body of literature has found positive effects of home-based care management by nurse practitioners, including reductions in the utilization of health care services, increased quality of life and satisfaction with care.

In this project, we evaluate an intervention that is based on the provision of care by nurse experts. Specially trained nurse experts are linked to a general physicians practice. They provide regular visits and care (blood pressure measurement, blood sampling etc.) to chronically ill patients for a treatment period of six months. The intervention is evaluated using primary data that is collected using an electronic patient file. Subjective measures such as life quality are evaluated as outcome variables pre and post treatment. Additionally, physician visits as well as hospital stays are evaluated using administrative data. To measure the impact of this program, we use a difference in differences approach and use propensity score matching to create an adequate counterfactual.

What Works in (Nurse) Home Visiting? – A Systematic Review

PRESENTER: **Christiane Wuckel**, Leibniz-Institut fur Wirtschaftsforschung

Home-visiting programs are becoming increasingly popular worldwide and aim to tackle a range of challenges to the social fabric, economy, and health care financing system at the individual and regional level. The link between these challenges and aggregate outcomes mainly works via the acquisition of human capital and health, and scales up to worse outcomes in economic aggregates, such as economic development. At the individual level, unequal opportunities hinder the optimal allocation of production factors. At the regional level, rural, less populated regions face enormous challenges in providing an adequate level of health care services to a growing share of elderly with chronic diseases and concurrent cost-benefit issues. The existing evidence focuses mainly on education, health and labor market outcomes at the individual level; whereby the utilization of health care services and quality of life are central outcomes for the health care system and at the regional level. Even though home-visiting programs became that popular, our knowledge on "what works" of these kinds of interventions, is scarce. Against this background, we aim to provide a systematic review on the effectiveness of these interventions.

We review all Randomized Controlled Trials (RCTs) on home visiting programs that have been published in leading (ranked Top 50) economic journals since 2010. We focus on home visiting programs that have been set up for disadvantaged families and the elderly. We summarize the average treatment effects from these studies and classify the estimates by i) type of home visit/intervention, ii) providers and recipients of home visits, iii) main outcomes, iv) treatment intensity, and v) socio-demographic groups. We distinguish between different three post-intervention time horizons (short, medium and long-term).

In conducting this systematic review, we follow Duflo et al (2008) and identify four potential threats to the identification of treatment effects of these home visits. In detail, we discuss these studies with respect to i) Hawthorne and John-Henry effect, ii) general equilibrium effects and, if the intervention uses treated units later on to deliver the content of the intervention in a staggered way to up-scale the RCT and to raise the benefits of the intervention, iii) specific sample problems and iv) special care.

The results and implications of this paper will contribute with respect to content – what works – and, the design and implementation of these different home visiting programs – potential threats to identification.

1:30 PM –3:00 PM   WEDNESDAY   [Cross-Cutting Themes And Other Issues]

Cape Town International Convention Centre | CTICC 2 – Daisy
Labour and labour force

MODERATOR: **Haruko Noguchi**, Waseda University

"Impact of International Cooperation for Health in Reducing Medical Brain Drain from Africa: Do the Main Channels Matter?"

PRESENTER: **Ruphin Tanoh Doua**, PhD Candidate at Felix Houphouet Boigny University

A growing literature has underlined the role of the inefficiency of health systems, including poor working conditions in the medical brain drain. However, little interest has been paid to evaluating policies aiming to strengthen health systems and to the channels through which these can retain medical workforce at home. This study investigates through which channels International Cooperation for Health reduces Medical Brain-Drain (MBD) from Africa. We use a new dataset documenting the flows of physicians' and nurses' Brain-Drain from 53 African countries, respectively, to 29 and 21 destination countries, and then, estimate a fixed effect and a standard gravity panel model of international migration, for the period 1995-2020. Medical Cooperation is approximated by using the Official Health Aid (OHA), the WHO global code of practice (WHO Code), and the Abuja Declaration of Public Health Financing (ACHF), which are three policy instruments implemented to strengthen health systems and improve health outcomes in Africa. As main transmission channels, we focus on health infrastructure (number of hospital bed per 1000 people), HIV prevalence, and medical workforce' enrollment, generally targeted by these instruments of international medical cooperation. The research anticipates three main empirical findings. First, OHA has a direct and an indirect reducing effect on MBD. Its indirect effect goes through health infrastructure, with a more pronounced effect

on nurses' emigration. Second, the Abuja Commitment policy instrument reduces MBD directly and indirectly, through the channel of health infrastructure. Third, WHO Code does not reduce the MBD from Africa, even directly and indirectly, but when interacted with OHA and Abuja Commitment policy instrument (Public Health Financing), it plays a key role in their reducing effects on MBD, with a more pronounced effect on nurses' emigration. We recommend close medical cooperation in the implementation of public health policies within the framework of health assistance, the WHO code of practice and the Abuja policy instrument in the African countries most affected by the MBD. By alleviating the challenges of the local health system, through channels such as medical equipment, including health infrastructure, and the fight against HIV AIDS, this close cooperation can reduce the migration of health workers from Africa.

Management of Human Resources for Health: Implications for Health Systems Efficiency in Kenya

PRESENTER: **Lizah Nyawira Mwangi**, Kemri-Wellcome Trust Research Program

Background: Human resources for health consume a substantial share of healthcare resources and determine the efficiency and overall performance of health systems. Under Kenya's devolved governance, human resources for health are managed by county governments. The aim of this study was to examine how the management of human resources for health influences the efficiency of county health systems in Kenya.

Methods: We conducted a case study using a mixed methods approach in two purposively selected counties in Kenya. We collected data through in-depth interviews (n = 46) with national and county level HRH stakeholders, and document and secondary data reviews. We analyzed qualitative data using a thematic approach, and quantitative data using descriptive analysis.

Results: Human resources for health in the selected counties was inadequately financed and there were an insufficient number of health workers, which compromised the input mix of the health system. The scarcity of medical specialists led to inappropriate task shifting where nonspecialized staff took on the roles of specialists with potential undesired impacts on quality of care and health outcomes. The maldistribution of staff in favor of higher-level facilities led to unnecessary referrals to higher level (referral) hospitals and compromised quality of primary healthcare. Delayed salaries, non-harmonized contractual terms and incentives reduced the motivation of health workers. All of these effects are likely to have negative effects on health system efficiency.

Conclusions: Human resources for health management in counties in Kenya could be reformed with likely positive implications for county health system efficiency by increasing the level of funding, resolving funding flow challenges to address the delay of salaries, addressing skill mix challenges, prioritizing the allocation of health workers to lower-level facilities, harmonizing the contractual terms and incentives of health workers, and strengthening monitoring and supervision.

Budget Impact Analysis in the Change of Human Resources in the Budget of the Unified Health System (SUS)

PRESENTER: **Mariana Marzullo M Pedreira**, Ministério da Saúde
AUTHORS: Cássia Rebeca de Lima Souza, Ana Carolina Esteves da Silva Pereira, Alessandra Gaspar Sousa, Luciana Costa Xavier, Vitor Hugo Tocci Lima, Everton Macedo Silva

Background: The Unified Health System (SUS), especially after the Covid-19 pandemic, points to a series of challenges in the management of health professionals, such as low pay, professional demotivation, precarious employment relationships, and excessive working hours. Considering this context, several legislative proposals emerged to implement the minimum wage for health professionals, corroborating the appreciation of these professionals. The application of Budget Impact Analysis (BIA) to know the effects of changing the wages of human resources in the budget of health systems is still tenuous. Although there is an international effort for structural inclusion, this methodology is being used more commonly in cases of incorporation of new technologies and medical devices. Thus, the present study aims at using the BIA to establish the necessary budget considering the implementation of the minimum wage for health professionals, more specifically the Nursing class, providing financial support for the decision-making process, contributing to a better allocation of resources and decisions for the society.

Methods: The methodology begins with the characterization of nursing class occupations through the Brazilian Classification of Occupations (acronym in Portuguese CBO 2002). This design directs the extraction of information on income and the number of hours worked by these professionals in the Annual Social Information Report (acronym in Portuguese RAIS). A workday of 40 hours per week was considered, with a income of R$ 4,750.00 for the Nurse, 70% of the value for the Nursing Technician, and 50% of the value for the Nursing Assistant and Midwife. The calculation of the estimated budgetary impact also considered the perspective of the public and private sectors.

Results: The incremental budgetary impact, referring to 2019, was estimated at over R$ 22,5 billion, where R$ 14,4 billion of this impact is related to the Public Sector. Concerning each category analyzed, for the category of Nurses, the estimated incremental budgetary impact was R$ 5,6 billion; for the category of Nursing Technicians, the estimated budgetary impact was R$ 14,8 billion; and for the Nursing Assistants and Midwives category, the estimated budgetary impact was R$ 2 billion. In occupational terms, the nursing technician category has greater weight in the budget impact.

Conclusions and implications: Because of the information on the budget impact estimate for establishing the minimum wage for the Nursing class presented, there are no questions about the merits of the proposal. However, given the budget projections presented about professionals from the public sector and the private sector, it is understood that the adoption of the minimum wage for nursing categories will reach the public budget of the Health Sector in the magnitude of tens of billions of Reais in the coming years, configuring a high

financial impact for the public sector. In this way, the BIA fulfills its role of constituting a fundamental tool to assist managers in decision-making process, presenting the budget forecast in a defined time interval.

Children's Health and Household Labor Decisions

PRESENTER: **Boriana Miloucheva**, Princeton University
AUTHORS: Michael Stepner, Sung-Hee Jeon

All families with children make decisions about how to allocate their time between work and caregiving activities, but these choices can be upended by childhood health shocks. Severe illness during childhood typically generates both expenses and caregiving needs, which simultaneously increase the marginal value of consumption and the marginal cost of labor.

This paper examines how household labor supply responds to the hospitalization of a child, and how these responses differ by gender and socioeconomic status. Using administrative data linking Canadian hospital records, tax records and Census records between 1998 and 2018, we study the responses to over fifty thousand childhood hospitalization events in an event study framework. This rich administrative data allows us to understand parental responses at both the intensive and extensive margins, capturing both employment status and earnings changes.

Average household earnings fall significantly in the year after a child is hospitalized, and do not fully recover in the subsequent five years. The average results mask substantial heterogeneity by gender and socioeconomic status. Mothers are more likely to exit the labor force than fathers: children's health shocks have no long-term effect on the average earnings or work status of fathers. The long-term decline in average household earnings is therefore entirely explained by women's labor supply, consistent with prior evidence from Denmark. Women without a university degree and those with lower earnings prior to a child's health shock experience larger relative declines in earnings.

We unpack the role of gender in household decision-making by examining how labor supply responds to a child's health shock among opposite-gender parents, and how their responses vary with prior labor supply. In households where both parents work and men's and women's earnings are perfectly substitutable, a unitary model of household labor supply would predict that the parent with lower earnings potential would reduce their labor supply to provide increased caregiving. Yet we observe that mothers are more likely to exit the labor force and reduce their earnings than fathers independent of prior earnings, even in households where the mother was the primary earner prior to the child's health shock.

Our findings contribute to the literature demonstrating how gender preferences within household decision-making constrain women's labor supply. Prior research identifies bunching in women's earnings below 50% of household earnings, demonstrating that many households observe a norm against women as primary earners. We show that even in households where women do become the primary earner, mothers retain greater residual earnings risk from the health shocks of their children. Overall, these findings document how the "motherhood penalty" applies to higher moments of the earnings distribution: mothers not only earn lower average wages, they also bear greater earnings risk.

Psychological Distress and Productivity Loss in an Australian Cohort of Working People: Evidence from the Nationally Representative Longitudinal Population Survey

PRESENTER: **Syed Afroz Keramat**, Khulna University
AUTHORS: Kabir Ahmad, Rabeya Basri

Abstract

Background: Psychological distress describes unpleasant emotions resulting from depression and anxiety. It determines the level of mental health and well-being of an individual. It is anticipated that the economic burden associated with mental health disorders would be roughly $6 trillion per year by 2030 globally. Most of these costs are indirect costs due to productivity losses. It is crucial to understand how psychological distress results in productivity losses. We aim to investigate the relationship between psychological distress and productivity loss in the Australian employed population.

Methods: We utilized seven waves of the Household, Income, and Labour Dynamics in Australia (HILDA) Survey (waves 7, 9, 11, 13, 15, 17, and 19). We have compiled an unbalanced panel data set containing 60,953 person-year observations from 17,731 individuals. We employed longitudinal random-effects negative binomial regression and random-effects logistic regression models to investigate the between-person differences in the relationship between psychological distress and productivity losses (absenteeism, presenteeism, and underemployment).

Results: We found that moderate and high psychological distress were associated with a higher rate of absenteeism, presenteeism, and underemployment compared to peers with low psychological distress. Our findings suggest that moderate (IRR: 1.12, 95% CI: 1.07-1.16) and high (IRR: 1.11, 95% CI: 1.06-1.16) psychological distress were associated with a higher rate of work absenteeism compared to peers with low psychological distress. We also found that employees with moderate (OR: 7.61, 95% CI: 7.08-8.17) and high (OR: 39.23, 95% CI: 35.79-43.01) psychological distress were more likely to report presenteeism than those with low psychological distress. Similarly, our results demonstrated that the likelihood of underemployment is considerably higher among employees with moderate (OR:

1.17, 95% CI: 1.07-1.29) and high (OR: 1.50, 95% CI: 1.35-1.67) psychological distress compared to their counterparts with low psychological distress after considering for several socio-demographic, health, and employment-related factors.

Conclusion: We found that presence of psychological distress had a negative impact on workers' job productivity in terms of increased absenteeism, a higher risk of presenteeism, and more underemployment. Our findings have important policy implications. We suggest workplace health promotion to manage the psychological distress of the workers. We also suggest em*ployee-friendly practices* to minimize productivity loss at work.

Keywords: Psychological distress, productivity loss, absenteeism, presenteeism, underemployment, Australia

Teaching Health Economics in Latin American Countries: A Cross-Sectional Survey

PRESENTER: **Elizabeth Pitney Seidler**, Regis College

The aim of the study is to gain an up to date picture of current health economics teaching capacity and outputs in Latin American Countries (LACs) to inform policy. This knowledge will facilitate discussion and support strategic planning about how to ensure LACs have sufficient health economics skills and knowledge to achieve health policy goals and reforms that seek to increase access, equity and financial protection. The study aim will be achieved by collating and documenting information about available health economic courses in LACs in an Excel database. This study parallels the design and uses the same survey questions as that utilized in the 2021 Congress presentation: "Teaching health economics in sub-Saharan Africa: a cross-sectional survey" with that presenter's approval and consent. This ensures a level of comparability across studies.

The survey has been created in English and translated to South American Spanish by a Chilean colleague in the field of Public Health. The survey will be sent to Program Directors, Deans, and instructors who teach or oversee post-graduate level courses in Health Economics (with various programs such as Health Administration) in Latin American countries including the South American continent, Central America, and select Caribbean countries. The survey is scheduled to be distributed and completed by February 15.

A critical mass of individuals with basic skills and knowledge in health economics working at the local country level is a necessary requirement for countries seeking to make the sustainable health system reforms mentioned above. The current supply of health economists in LAC region will be investigated to inform policy for creating capacity in this region.

Health economics is not the only skill and knowledge set required for establishing and maintaining policy and institutional processes in support of reforms such as Universal Health Care, but the local knowledge of concepts including economic theory as applied to health and health care, economic evaluation, and applied microeconomics in health and health economics research methods is a necessary element.

Some training and external advisement is a necessary element of capacity strengthening for those currently in key policy positions, but without a pipeline of local health economists with substantive formal education, many LAC countries could be indefinitely dependent on external technical assistance for essential inputs to health policy reform and performance. This could have significant implications for the achievement and resilience of reforms in LACs if there is an inconsistent supply of expertise, and therefore limit the incorporation of a country's unique history, culture and social perceptions of health and health care when considering critical issues and fundamental health economics concepts, such as resource allocation, risk pooling and cross-subsidization, equity, incentives and prioritization.

A complete picture of the capacity of teaching health economics to inform policy is essential to supporting the goals of reform.

1:30 PM – 3:00 PM   WEDNESDAY   [Economic Evaluation Of Health And Care Interventions]

Cape Town International Convention Centre | CTICC 2 – Protea

Promoting Healthy Longevity By Incorporating Non-Health Outcomes into Policy Research: Methodological Innovations

MODERATOR: **Sameera Maziad Al Tuwaijri**, The World Bank Group

ORGANIZER: **Gisela Garcia**, The World Bank Group

DISCUSSANT: **John Ele-Ojo Ataguba**, University of Manitoba; **Magnus Lindelow**, The World Bank Group

The Economic Burden of Disease – Monetizing the Benefits of Preventing Avoidable Mortality

PRESENTER: **Angela Chang**, Danish Institute for Advanced Study

We estimated the economic value of avoidable mortality by world regions, sex, and age, between 2000 and 2019, with projection to 2040 using two novel methods. First, we took the frontier approach to compute avoidable mortality by identifying the lowest observed or projected mortality rate and set it as the frontier for each age group and year. We defined avoidable mortality as the difference between current and the frontier mortality levels for each country, age, sex, and year. Second, the economic value of avoidable mortality in a

given year is defined as the proportion of annual income one is willing to forgo to live that year at the frontier survival probabilities. We adopted the value per statistical life approach and used a logarithmic function to account for the effect of large risk changes and model the nonlinear trade-off relationship between income and risk reduction.

Avoidable mortality as percentage of total mortality was about 73% in 2019. Globally, more avoidable deaths occurred in older adults than children, adolescents or younger adults. The economic value of avoidable mortality globally in 2019 was 24% of annual income, and the values are unevenly distributed among different age groups. Infants and the elderly account for a proportion of the total value that is larger than their population weights. For example, globally, ages of 60 and above account for about 34% of the total value despite representing 13% of the population.

Previous literature on estimating amenable or preventable mortality that use list-based approaches exclude deaths among age 70 or 75 and above. In comparison, our approach estimates avoidable deaths in all age groups. For example, using a list-based approach, OECD found that more than a quarter of deaths in OECD countries—mainly high-income countries with high-quality cause-of-death information—were avoidable in 2019. In our analysis, we found that 46% of deaths in high-income countries were avoidable in 2019, with half of avoidable deaths occurring in ages 75 and over. Thus, our analysis demonstrates that exclusion of avoidable deaths in older adults results in a substantial undercount of overall avoidable mortality.

Our results also highlight the need to adjust the VSL for large risk change. Existing global health literature seldom considers the issues associated with using linear approximation when extrapolating values with larger mortality changes. In our work, we find that linear extrapolation yields a value that is on average 56% higher than estimates using a logarithmic value of income function. For certain age groups in countries with high avoidable mortality rates, linear extrapolation results in values that are nearly ten times larger than our estimates. The logarithmic approach also ensures that valuation of mortality reduction does not exceed resource constraints, and we believe future research should consider adopting this method.

As governments worldwide engage in policy dialogues on how and how much to invest in improving population health, our work provides supportive evidence on the high economic value placed on improving health, even when considering resource constraints.

The Economic Value Associated with Avoidable Mortality Due to NCDs and Injuries

PRESENTER: **Stephane Verguet**, Harvard University

With rapidly ageing populations, national health systems must set difficult priorities toward improving the healthy longevity of their populations, as financial resources are severely constrained. We quantified avoidable mortality from major non-communicable diseases (NCDs) and injuries and assigned an economic value to this avoidable mortality by cause of death for the time period 2019-2040.

We used the World Health Organization's Global Health Estimates for the years 2000-2019 for an exhaustive set of 25 causes of death including major NCDs and injuries, along with the United Nations 2019 World Population Prospects population estimates, and the World Bank's World Development Indicators. First, we quantified avoidable mortality, that is the difference between lowest-achieved mortality frontiers (the 10th percentile of age-specific mortality rates) and observed or projected mortality trajectories, for each cause of death, for the period 2010-2040 for six large world regions: China; India; High-income; Eurasia & the Mediterranean; Latin America & the Caribbean; and sub-Saharan Africa. Second, we applied value of a statistical life approaches to systematically assign an economic value to these estimates of avoidable mortality by cause of death, world region, and calendar year. This economic value of avoidable mortality by cause of death captures the percent of income an individual would be willing to pay to live one year under the lowest possible mortality rate for a given cause of death.

We show that the welfare implications of preventing and controlling NCDs and injuries would be substantial, in particular for cardiovascular diseases (CVD), cancers, and injuries with some variations depending on the setting and sex. For example, the economic value associated with CVD was high in all six regions for both females and males; while for injuries it was especially high among males in Latin America & the Caribbean and sub-Saharan Africa.

As a result, we are able to provide a systematic monetary assessment of the welfare losses associated with elevated NCD and injury mortality globally and regionally, which enables the derivation of an economic metric directly comparable to annual incomes (e.g., gross national income) and annual budgetary allocations, so as to enable both health sector and multisectoral priority setting.

Unpaid Caregiving for Non-Communicable Diseases: Accounting for the Essential, Yet Ignored Value of Women's Time.

PRESENTER: **Beverley Essue**, University of Toronto

The dual paid and unpaid roles that women play supporting and promoting the health of others are essential for maintaining healthy populations and ensure the sustainability of healthcare systems. But, women's contributions to health remain undervalued in part, because much of this time is unpaid and underrecognized formally. This is despite the criticality of unpaid caregiving in supporting non-communicable disease (NCD) management and control, especially in low and middle-income (LMICs) countries where there have been inadequate investments in NCD control. Promoting healthy longevity requires recognition and valuation of unpaid health work to redress gender inequities in health systems while also supporting more comprehensive and accurate NCD investment cases. This paper

will present estimates of the value of unpaid caregiving, including NCD-related care, and critique the approaches used to account for unpaid work in conventional economic evaluation approaches.

We used the methodological approach developed for the Lancet Commission on Women and Health (Langer 2015). Total hours per week spent doing unpaid health care, health-related and health-promoting work were identified using Time Use Survey data from 50 countries. The value of unpaid work was estimated as the replacement value (i.e. average wage of the population). The gender gap in income was estimated using male wages. The value of unpaid work was estimated for individual countries and projected to regional and global estimates and sensitivity analyses tested the robustness of the estimates. The value of NCD-related caregiving was estimated from country-level population estimates of NCD burden and data on caregiving demand from the literature. A structured scoping review (in MEDLINE, SCOPUS, EMBASE and Web of Science) identified approaches for accounting for gender and unpaid work in economic evaluations, including of NCD interventions, following PRISMA guidelines. A narrative synthesis critiqued the strengthes and weaknesses of the approaches.

Women consistently spend more hours per week than men doing unpaid caregiving. Women's work accounts for a substantial share of the total value of unpaid health care and caregiving. But, approximately 20% of this value reflects gender differentials in the wages that should be associated with this work, with a much larger gender gap estimated for LMICs. The value of NCD-related caregiving will be presented. From the literature review, a list of evidence-informed recommendations will be presented to guide future practce.

Unpaid health care and caregiving is unaccounted for, unrecognized and deprofessionalized and continues to provide a precarious and fragile foundation for global health and for the development of health systems. To redress this gender inequity, there are opportunities to better account for the value and benefits of unpaid caregiving, and the women who perform it, to ensure that health system strengthening and health longevity agendas also advance gender equity.

Incorporating Non-Health Outcomes into Health Benefits Package Design in Low- and Middle-Income (LMICs) Countries

PRESENTER: **David Watkins**, University of Washington

WHO (2014) recommends that the design of health benefits packages (HBPs) for universal health coverage systems include considerations of equity and financial protection alongside conventional cost-effectiveness analysis (CEA); however, worked examples of this approach are lacking. In this paper, we demonstrate how to explicitly include these two additional considerations alongside CEA in HBP design.

Using noncommunicable disease (NCD) prevention and control as a motivating case for HBP priority setting, we analyze the costs and consequences of 30 complementary interventions for NCDs, including 24 clinical interventions (e.g., cervical cancer treatment) and 6 intersectoral policies (e.g., tobacco taxes). (We defined NCDs broadly to include mental disorders as well as other NCDs like digestive disorders that are amenable to surgery.) Our analysis used epidemiological, demographic, and cost data from 123 LMICs countries. Cost-effectiveness findings were based on our previous modeling studies and were presented as costs per disability-adjusted life-year (DALY) averted. To assess the equity and financial protection properties of each intervention, we developed semi-quantitative (ordinal) measures based on the characteristics of the disease(s) targeted by an intervention and its out-of-pocket cost in the absence of public finance (respectively). We then designed an algorithm to create a short list of interventions in each country that were highly cost-effective and/or were especially attractive on equity or financial protection grounds. We compared the findings for the entire package of 30 interventions and for the locally-defined short list of high-priority interventions.

We found that scaling up the entire NCD package (n = 30) to 80% coverage in all 123 countries over 2023-2030 would require about 40% of projected annual government expenditure on health by 2030. While most interventions were reasonably cost-effective in most settings, only about half had incremental cost-effectiveness ratios of <0.5x GDP per capita. Equity did not appear to be an influential criterion, since the most equity-enhancing interventions were also highly cost-effective. However, the incorporation of financial protection substantially influenced the short list of high-priority interventions, with some less-cost-effective interventions (e.g., advanced treatment for heart attacks; comprehensive diabetes care) being included because of their financial protection benefits. This prioritization to a shorter list of interventions would reduce the cost of the NCD package to about 18% of projected annual government expenditure on health by 2030 and would improve its aggregate cost-effectiveness from US$ 2000 to US$ 800 per DALY averted.

Our semi-quantitative approach to appraising interventions in equity and financial protection terms takes important steps towards the WHO recommendations and provides a practical approach to HBP design in settings where local data are limited. Our preliminary findings underscore the need to consider financial protection in health technology assessments and HBP reforms, even in low-income countries. We note that our findings may be peculiar to NCDs; e.g., equity may become more relevant when comparing interventions that address NCDs vs. communicable diseases. We are currently working on quantitative modeling approaches that integrate CEA, equity, and financial protection assessments within one analytical framework.

Cape Town International Convention Centre | CTICC 1 – Room 2.43

Strengthening Health Economics Methods and Capacity for Projecting Costs in National Strategic Plans for HIV and Beyond

MODERATOR: **Gesine Meyer-Rath**, Health Economics and Epidemiology Research Office (HE2RO), Boston University and the University of the Witwatersrand

ORGANIZER: **Fern Terris-Prestholt**, UNAIDS

DISCUSSANT: **Yogan Pillay**, Clinton Health Access Initiative; **Steve Cohen**, genesis analytics

Review of Costing Methods in National HIV Strategic Planning Documents

PRESENTER: **Kathleen McGee**, London School of Hygiene & Tropical Medicine (LSHTM)
AUTHORS: Iris Semini, Paul Revill, Charles Birungi, Erik Lamontagne, Gesine Meyer-Rath, Charlotte Muheki, Carl Schutte, Anna Yakusik, Teresa Guthrie, Melissa Sobers, Shufang Zhang, Fern Terris-Prestholt

Background: Stagnating HIV funding means efficient resource allocation and utilization is increasingly vital to an effective and sustainable HIV response. Strategic planning documents (SPDs) including Investment Cases, National Strategic Plans (NSPs), and their respective resource-needs estimates, are central to this aim. This study reviews SPD costing methods to identify common methodological strengths, weaknesses, and gaps.

Methods: Costed SPDs from nine countries for the years 2017-2027 were reviewed using purposive sampling. Unit costs were extracted and evaluated for transparency and validity using an adaptation of the Global Health Cost Consortium principles. SPD narratives, their costings, and all primary data sources retrieved and compared to evaluate alignment in scope and for appropriate adaptation to country settings. The review was shared with a broad set of stakeholders to design the scope of the analysis, the data extraction template, the analyses and interpretation of findings.

Results: Across all SPD costings, 426 unit costs were extracted, categorized and compared with SPD narratives and primary source data. Costs were collected and adapted from existing unit cost estimates in the literature (n=70, 16%), estimated using ingredients-based costing (n=244, 57%) (IBC), valued as a lumpsum (n=57, 13%), as a proportion of direct costs (n=19, 4%), or using an unstated methodology (n=36, 8%). When cited literature sources were accessible (n=50, 50%), 66% of corresponding estimates were found, of which half matched in scope. When examining peer-reviewed sources, primary cost literature was found to be robust for prevention interventions, testing and treatment and sparse for the remaining four service areas (prevention of mother to child transmission, integrated health, societal enablers, and program support functions). Of the 44 unit costs estimated from IBC, 37% were presented with itemized inputs. Of all the interventions listed in NSPs, 89% (n=256) were accounted for in their respective costings. Among these, 63% of estimates aligned with the NSP description of the intervention, while 8% did not match, and 29% provided insufficient detail to appraise scope match. Discussion with stakeholders highlighted challenges faced by costing teams, often working in parallel with the Epidemiologists teams, that analyses are often conducted without a completed interventions plan and on very short timeframes.

Conclusion: This review demonstrates an opportunity to improve costing methodologies as well as costing reporting standards for national HIV planning documents. Many of the methodological issues found across SPD costings result from poor coordination between SPD stakeholders, little support for costing teams, and insufficient reporting standards. An NSP costing guidance and a reporting checklist have been developed based on review findings to support improved national planning and budgeting and promote transparency.

New Guidelines for Costing HIV National Strategic Plans

PRESENTER: **Fern Terris-Prestholt**, United Nations Joint Programme on HIV/AIDS (UNAIDS)
AUTHORS: Kathleen McGee, Stephen C Resch, Joseph Corlis, Steven Forsythe, Gesine Meyer-Rath, Shufang Zhang, Steve Kubenga Banza, Erik Lamontagne, Anna Yakusik, Steve Cohen, Carl Schutte, Teresa Guthrie, Charlotte Muheki
Background:

To guide and optimize disease programs, many low- and middle-income countries develop National Strategic Plans (NSPs). The NSP development process includes: interpreting recent expenditure tracking results; epidemiological impact modelling; cost-effectiveness modelling to optimize resource allocations; analysis of the funding landscape for HIV and the health sector; and projection of costs for NSP interventions. The cost projections, depending on each country's agenda, may be used to inform resource mobilization strategies, donor funding requests, budget reprioritization and re-alignments, sustainability assessments and sectoral and sub-national budget planning.

While multiple costing guidelines and models exist to project NSP costs, there is no global guidance on how to generate the cost inputs for these models, specifically, within a constrained time period, on how to adapt existing cost estimates, construct new estimates, and formatted these appropriately to fit into resource needs models to project national costs. This lack of standardized guidance and training

tools results inconsistent quality of development of costs and evaluation of their quality difficult and creates barriers to national costing capacity building.

Methods:

Following review of nine costed NSPs, and practical experience projecting NSP costs and input from key practitioners and stakeholders, we identified the key issues that the guidelines needed to addressed. A systematic review of costing guidelines informed the guideline structure. A technical working group (TWG) was convened to facilitate feedback from global and national costing practitioners. Draft guidelines were put online to elicit further feedback and buy-in beyond the TWGs usual networks. The NSP cost reporting checklist was piloted in selected countries, then the full NSP guidelines were shared with experts to pilot with national HIV authorities in three countries. Finally, feedback from these applications informed the guidelines' finalization.

Results:

With broad consultation, a guideline for projecting costs for NSPs was drafted, piloted, refined, finalized and adopted. The guideline aims to build or strengthen national costing experts' skills to work harmoniously with the NSP team to define the purpose and scope of the exercise at the outset. Three broad cost projection methods were identified: 1. adaptation of existing unit cost estimates, 2. construction of new unit costs, 3. estimation of national fixed costs. The final section explains how to run scenarios for uncertainty and efficiency analyses, and prepare cost as inputs national cost projection models. The tools and templates provided, including the transparent reporting checklist, support analyses to be routinely submitted to a public repository for review and future use. Worked examples show specific applications in HIV and are presented in textboxes to facilitate adaptation to other health sector applications.

Conclusion:

A comprehensive HIV NSP costing guideline was developed with national and international experts that provides methods, tools and best practices to develop high quality and country-relevant cost projections for HIV and potentially other disease programs. These guidelines should support improved quality of the cost data utilized in NSPs, build capacity in costing within the low- and middle-income countries and allow for the development of a transparent, national database of costs for future use.

A Roadmap for Strengthening Capacity of HIV Organizations to Analyze Cost and Efficiency for Strategic Planning and Program Management

PRESENTER: **Joseph Corlis**, Harvard University
AUTHORS: Nathan Isaacs, Grace Chen, Daniel Mwai, Mariana Posse, Robert Hecht, Stephen C Resch

Background:

As bilateral and multilateral donors transition the role of funding HIV programs to the governments of middle-income countries, the capacity of those country governments to calculate resource needs during program planning becomes critical. Policy and implementation decisions depend on accurate cost information when the time comes to mobilize resources and deliver services. Yet many countries face challenges in quantifying the costs of future programs, ensuring that cost data are accurate and accessible, and optimizing planned activities for cost-effectiveness and technical efficiency.

Methods:

Between 2018 and 2021, we supported HIV costing activities for national planning (Tanzania, Zimbabwe and Mozambique) and conducted assessments of the local capacity and practices for generating and using cost analyses in strategic decision-making (South Africa, Kenya, Zimbabwe, and Mozambique). Informed by these experiences, we developed a toolkit ("Roadmap for Implementing Change in Costing Capacity and Practices") to help countries respond to such challenges, covering three main dimensions of costing capacity and practices: data & tools, knowledge & skills, and processes & governance (see Figure). We adapted Kotter's 8-Step Process for Leading Change to the purpose of improving an organizations' capacity to conduct and use cost analysis for strategic planning and program management—from diagnosing weaknesses and creating a sense of urgency, to removing barriers to success and sustaining long-term changes.

Results:

The Roadmap is organized to achieve the following three objectives. First, to identify the necessary components of a well-functioning costing "ecosystem" that can consistently and efficiently generate cost analysis to support planning and management decisions. In doing so, the Roadmap helps users visualize a long-run goal of organizational change efforts. Second, to provide guidance on assessing the costing capacities, practices, and resources that exist within a country or organization. The Roadmap includes questionnaire templates to facilitate review of the current costing ecosystem in order to get a clear picture of existing strengths and weaknesses that need attention. Third, to facilitate the creation of action plans for making incremental improvements in the costing ecosystem. We included country examples and customizable templates to help with implementation.

Conclusion:

Our work revealed the array of challenges that countries face in using financial information to plan, analyze, optimize, monitor, and sustain HIV programs. In most settings, data related to the cost of specific interventions are not regularly generated. Where data does exist, the ability to analyze and use it in decision-making is often constrained by technical capacity issues such as a limited number of personnel with technical expertise in costing and process challenges such as organizational barriers limiting access to data, short timeframes for costing exercises, lack of requirements for consistent methods and documentation. By following the Roadmap to implementing change, organizations responsible for planning and managing HIV programs will be able to incrementally strengthen their capacity to conduct cost and efficiency analysis and make more informed strategic decisions.

Lessons Learned from the Costing of Mozambique's 5th National Strategic Plan for HIV

PRESENTER: **Makini Boothe**, United Nations Joint Programme on HIV/AIDS (UNAIDS)
AUTHORS: Joseph Corlis, Jacinto Manuel Mutimucuio, Lourena Manembe, Stephen C Resch

Background: While early versions of national strategic plans (NSPs) for HIV seldom contained cost information, today's NSPs typically include some cost analysis used for resource mobilization. Increasingly, bilateral and multilateral donors have called for more rigorous cost analysis in strategic planning to enable the prioritization of HIV interventions based on efficiency and sustainability. Despite these calls, many NSPs are still developed as strategies first and budgets second. As the next generation of NSPs are created, costing experts have an opportunity to further integrate costing exercises into decision-making processes that underpin NSP development.

Methods: We present lessons learned during the costing of Mozambique's NSP for HIV Response, 2021-2025, which we conducted between June 2020 and March 2021. The aims of this project were to: (1) generate budget projections for Mozambique's NSP, and (2) inform future NSP development by documenting problems that arose and solutions implemented while completing the costing.

Results: Five major lessons learned emerged. Lesson 1: A significant amount of engagement is necessary between the costing expert and other NSP creators, in particular the epidemiology and monitoring and evaluation contributors, throughout the NSP development process. This engagement proves especially critical when NSP development is conducted remotely (as was the case during COVID-19). Lesson 2: Conducting the NSP's cost analysis in parallel with strategy development allows the strategy to be informed by cost considerations. Lesson 3: Conducting cost projections for interventions under both aspirational and constrained budget scenarios is likely to increase the real-world applicability of the NSP over time versus a single set of cost projections. Our cost scenarios included: (1) continuation of current intervention coverage at a fixed rate of inflation, (2) funding to achieve the global UNAIDS 95-95-95 targets by 2030, (3) increased funding for fast-track programming toward UNAIDS's 95-95-95 targets and reducing HIV-related mortality by 50% by 2025, and (4) resources constrained to a modest increase in domestic funding and no increase in external funding. Scenario 1 served as the baseline for all target and cost comparisons in the NSP. Lesson 4: When making strategic decisions to prioritize interventions based on efficiency, a time horizon longer than the NSP's scope should be considered. When we analyzed allocative efficiency for Mozambique's NSP using only a 5-year time horizon, our models prioritized interventions that quickly reduced HIV incidence or mortality. Other interventions, which may achieve a greater reduction in long-term incidence or mortality, but whose effects take longer to manifest (e.g., voluntary medical male circumcision for males aged <15 years), were generally underprioritized. Lesson 5: Full transparency of the documentation and assumptions underpinning the NSP cost calculations can help foster trust in the NSP and facilitate updates in light of shifts in priorities or available resources.

Conclusion: While no two countries are exactly alike, the lessons learned in Mozambique should translate to actionable steps that costing contributors in other countries can take during the development of NSPs for HIV and other disease areas. These steps should help to improve the quality, credibility, and usefulness of the NSP's cost projections.

1:30 PM –3:00 PM   WEDNESDAY   [Economic Evaluation Of Health And Care Interventions]

Cape Town International Convention Centre | CTICC 2 – Freesia
Economic Evaluation of Infectious Diseases

MODERATOR: **Katharina Hauck**, Imperial College London

Economic Evaluation of the Cost-Effectiveness of the HIV Test and Treat Programs in South Africa

PRESENTER: **Shepherd Nyamhuno**, University of South Africa

In 2016, South Africa implemented the universal test and treat (UTT) for people living with HIV/AIDS (PLWHA) to try and control the further spread of the human immunodeficiency virus (HIV) which causes acquired immunodeficiency syndrome (AIDS). Previous studies on antiretroviral treatment (ART) scale-up had indicated that UTT is cost-effective. This study looked at how ART coverage, migration rates and pre-exposure prophylaxis (PrEP) coverage across various risk groups affected the level of cost-effectiveness of UTT. The study used the Goals model, a dynamic compartmental model with inbuilt HIV parameters to project the expected impact of the UTT under various scenarios. It was discovered that increased ART coverage is still cost-effective for South Africa and had more health benefits for the country (95% of ART coverage had incremental cost-effectiveness ratios (ICERs) of $936/ quality adjusted-life year (QALY) gained while 90% had $1,689/QALY gained). We accepted the hypothesis that increased ART coverage is cost-effective (p-value of 0.0031) and economical for the country to keep migration to the second line of ART at a low level. High levels of migrations

had higher costs with no impact (minimal migration scenario cost $76/QALY gained while higher migration rates had higher costs/QALY gained ($94/QALY)). A p-value of 0.034 was obtained and we accepted the hypothesis that lower migration to the second-line regimen was cost-effective. Lastly, PrEP is cost-effective when administered to all risk populations (an all risk-level PrEP coverage scenario had the lowest ICER of $229/QALY gained). However, that coverage was very costly. We accepted the hypothesis that PrEP is cost-effective when given to high-risk populations, given the p-value of 0.042. We discovered that if antiretroviral ART drug prices are reduced by 50%, the country might save about 35% of its total ART costs. Increased ART coverage, minimal migration to the second-line regimen and focused PrEP coverage is the best program combination for the country. For the country to maximise the impact of these interventions it is necessary to create enablers such as local production of tolerable ARV drugs, improve adherence and decentralise the distribution of ARV drugs.

Equity Impact of a Package of Interventions Addressing Infectious Diseases in Ethiopia.

PRESENTER: **Lelisa Fekadu Assebe**, UIB

Background: Inequalities in health and non-health benefits of public health interventions are key challenges on the path towards universal health coverage, particularly in low- and middle-income countries (LMICs). The design of health benefit package (HBP) creates an opportunity in selecting
interventions through established criteria. The aim of this study is to examine the health equity and financial protection impact of selected interventions, along with their costs, at the national level in Ethiopia.
Methods: Data on average health benefits, and program costs were extracted from the latest Ethiopian Essential Health Service Package (EHSP) database. Similarly, population estimates, and disease prevalence were derived from the Global Burden of Diseases (GBD) and, national survey, and published sources. Benefits were distributed across income quintiles using a combined adjusted risk of disease prevalence and coverage, with the latter also used to estimate the programmatic costs. For each of the 30 interventions, we estimated the benefits to health equity and financial protection that would result from an incremental increase in coverage of 10 percentage points for one year.
Results: A total of 390,000 Health Adjusted Life Years (HALYs) would be gained and 64,240 cases of catastrophic health expenditure (CHE) averted by implementing the chosen intervention at 10 percentage point increase in coverage. Overall, the EHSP interventions provide 22% (86,760 HALYs) of the health benefits to the poorest and 20% (77,270 HALYs) to the richest quintile. Similarly, a total of 33% (21,500) cases of CHE were averted in the poorest quintile and 14% (8,740) in the richest quintile.
Conclusion: Despite current coverage gaps, access to certain EHSP interventions had the potential to improve overall health, equity, and financial protection benefits. The potential impact of the selected interventions differs in their impact on population health, health inequality, and financial protections benefit. Examining the trade-offs and weighing each outcome is necessary for prioritization of interventions in the health benefit package.

Modelling the Cost-Effectiveness of Essential and Advanced Critical Care for COVID-19 Patients in Kenya

PRESENTER: **Angela Kairu**, KEMRI Wellcome Trust Research Programme

Background: Case management of symptomatic COVID-19 patients is a key health system intervention. The Kenyan government embarked to fill capacity gaps in essential and advanced critical care (ACC) needed for the management of severe and critical COVID-19. However, given scarce resources, gaps in both essential and ACC persist. This study assessed the cost-effectiveness of investments in essential and ACC to inform the prioritisation of investment decisions.

Methods: We employed a decision tree model to assess the incremental cost-effectiveness of investment in essential care (EC) and investment in both essential and ACC (EC +ACC) compared with current healthcare provision capacity (status quo) for COVID-19 patients in Kenya. We used a health system perspective, and an inpatient care episode time horizon. Cost data were obtained from primary empirical analysis while outcomes data were obtained from epidemiological model estimates. We used univariate and probabilistic sensitivity analysis to assess the robustness of the results.

Results: The status quo option is more costly and less effective compared with investment in EC and is thus dominated by the later. The incremental cost-effectiveness ratio of investment in essential and ACC (EC+ACC) was US$1378.21 per disability-adjusted life-year averted and hence not a cost-effective strategy when compared with Kenya's cost-effectiveness threshold (US$908).

Conclusion: When the criterion of cost-effectiveness is considered, and within the context of resource scarcity, Kenya will achieve better value for money if it prioritises investments in EC before investments in ACC. This information on cost-effectiveness will however need to be considered as part of a multicriteria decision-making framework that uses a range of criteria that reflect societal values of the Kenyan society.

Cost-Effectiveness of Tafenoquine and STANDARD[TM] G6PD Point-of-Care Testing for the Treatment of *Plasmodium Vivax* Malaria for the Brazilian Unified Health System

PRESENTER: **Dr. Angela Devine**, Menzies School of Health Research
AUTHORS: Henry Peixoto, Luiza Lena Bastos, Jose Diego de Brito Sousa, Vanderson Sampaio, Wuelton Monteiro, Marcus VG Lacerda

The radical cure of *Plasmodium vivax* malaria will be vital to successful malaria elimination efforts, ensuring that the liver-stage parasites are cleared in addition to the blood-stage treatment. Brazil currently prescribes a 7-day regimen of primaquine for radical cure without prior testing for glucose-6-phosphate-dehydrogenase (G6PD) deficiency. Patients with G6PD deficiency who take primaquine are at risk of hemolysis, which can be life-threatening. Tafenoquine, a new drug for radical cure, is taken in a single dose, reducing the

challenges of patient adherence to the 7-day primaquine regimen. Tafenoquine requires mandatory semi-quantitative G6PD screening before prescription to ensure safety, which will increase the costs of testing and treating patients.

The aim of this study was to estimate the cost-effectiveness of prescribing tafenoquine after semi-quantitative G6PD screening from the perspective of Brazil´s Unified Health System. Tafenoquine was prescribed to those with normal G6PD activity while patients with intermediate test results were prescribed 7-day primaquine therapy (0.5mg/kg/day). This *tafenoquine strategy* was compared with *current practice* (7-day low-dose primaquine therapy without G6PD screening). Recently, malaria guidelines were updated to require G6PD screening before primaquine where possible. Accordingly, in a second analysis, tafenoquine following semi-quantitative G6PD screening was compared to primaquine for those who tested G6PD normal and intermediate with the semi-quantitative test.

A cost-effectiveness analysis over a 12-month time horizon was conducted with a decision tree model for individuals presenting with vivax malaria in terms of cost per disability-adjusted life-year (DALY) averted using 5% discounting. Different pathways are presented for males and females to account for their differences in risks and outcomes. A one-way sensitivity analysis and a probabilistic sensitivity analysis using 10,000 sampling iterations were also conducted.

In the base case analysis, the *tafenoquine strategy* cost R$122 more than *current practice* and R$66 less than *primaquine screening strategy*. In both comparisons, the *tafenoquine strategy* averted 0.008 DALYs. The incremental cost-effectiveness ratio (ICER) for the comparison with *current practice* was R$14,934, well below the willingness to pay threshold of R$40,000. The *tafenoquine strategy* dominated the *primaquine screening strategy*.

The one-way sensitivity analysis for the comparison between the *tafenoquine strategy* and *current practice* showed that the model results remained below the willingness to pay threshold of R$40,000 for all parameter values except for when the number of patients per facility per year was reduced from 55 to 1. This change increased the ICER to nearly R$500,000. Other parameters that had the most impact on the results included adherence to primaquine regimen, parameters related to the risk and number of recurrences, and the risk of mortality for recurrences. The probabilistic sensitivity analysis showed that the *tafenoquine strategy* had a 98.3% likelihood of being cost-effective at a willingness-to-pay threshold of $40,000 in both comparisons.

Compared to current use of primaquine without G6PD screening, the model results suggest that prescription of tafenoquine to those who test G6PD normal with a semi-quantitative test will be cost-effective in Brazil. This is attributable to reductions in hemolytic events and improvements in the effectiveness of radical cure through single-dose treatment.

Life after Tuberculosis: Evidence from India

PRESENTER: **Susmita Chatterjee**, George Institute for Global Health
AUTHORS: Palash Das, Gayatri Bhambure, Anna Vassall

India has the highest tuberculosis burden in the world with an estimated incidence of 1.9 million in 2021. Economic studies on tuberculosis historically focuses on out-of-pocket expenses of treatment and catastrophic cost during the treatment period. Understanding the economic burden during post-treatment period is crucial to meet the END TB target of achieving zero catastrophic cost and to improve the wellbeing of the tuberculosis survivors. However, post-treatment quality of life and the economic conditions of the tuberculosis patients have never been explored in Indian context. We aim to bridge this knowledge gap.

As part of an ongoing study, 403 adult drug-susceptible tuberculosis patients from general population (166 patients) and from a 'high risk group' urban slum areas (237 patients) were interviewed at their intensive and continuation phases of treatment and about six months post-treatment to understand the health and economic conditions in the post-treatment period. Health condition was measured using EQ-5D-3L and EQ visual analogue scale (EQ VAS) developed by EuroQol Group and economic conditions were measured comparing employment and income status pre-TB and post-treatment period, and through other economic consequences such as borrowing / selling / outstanding loan. Results were compared with another group of 326 patients who were followed up about one-year post-treatment to examine if there are changes in the economic conditions six months and one-year post-treatment.

Anxiety/depression and pain/discomfort were two dimensions where study participants had some to extreme problems during the post-treatment period. 7.5% participants reported extreme problems with anxiety/depression while 24% reported some problems. 38% reported some problems with pain/discomfort and 4.5% extreme problems. Mean EQ VAS score 73.24 (SD 18.9) was significantly associated with age and wealth quintile. 13% participants who were employed before tuberculosis were unemployed six months post-treatment and major reason of inability to work was poor post-tuberculosis health. 54% participants were unable to repay loan they took during treatment and outstanding loan amount was significantly associated with direct treatment cost of tuberculosis. 21% and 10% borrowed and sold/ mortgaged personal belongings respectively in the post-treatment period. Proportion of participants having outstanding loan during one-year post-treatment was lower (42%) as compared to participants followed up six months post-treatment (54%), however, borrowing was higher (27%) and sold/mortgaged was similar (10%). Amount of borrowing/selling in the post-treatment period was significantly associated with outstanding loan amount implying that participants had to use alternative coping strategies to reduce the burden of outstanding loan.

It is therefore evident that many tuberculosis patients had limited health and financial recovery in the post-treatment period. As unemployment in the post-treatment period was one of the major issues of financial hardship, and post-treatment health was the major contributor to unemployment, early case detection, proper nutrition and job security of the tuberculosis patients should be the policy

priorities. Direct cost of tuberculosis treatment was significantly associated with post-treatment economic consequences. Therefore, interventions need to be explored to reduce long-term health and economic burden of the tuberculosis patients in India.

An Assessment of the Economic Burden of Lassa Fever on Households of Patients Admitted in a Referral Centre, Edo State, Nigeria

PRESENTER: **Bosede Elizabeth Arogundade**, Irrua Specialist Teaching Hospital, Irrua.
AUTHORS: Akhere Danny Asogun, Benjamin Chudi Uzochukwu, Martilord Ifeanyichi, Osahon Otaigbe

Background: Lassa fever is an acute viral haemorrhagic fever caused by the Lassa virus. It is primarily transmitted to humans through contact with infected rodents, the multimammate rat. Lassa fever is endemic in many parts of West Africa, including Nigeria, occurring more in rural communities. The high cost of treatment and containment measures for Lassa fever can have significant economic implications. The costs of healthcare services, such as laboratory testing, supportive care, and monitoring, can place a financial burden on affected individuals, their families, and the healthcare system. This study aimed to assess the economic burden of Lassa fever on households of patients admitted into a referral centre in Edo state, Nigeria.

Methods: This incidence-based cost of illness study utilised the incremental cost approach from the societal perspective. A matched cohort study design was used. Sixty-four patients who volunteered for the study and were admitted to the Institute of Lassa Fever Research and Control (ILFRC) of Irrua Specialist Teaching Hospital between June and August 2022 were recruited and matched 1:1 with healthy cohorts. The Lassa cohort was prospectively followed from admission to discharge, while the healthy cohort was prospectively followed for one month. The direct and indirect cost of Lassa fever was estimated as well as the incremental cost of Lassa fever.

Results: The majority (70.3%) of the study participants were within the working age group 18-60 with a mean age of 28.98 ±15.48 years for the two groups. The results showed that the median cost of Lassa fever illness per case was $336 (₦148,006), ranging between $132-$1864 (₦58000 - ₦820364). The total estimated indirect healthcare costs were $6631 (₦2917640) with a median cost of $62 (₦27100) which is 90.3% of the income of half of the participants and 36% of the income of half of the household's income. When comparing the health care expenditure associated with the presence or absence of Lassa fever, the median direct cost of Lassa fever was $249 (₦129787) compared to a median cost of $10 (₦4500) in the matched non-Lassa fever cohort. Thus, an incremental cost of $285 (₦125287) is due to Lassa fever alone. In the multivariable regression, the number of household members, the length of hospitalisation, and the occurrence of complications were significant predictors of the cost of illness. The median expenditures of the Lassa cohort were significantly greater than those of the control cohort. This median difference was statistically significant (p< 0.001)

Conclusion: The cost of Lassa fever is about five times the minimum wage (₦30000, $68) in Nigeria; thus, Lassa fever still poses a high economic burden to affected households despite the subsidization of treatment by the government through the provision of the primary drug (Ribavirin), Personal protective equipment's (PPEs) and Lassa PCR diagnostics free. There is, therefore, a need to provide financial protection to households affected by Lassa fever to prevent them from becoming impoverished.

Keywords: Cost of illness, economic burden, Lassa fever

Modelling Gametocytes in the Presence of Interval-Censoring

PRESENTER: **Michaela Faro Chehesai Takawira**, London School of Hygiene and Tropical Medicine

Malaria is a parasitic disease that continues to be a pressing public health problem for many, with Plasmodium falciparum malaria accounting for many deaths. Gametocytes are the sexual form of the parasite responsible for transmitting malaria from the human host to the mosquito vector. However, most study designs measure asexual parasites and hence the measurement intervals are not optimal for measuring gametocytes. In a past clinical trial, patients were observed on follow-up visits which results in the data collected on gametocytes being interval-censored.

The primary objective of this work was to conduct a secondary analysis on old malaria data, to illustrate the impact of ignoring interval-censoring using different approaches to modelling gametocytes. The secondary objectives seek to determine the covariates that influence gametocyte emergence, elimination and duration.

The data analysed was obtained from a series of clinical trials conducted between 2002 and 2004 in South Africa and Mozambique. As part of the South-East African Combination Antimalarial Therapy (SEACAT) evaluation of the phased introduction of combination antimalarial drug under the Lubombo Spatial Development Initiative. Due to the study design, observing gametocyte profiles was complicated because of censoring as patients were observed and monitored on follow up days. Thus, the actual moment of observation of an event was estimated to have occurred between two observation days. Hence, the gametocyte data is thus characterized by interval-censoring. Given these unusual characteristics of the gametocyte data, this research aims to directly model gametocytes accounting for censoring. Researchers often opt to assume the times to events of interest are at the moment of observation (right endpoint of an interval) or midpoint of the interval in which the event is assumed to have occurred. In this research, we investigate the impact of ignoring the interval-censored mechanism and how parameter estimates based on these ad-hoc approaches might differ from interval-censored results. The Cox Proportional Hazards, parametric PH and accelerated failure time models were used to demonstrate differences in results based on whether interval-censoring taken into account or not.

Analysis of the survival curves revealed that where intervals are wide, right imputation tends to overestimate while midpoint imputation underestimates when compared to interval-censored survival curves . In shorter intervals, the difference in survival curves is almost negligible. For the fitted semi-parametric, parametric and AFT models right imputation methods led to biased results. In contrast, midpoint approach produced similar results to models fitted using interval-censored approaches.

Information is lost when censored data is being analysed. Where possible authors should apply interval-censoring methods when analysing data that is interval-censored. Ignoring the interval-censoring mechanism leads to biased results when the time to event data is not treated correctly. Where researchers are unable to apply interval-censoring methods and prefer to apply standard survival analysis methods, researchers must then pay attention to the length of the interval. If the interval is narrow, ignoring the interval-censoring mechanism may have little to no bearing on the results. However, should intervals be relatively wide, and data heavily interval-censored, then midpoint imputation is the best course of action.

1:30 PM –3:00 PM   WEDNESDAY   [Health, Its Distribution And Its Valuation]

Cape Town International Convention Centre | CTICC 1 – Room 1.43

Valuing Capabilities: Application of Different Methods in Mozambique, Uganda and the UK

MODERATOR: **Joanna Coast**, University of Bristol

ORGANIZER: **Giulia Greco**, London School of Hygiene and Tropical Medicine

DISCUSSANT: **Darshini Govindasamy**, MRC South Africa

Valuing the ICECAP-CYP:11-15 Capability Wellbeing Measure for Adolescents By Adolescents: A Best Worst Scaling Study in the UK

PRESENTER: **Paul Mitchell**, University of Bristol
AUTHORS: Samantha Husbands, Paul Anand, Cara Bailey, Katie Breheny, Sarah Byford, Isabella Floredin, Philip Kinghorn, Tim Peters, Louise Proud, Joanna Coast

Background

A new measure of capability wellbeing for children and young people (CYP) aged 11-15 years old has recently been developed. The measure is part of the ICECAP family of capability wellbeing measures that have been developed for adults for use in the economic evaluation of health and care interventions. The ICECAP-CYP:11-15 has eight attributes: fun and enjoyment, learning and experiencing, attachment, emotional security, achievement, freedom and having choices, physical protection and security, and well-becoming/aspiration, with four levels per attribute. For the ICECAP-CYP:11-15 to be used in health and care economic evaluations, it is important that population values are attached to the attributes and their levels so that decision makers understand the relative importance of attributes and levels to one another.

Aim

To develop an 11 to 15 year old UK population value set for the ICECAP-CYP:11-15.

Methods

An online panel company was used to recruit 11-15 year olds via their parents/guardians in the UK. We undertook a best worst scaling (BWS) case 2 (profile) to generate population values for the ICECAP-CYP:11-15. BWS is a method that has performed relatively well when compared to other established health economic valuation methodologies in this population. The 11-15 year olds completed 10 BWS tasks each, as well as completing the ICECAP-CYP:11-15 measure first to familiarise them with the eight ICECAP-CYP:11-15 attributes. Piloting suggested introducing a minimum time period to read the BWS instructions, complete a practice and the 10 BWS tasks. Piloting also suggested raising the initial sampling target of 1,000 participants to ensure enough considered responses were collected. Study design included the completion of four blocks of 10 BWS tasks, with a minimum target of 1,600 considered responses overall, with a minimum of 400 participants per block who took at least 90 seconds to complete the 10 BWS tasks.

Initial unadjusted analysis describes the best-worst pairs chosen most often in one of the four BWS blocks. Full analysis of the BWS data and estimation of the population valuation set will be completed and presented at the conference.

Results

Data was collected from 22 October – 11 November 2022. From a potential pool of 8,592 parents/guardians of 11 to 15 year olds, 2,307 completed the survey, with 1,611 of those completing the BWS tasks over the minimum time. Best-worst pairs for the 409 who completed block one show that the top level of attachment (443, 54%), fun and enjoyment (380, 46%) and emotional security (355, 43%) were chosen as the best three most frequently. The bottom levels of attachment (619, 50%), fun and enjoyment (566, 46%) and physical protection and security (444, 36%) were the most frequently selected as the worst options.

Discussion

Initial evidence suggests that attachment (or in lay terms, love and friendship) and fun and enjoyment are the two most important capabilities on the ICECAP-CYP:11-15. The final population values for the ICECAP-CYP:11-15 will be presented at the conference.

Translation, Adaptation, and Valuation of the OxCAP-MH into Juba Arabic for Use Among South Sudanese Refugees in Uganda

PRESENTER: **Dr. Giulia Greco, PhD**, London school of hygiene and tropical medicine
AUTHORS: Catharina Van der Boor, Taban Dalili, Ismail Kawati, Bayard Roberts, Daniela Fuhr, Wietse Tol

Background: One **person is forcibly displaced every two seconds** because of conflict, violence, or persecution. These conflict-affected populations are vulnerable to psychosocial distress and are at risk of considerably higher levels of mental disorders than non-conflict-affected populations, including alcohol misuse. In an ongoing trial that seeks to develop a transdiagnostic intervention addressing mental health comorbidities among conflict-affected populations in Uganda and Ukraine, we will assess quality of life using the standard EQ-5D-5L, and the capability-based OxCAP-MH. The OxCAP-MH is a multi-dimensional, self-report instrument designed to capture different dimensions of wellbeing, including non-health dimensions and welfare inequalities, within the conceptual framework of the capability approach. The aim of the current paper is to present the results of the translation, cultural adaptation and valuation of the OxCAP-MH into Juba Arabic for South Sudanese refugees living in the Rhino camp settlement, Northern Uganda.

Methods: we adhered to the official Translation and Linguistic Validation process of the OxCAP-MH, as instructed by the OxCAP-MH authors. To carry out the translation, the Concept Elaboration document, official English version of the OxCAP-MH, and the Back-Translation Review template were used as provided during the user registration process of the OxCAP-MH. Four independent translators were used for forward and back translations. The reconciled translated version was then piloted and reviewed by 17 participants in two focus group discussions that took place in the Rhino refugee settlement. Participants in the two focus groups carried out a worst to best valuation of each of the sixteen capability domains covered in the OxCAP-MH.

Results: The Juba Arabic version of the OxCAP-MH was finalized following a systematic iterative process, in line with the international principles of good practice for translation. The content of the Juba Arabic version remained unchanged, but key concepts were adapted to ensure cultural acceptability, feasibility, and comprehension of the measure in the local context of Rhino refugee camp. Most participants were illiterate and required hands on support with filling in the OxCAP-MH. In addition, there was some confusion on how to respond to each question. Participants suggested two additional capabilities that are currently not reflected in the OxCAP-MH namely nutrition and education. Furthermore, discussions around the worst to best valuation of the sixteen domains led to two separate worst to best scales, which showed important differences.

Conclusion: the official Juba Arabic version of the OxCAP-MH can be used as an alternative or addition to other health-related quality of life outcome measures in research focused on South Sudanese refugee populations to gain insight into their capabilities, mental health, and quality of life more broadly. In this context, the OxCAP-MH was considered culturally acceptable. The valuation exercise proved challenging, as most focus group participants had low level of literacy. This made the valuation exercise cognitively demanding. Participants voiced confusion over how to answer the questions. These concerns invites consideration for future research to consider how measures such as the OxCAP-MH can be made more accessible wherein participants may have low levels of education and/or literacy

Valuing an Index of Sanitation-Related Quality of Life in Maputo, Mozambique – A Discrete Choice Experiment

PRESENTER: **Patrick V. Katana**, London School of Hygiene and Tropical Medicine
AUTHORS: Neiva Banze, Cremildo Manhiça, Catildo Cubai, Lucia Viera, Edi Fulai, Oliver Cumming, Edna Viegas, Ian Ross
Valuing an Index of Sanitation Related Quality of Life - a Discrete Choice Experiment in two Cities in Mozambique

Patrick V. Katana,[1*] Neiva Banze,[2] Cremildo Manhiça,[2] Catildo Cubai,[2] Lucia Viera,[2] Edi Fulai,[2] Oliver Cumming,[1] Edna Viegas,[2] Igor Capitine,[2] Ian Ross[1]

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Introduction: Improved sanitation can prevent infectious diseases, but toilet users also value other aspects of sanitation such as privacy and safety. Quantifying incremental improvements in the quality of life (QoL) outcomes associated with different levels of service could help inform resource allocation, but limited evidence is so far available. A five-attribute index of sanitation-related QoL (SanQoL-5) has been established and captures respondents' perceptions of sanitation-related disgust, disease, privacy, shame, and safety. Each attribute is measured on a three-level frequency scale (always, sometimes, never), with responses valued as 0 = no sanitation capability and 1 = full

sanitation capability. To date, this index has been weighted using simple methods with limitations, such as rank sum. For more widespread application of SanQoL-5, more robust valuation methods are required.

Objective: To value a sanitation-related quality of life (SanQoL-5) index using a discrete choice experiment (DCE), and assess how values vary by toilet type.

Methodology: We enrolled 600 adults in Maputo and Dondo cities, Mozambique, after piloting with n=32. We sampled based on quotas for toilet types, to achieve a wide range of sanitation from flush toilets to open defecation. The DCE task was a choice of which is "better" between two scenarios, each representing combinations of SanQoL-5 attribute levels. Each respondent completed 10 tasks and a dominance test. For analysis, we fitted a conditional logit model and rescaled coefficients to derive a 0-1 index. We also applied a simpler attribute scoring approach that is less cognitively demanding, comparing the resulting value set to the DCE value set.

Results: A total of 508 participants have so far completed choice tasks (data collection ongoing). Disgust was the highest-valued attribute, with "never feeling disgusted while using the toilet" having the highest SanQoL-5 index value (0.259) of the five attributes. The other attributes had similar value to one another, ranging 0.181-0.193. The "sometimes" levels were valued at around 55-60% of the "never" levels of each attribute. SanQoL-5 by toilet type followed a gradient with objective toilet quality: flush toilet (mean 0.76), pit latrine with concrete slab (0.63), pit latrine with other slab, e.g., wood/soil (0.49), and open defecation (0.32).

Conclusion: This is the first SanQoL-5 value set based on robust elicitation methods and enables the index to be used in economic evaluation. The DCE tasks were comprehensible to most respondents, with sanitation states valued consistently. The gradient with toilet quality supports the validity of the SanQoL-5 index. Identifying the toilet attributes and sanitation service transitions associated with the greatest quality of life gains could inform more efficient resource allocation, by accounting for those gains alongside infectious disease reduction and other benefits.

Does the Age of People at the End-of-Life Influence How Much Weight People Provide to Their Outcomes Compared to Their Family and Friends? A Budget Pie Study in the UK General Population.

PRESENTER: **Isabella Floredin**, University of Bristol
AUTHORS: Paul Mitchell, Samantha Husbands, Susan Neilson, Joanna Coast

Background:

If a capability-based framework is used in economic evaluation of end-of-life care (EOLC), one important issue to consider is how outcomes for the person at the end-of-life (EOL) and outcomes for those close to them should be integrated when making decisions based on the outcome of interventions. Recent deliberative work looking at an integrated capability framework for economic evaluation of EOLC explored how much weight should be placed on outcomes for people at the EOL and how much weight should be placed on those close to them, in decisions about funding interventions. However, the deliberative work did not explore the impact of age on these weights and did not aim to achieve a representative sample.

Aim:

This work explored weights given by the general population to the provision of outcomes to young people (14-25 years old) at the EOL, relative to the weights given to outcomes to those close to them.

Methods:

An online panel survey was used to explore preferences of the UK general population.

Respondents (n=601) were recruited through a professional online panel company and the sample aimed to be representative of the general adult population in the UK. Respondents were stratified by gender, age group and UK region.

A budget pie task was used in the survey to obtain weights from respondents. Each respondent was presented with eleven budget pie tasks and asked to allocate tokens between people at the EOL and their family and friends. The task was repeated for different age groups (all ages; 14-17 years old; 18-25 years old) and for different time points in the trajectory towards death (over the twelve months preceding death).

Survey analysis plan: Mean values and ranges for each budget pie task are estimated. Staged regression analysis will be used to understand the association between different socio-demographic and other health and care related characteristics of the sample and their budget pie token allocations.

Findings:

Average weights elicited from respondents for the importance that should be given to close persons (vs. person at the EOL) were similar across tasks on different age groups, at around 45%. For tasks on different time points in the trajectory towards death, average weights given to close persons increased, from around 43% to 51%, as the trajectory got closer to death.

Discussion:

Weights elicited through the budget pie tasks can inform the development of an integrated capability framework for economic evaluation at the EOL for young people.

In the deliberative work, average weights elicited for the importance that should be given to close persons (vs. person at the EOL) were at around 30% whilst in the representative survey sample average weights for the same task were at around 45%. Regression analysis will explore whether this difference in findings might be related to underlying factors regarding the participants who took part in the two different exercises, or whether this might be more related to the deliberation. Full regression analysis will be completed and presented at the conference.

1:30 PM –3:00 PM   WEDNESDAY   [Economic Evaluation Of Health And Care Interventions]

Cape Town International Convention Centre | CTICC 2 – Orchid
Pushing the boundaries of economic evaluation

MODERATOR: **Tommy Wilkinson**, Health Economics Unit, School of Public Health, University of Cape Town

On Spillovers in Economic Evaluations: Definition, Mapping Review and Research Agenda
PRESENTER: **Maria Jose Mendoza J.**, Erasmus School of Health Policy & Management
AUTHORS: Job van Exel, Werner Brouwer

An important issue in economic evaluations is determining whether all relevant impacts are considered, given the perspective chosen for the analysis. Acknowledging that patients are not isolated individuals has important implications in this context. Increasingly, the term "spillovers" is used to label consequences of health interventions on others. However, a clear definition of spillovers is lacking, and as a result, the scope of the concept remains unclear. In this study, we aim to clarify the concept of spillovers by proposing a definition applicable in health economic evaluations. To illustrate its implications, we highlight the diversity of potential spillovers through an expanded impact inventory and conduct a mapping review that outlines the evidence base for the different types of spillovers. In the context of economic evaluations of health interventions, we define spillovers as *all impacts from an intervention on all parties or entities other than the users of the intervention under evaluation*. This definition encompasses a broader range of potential costs and effects, beyond informal caregivers and family members. The expanded impact inventory enables a systematic approach to identifying broader impacts of health interventions. The mapping review shows that the relevance of different types of spillovers is context-specific. Some spillovers are regularly included in economic evaluations, although not always recognised as such, while others are not. A consistent use of the term "spillovers", improved measurement of these costs and effects, and increased transparency in reporting them are still necessary. To that end, we propose a research agenda.

Spillovers in Health Economic Evaluation and Research (SHEER) Task Force: Emerging Good Practice and Recommendations for a Future Research Agenda
PRESENTER: **Edward Henry**, NUI Galway
AUTHORS: Hareth Al-Janabi, Werner Brouwer, John Cullinan, Lidia Engel, Susan Griffin, Claire Hulme, Pritaporn Kingkaew, Andrew Lloyd, Nalin Payakachat, Becky Pennington, Luz María Peña-Longobardo, Lisa Prosser, Koonal Shah, Wendy Ungar, Tommy Wilkinson, Eve Wittenberg

Background: Omission of 'family and caregiver health spillovers' from the economic evaluation of healthcare interventions remains common practice. When reported, a high degree of methodological inconsistency in incorporating spillovers has been observed.

Aims: To promote "emerging good practice", the Spillovers in Health Economic Evaluation and Research (SHEER) task force aims to provide guidance on the incorporation of family and caregiver health spillovers in cost-effectiveness and cost-utility analysis. SHEER also seeks to inform the basis for a spillover research agenda and future practice.

Methods: A modified nominal group technique was used to reach consensus on a set of recommendations, representative of the views of participating subject-matter experts.

Results: The report of the task force details 11 consensus recommendations for emerging good practice. SHEER advocates for the incorporation of health spillovers into analyses conducted from a healthcare/health payer perspective, and more generally inclusive perspectives such as a societal perspective. To the extent possible, spillovers related to displaced/foregone activities should be considered, as should the distributional consequences of inclusion. Time horizons ought to be sufficient to capture all relevant impacts. Currently, the collection of primary spillover data is preferred and clear justification should be provided when using secondary data. Transparency and consistency when reporting on the incorporation of health spillovers are crucial. The still-nascent health spillover evidence base warrants much methodologic development and 12 avenues for future research are thus prioritised.

Discussion: Consideration of health spillovers in economic evaluation has been called for by researchers and policymakers alike. To this end, it is hoped that the consensus recommendations of SHEER will motivate more widespread incorporation of health spillovers into analyses. The emergent nature of spillover research impels that this guidance be viewed as an initial roadmap, rather than a strict

checklist. Moreover, there is a need for balance between consistency in approach, where valuable in a decision-making context, and variation, to reflect differing decision-maker perspectives and to support innovation.

Designing Economic Evaluations for Transferability: A Critical Review and Practical Guide

PRESENTER: **Catherine Pitt**, London School of Hygeine and Tropical Medicine
AUTHORS: Kara Hanson, Catherine Goodman

The costs, effects, and cost-effectiveness of interventions vary across contexts. Understanding when and how to transfer evidence appropriately across geographies or jurisdictions and from small-scale trial or pilots to much larger, real-world decision contexts is therefore challenging. Nonetheless, such transfers are crucial for optimizing the efficiency of policy choices and the value of evidence. This presentation describes a practical guide to promote more efficient priority setting by increasing the transferability of economic evaluation evidence generated from trials and pilots.

To develop the practical guide, we first conducted a wide-ranging critical review, which identified ten literature streams contributing to understanding how to make economic evaluations more transferable. Several of these literature streams originate from the health technology assessment and pharmacoeconomics literature, while others emerged from evidence-based medicine, global health, and implementation science, including realist evaluation. Drawing on this diverse review and experience conducting economic evaluations, we developed guidance on how to design economic evaluations alongside trials or pilots in ways that promote transferability.

The guide consists of questions arranged in four iterative stages: I) Framing the economic evaluation, II) Model identification and/or development, III) Data needs identification, and IV) Analysis and reporting. Identifying and closing – where possible – the transferability gap between planned implementation in the study context and anticipated implementation in one or more decision contexts are important first steps. In the second stage, questions guide the identification both of a provider cost model and a cost-effectiveness model. The third stage guides the identification of needed and obtainable data on resource use, prices, effects, assumptions, and decision contexts to populate these models. The analysis stage includes questions to ensure that the model meets relevant quality benchmarks and is communicated transparently.

Model-based economic evaluations alongside trials or pilots can facilitate the transfer of findings generated within trials and pilots to relevant decision context(s). We argue that transferability is a complex question requiring a complexity perspective, even for seemingly simple interventions. Making economic evaluation evidence more transferable therefore requires understanding and communicating what an intervention is and the mechanisms of action through which it interacts with context to produce changes in costs and effects. Rather than remaining an afterthought, promoting transferability of economic evaluation evidence should become the guiding principle of intervention research. This guide provides practical steps to support this process.

Economic Evaluation and Decentralised Decisions: Why Current Approaches Can be Unsuitable and What Can be Done to Improve Them.

PRESENTER: **Sebastian Hinde**, Centre for Health Economics, University of York
AUTHORS: Laura Bojke, Gerry Richardson

The majority of economic evaluation research, both methodological and applied, is framed to inform national decision-making processes, with a focus on headline cost-effectiveness relevant to a health focussed remit and a long-term time horizon. However, increasingly funding (including health, social care, and public health budgets) is decentralised to more localised decision makers, who are given a level of flexibility on how to allocate it. As a result, the characterisation of the healthcare system, for the purposes of health technology assessment, as controlled by a single national commissioner making investment decisions based on an intervention's ability to achieve long term cost-effective health gains becomes inaccurate.

Alongside this there is increasing evidence that the current means of conducting and disseminating economic evaluation evidence is not impacting these decentralised decision-making processes, bringing into question the relevance of what is produced to those who make many of the commissioning decisions. It is therefore important to reassess whether the default approach of economic evaluation used internationally are relevant to those making commissioning decisions, and how economic evaluation can be better structured and applied to be of more relevance to them.

This research explores the challenges associated with conducting economic evaluations that are relevant to localised decision makers through two elements. Firstly, we interrogate the conventional framework of cost-effectiveness analysis applied internationally in health technology assessments, investigating the disconnect between the most commonly applied evaluative frameworks and the reality of the decision problem faced by more localised commissioners. Secondly, we explore how these areas of disconnect can be better tailored to the evidentiary needs of local commissioners.

Throughout this analysis a case-study of cardiac rehabilitation in England is used. In England, 60% of the National Health Service NHS budget is held by localised commissioning groups, with most of the public health commissioning done by local authorities. Cardiac rehabilitation is commissioned at a decentralised level and subject to very large variation across different commissioners, but with national targets. Additionally, an international research base exists considering the effectiveness and cost-effectiveness of cardiac rehabilitation, but one that is focussed on a national perspective of evaluation. Using a decision analytical model of cardiac rehabilitation we demonstrate how taking a more dynamic approach to presenting and disseminating economic evaluation findings can greatly increase

the relevance of the analysis to the commissioners of the services. We evidence the merits of this more pragmatic approach through this works impact on the NHS Long Term Plan and engagement with localised commissioners.

Cape Town International Convention Centre | CTICC 1 – Room 1.63
Vaccine uptake and incentives

MODERATOR: **Afschin Gandjour**, Frankfurt School of Finance & Management

The Effect of Media Utilization on Vaccine Hesitancy: Evidence from the European Union

PRESENTER: **Silvana Robone**, University of Insubria
AUTHORS: Elena Cottini, Claudio Lucifora

In our paper we study the influence of media utilization, focusing on the use of internet in particular, on vaccine hesitancy. Nowadays the issue of vaccine hesitancy is very relevant from a policy point of view (Brilli e Lucifora 2020). After the spread of the SAR-COV 19 virus, the adoption of vaccines has proved as crucial to limit the spread of the pandemic and reduce mortality. However, many people have been reluctant to be vaccinated against COVID, and several have refused to. In general, the literature in health economics on the effects of media utilization on health behaviours is limited, and little is known about the effects of internet utilization on vaccine hesitancy (Principe and Carrieri 2020). The few studies which have addressed this research question so far mostly focus on the USA (Featherstone et al. 2019, Xu et a. 2020). We contribute to this literature by focusing on Europe.

We investigate our research question by exploiting cross-sectional data on 27 European countries comprised in the Eurobarometer 2019 dataset. This dataset contains information on vaccination rates, attitude towards vaccine and media utilization. Data are collected at NUTS2 geographical level. Our final sample is made by about 27.000 observations. We use a set of variables related to vaccine hesitancy as dependent variables: 1) *vaccine hesitancy_self*, a dummy equal to 1 if the respondents had no vaccination for themselves in the last 5 years, they were not covered by previous vaccinations and had been offered a vaccination by a doctor, 0 otherwise 2) *vaccine hesitancy_children,* a dummy equal to 1 if the children of respondent had no vaccination in the last 5 years 3) *vaccine hesitancy_other,* a dummy equal to 1 if the other members (not children) in the family had no vaccination in the last 5 years 4) *vaccine not_effective*, a dummy which is equal to 1 if the respondent believes vaccines are not effective in preventing infectious diseases, 0 otherwise. Our main independent variables are *social networks* ("getting information about vaccine from social networks") and *other websites* ("getting information about vaccine from other internet sites"). We control for standard socio-demographic characteristics and regional fixed effects.

To address possible endogeneity issues, we estimate a two stage least square model with instrumental variables. An instrument for the diffusion of broadband technology in Europe has been built on the bases of data on fixed broadband availability and next generation access (NGA) availability, provided by the European Commission. These data are available for all European countries at NUTS3 level. Preliminary results show that getting information about vaccine from social networks increases the probability of being vaccine hesitant, when we proxy it through all the four dependent variables considered. With regard to getting information about vaccine from other websites (not social networks), this variable reduces the probability that the children in the family had no vaccines in the last 5 years, but it increases the probability of vaccine hesitancy when considering the other three dependent variables.

Public Health Policy and Political Support: Evidence from COVID-19 Vaccination

PRESENTER: **Reo Takaku**, Hitotsubashi University

This study examines the effect of COVID-19 vaccination on political support for the government, exploiting Japan's age-based COVID-19 vaccine roll-out that prioritized people aged 65 years and older. A fuzzy regression discontinuity design based on a large-scale online survey reveals that COVID-19 vaccination increases the favorable opinions of the vaccination progress in municipalities and infection control measures of municipal governments by 30.3pp and 15.7pp, respectively. We also found that people with chronic diseases, women, and low incomes changed their opinion affirmatively than their counterparts. High incomes did not change their opinions at all. Among low incomes and people with chronic diseases, only those with high levels of interpersonal trust changed their opinion positively. These results suggest that voters' inherent level of trust may play an important role in their assessment of public policy.

Using the large-scale survey data (N=30982), we adopt a fuzzy regression discontinuity (RD) design to estimate the impact of COVID-19 vaccination on political support for the municipal and central governments. The first stage estimates indicate that at the age 65 threshold, the vaccination rate jumps by 29.3 percentage points. Our fuzzy RD estimation reports the following main results based on the significant first-stage impact. First, COVID-19 vaccination significantly increases favorable opinions of vaccination progress in municipalities and municipal government infection control measures. Specifically, the 2SLS estimates indicate that COVID-19 vaccination increases the favorable opinions of the vaccination progress in municipalities and infection control measures of municipal governments by 30.3pp and 15.7pp, respectively. We also discovered that people with chronic diseases and low socioeconomic status are more affected. These results show that reciprocal motives and political information play an important role in evaluating public policies. Second, when respondents are classified by health condition based on the presence or absence of chronic diseases, those with chronic

diseases are more likely to increase political support due to vaccination. It is widely known that people with pre-existing health conditions are at greater risk of hospitalization and death from infection with COVID-19. Therefore, those with chronic diseases might be more appreciative of vaccination than those without and take their vaccination status as crucial political information. We also find that people with a high level of interpersonal trust increase their support for the government more than those with low trust levels. These results show that reciprocal motives and political information play an important role in evaluating public policies.

Government Cash Transfers and COVID-19 Vaccination Uptake and Intentions: Comparative Evidence from Ecuador and South Africa

PRESENTER: **Omar Galarraga**, Brown University
AUTHOR: Brendan Maughan-Brown

Background

COVID-19 vaccine uptake in low- and middle-income countries (LMICs) remains suboptimal, yet heterogeneous. As of December 2022, Our World in Data reports that less than 40% of South Africans are vaccinated, while about 85% of Ecuadorians have received at least one shot.

Research objective

We used nationally representative survey data from N=3,608 respondents in South Africa (collected during November 2021 - March 2022), and N= 85,459 respondents in Ecuador (September – December 2021) to measure the extent to which (already existing) government cash grants increased vaccine uptake and intentions to vaccinate; and to explore a potential mechanism: trust in the government's information regarding COVID-19 and the vaccine.

Methods

We used country-specific logit models with relevant dichotomous dependent variables: vaccination status (1=vaccinated or 0=not vaccinated) in Ecuador; and intention to vaccinate among the unvaccinated (1=intends to vaccinate as soon as possible; and 0=otherwise) in South Africa. We controlled for demographic, health, and socio-economic characteristics (including age, gender, educational level, province of residence, previous COVID-19 infection, chronic conditions, etc.), and report an adjusted odds ratio (aOR).

Results

In Ecuador, 9% of the population received cash transfers. Holding all other variables constant, having received government cash transfers almost doubled the likelihood of being vaccinated for COVID-19 in the rural areas (adjusted Odds Ratio, aOR: 1.705, *p<0.001*).

In South Africa, 55% of households were receiving a government grant. Respondents in households receiving grants were over 50% more likely to intent to vaccinate as soon as possible (aOR: 1.53, 95%, *p<0.001*). The evidence supports the hypothesis of trust being a potential mechanism: people in households receiving grants were 53% more likely to "trust a lot" the information provided by the government about COVID-19 and the vaccine; and those with a lot of trust were over five times more likely to intend to vaccinate.

Conclusions and policy implications

Government cash grants in South Africa and Ecuador seem to exhibit spillover effects over and above the original intent for which they were originally instituted. The overall anti-poverty assistance seems to contribute to increasing COVID-19 vaccination rates as well as intentions to vaccinate.

Evaluation of Financial Incentives on Influenza Vaccination Rates Among the Elderly: Evidence from a Randomized Controlled Trial

PRESENTER: **Dawei Zhu**, Peking University
AUTHORS: Yang Shen, Min Lv, Jian Wang

Background: Financial incentives are an effective intervention for promoting prosocial health behaviors, including vaccinations. Evidence of financial incentives increasing influenza immunization coverage and timely immunization in low-income and middle-income countries is scarce and has primarily focused on the short-term impact financial incentives on influenza vaccinations.

Methods: We conducted a randomized controlled trial to investigate the effectiveness of financial incentives of four groups with monetary incentives of RMB0, RMB20, RMB40, and RMB60 on willingness to be vaccinated and influenza vaccine uptake among older adults (≥60 years) in Beijing, China. The primary outcome variable was the vaccine uptake rate, and the secondary outcome variable was the length of time to immunize. We used mixed-effects models for repeated measures to compare the influenza vaccine uptake rate between different incentive groups, and Cox proportional hazards regression models to analyze the waiting time of influenza vaccine uptake after randomization in different treatment groups. This trial was registered with the Chinese Clinical Trial Registry (NO: ChiCTR2000039344).

Results: Adults ≥60 years old completed 720 surveys. Financial incentive significantly promoted higher intention to influenza vaccinate (adjusted odds ratio, 2.20; 95% CI: 1.42,3.41) and high vaccination participation (adjusted odds ratio, 4.56; 95% CI:1.97-10.59). The financial incentive of RMB60 had the largest impact on the intention to vaccination and vaccination uptake compared to other financial incentives, but diminishing returns were observed between smaller and larger financial incentive amounts. Time to vaccination was significantly lower among participants receiving financial incentives than those with no financial incentive (adjusted odds ratio, 1.57; 95% CI:1.22-2.53; P <0.001). Financial incentives had a more pronounced effect on older individuals with certain socio-demographic characteristics, such as those who had not vaccinated previously and those with frequent social activities.

Conclusions: Providing appropriate financial incentives will boost influenza vaccination rates and shorten the length of time to immunization among the older Chinese, especially those without a vaccination history. A diminishing effect was observed when offering larger amounts of financial incentives, with financial incentives having no impact on the long-term vaccination behavior.

1:30 PM –3:00 PM   WEDNESDAY   [Health Care Financing & Expenditures]

Cape Town International Convention Centre | CTICC 1 – Room 2.61-2.62

Payment, financing and value

MODERATOR: **Inke Mathauer**, World Health Organization (WHO)

Does the Evolution of Wage Bill for Healthcare Workers Match the Workload Growth in Devolved Units in Kenya? Insights from Makueni County

PRESENTER: **Felix Munene Murira**, ThinkWell

Introduction

With Kenya's transition to a devolved system of government in 2013, the County governments Public Service boards are required by law to hire all healthcare workers. Salaries and wages for human resources for health (HRH) are an important cost driver, constituting 65-80% of all county health spending limiting fiscal space for other priority services. However, counties report considerable staffing gaps to meet service delivery demands. There are concerns on how counties can sustainably finance healthcare with an increasing wage bill and whether data driven decision making can improve HRH management efficiency. This study sought to document the evolution of wage bill vis-à-vis service workload and make recommendations to improve the management of HRH resources in Makueni County in Kenya.

Methods

We used a mixed methods approach to collect quantative data on salaries and wages between financial year (FY) 2013/14 and FY 2021/22 from the integrated payroll database and the integrated human resources information system. We also reviewed the annual staff data returns compiled by facility managers for the human resources management office in the county. Data on workload was derived from the Kenya Health Information System. Qualitative data was collected through key informant interviews with the County Health Management Team. Quantative data was analyzed using Excel while thematic analysis was applied for the qualitative data.

Findings

The HRH wage bill has tripled from the onset of devolution in FY 2013/14 to FY 2021/22 (from KSHs 796 million to KSHs 2.5 billion), while the number of staff grew 2.7 times (from 1,026 to 2,775). However, the workload evolution has not matched the salaries and wage bill growth as well as increasing staff numbers, with an increase of only 17% over the same period (from 2.1 million to 2.4 million services). The workload ratio per cadre varied up to seven times within similar level of care. The study also shows that salaries and wages constituted 72% of county healthcare spending in FY 2021/22, compared to 58% in FY 2013/14. This means that in FY 2021/22 other programs had to share 28% of the remaining county health funds. The construction of 92 new facilities is correlated with the HRH growth since these facilities needed new staff. Despite the high wage bill spending as a proportion of the health budget, 40% of the dispensaries are manned by one healthcare worker hampering service delivery. Analysis reveals that facility growth is not correlated with workload over the same period. Over 30% of primary healthcare facilities have very low workload and at the time of data collection, the county was considering transforming them into outreach centers and redistributing staff to facilities with a high workload.

Conclusion

Opportunities for counties to strengthen data-driven decision making to improve HRH management efficiency exist. Workload-based HRH analysis should be a frequent practice to inform staff rationalization to improve efficiency and to maintain a sustainable wage bill. Budget advocacy for increased health funding and prudent management of funds are critical for meeting the financial demands for a growing wage bill.

Do Medicare Advantage Financial Incentives Impact the Quality of End-of-Life Care?

PRESENTER: **Lauren Hersch Nicholas**, University of Colorado

AUTHORS: Alicia Arbaje, Stacy Fischer, Marcelo Perraillon, Daniel Polsky

End-of-life healthcare delivery in the United States is frequently characterized by services that do not extend length or quality of life, are inconsistent with patient preferences, and lead to poorly coordinated transitions across sites of care. These treatments come at significant financial cost to Medicare, patients, and families and may reflect the financial incentives and fragmented delivery system embedded in Fee-for-Service (FFS) Medicare and program rules limiting innovation in service delivery. Medicare Advantage (MA), the voluntary, managed care option has seen explosive growth in recent years and covers nearly 40% of Medicare beneficiaries at the end-of-life. MA plans receive capitated payments, can offer benefits not covered in FFS, and are shielded from most costs when beneficiaries enroll in hospice. These financial incentives may encourage provision of high-quality EOL care for terminally ill patients by minimizing expensive and burdensome treatments or emphasizing home care, which may be particularly beneficial for complex patients with life-limiting illnesses.

In this paper, we use Medicare claims data from 2015 - 2018 including newly available MA encounter data to test whether MA enrollment impacts end-of-life care for older Americans (aged 66+ at time of death). We restrict our sample to patients who experience one or more emergency hospitalizations for a life-limiting medical condition (end-stage organ failure, cancer, or dementia) in the last year of life, a group with a high level of medical need that is appropriate for referral to hospice care. We compare healthcare utilization in the last 6 months of life using a variety of regression models including specifications with county or hospital referral region level fixed effects to account for persistent characteristics of the healthcare environment that may influence treatment and plan choice.

We reestimate models comparing MA versus FFS in counties with at least 15%, 25%, and 35% MA penetration since a larger MA presence can influence providers to adopt a constant treatment style that impacts all patients and there may be unobservable differences between those who elect MA versus stay in FFS and the marginal MA enrollee is expected to be more similar to the marginal FFS stayer in counties with higher rates of penetration.

MA and FFS enrollees were similarly likely to receive potentially burdensome treatments in the last 6 months of life (i.e. feeding tube placement, CPR). However, MA beneficiaries were 6 percentage points (20%, $p < 0.01$ in the 25% penetration sample) less likely to die in the hospital, 3 percentage points (5%, $p < 0.01$) less likely to be moved across facilities in the last 3 days of life, and experienced 0.62 fewer transfers in the last 6 months of life.

Hospice, home health, and outpatient data suggest that MA incentives to manage care of seriously ill patients and/or enroll patients in hospice do not explain these differences; MA enrollees were 10 – 40% less likely to have a home health or outpatient follow-up post-discharge and only 3% more likely to receive hospice care in the last 6 months of life.

Better Access to Emergency Medicines and Health Supplies; Implications of Improved Autonomy in the Context of Performance Based Financing

PRESENTER: **Eric Tabusibwa**, ThinkWell Institute

AUTHORS: Charlotte Muheki, Cathbert Tumusiime, Richard Ssemujju, Derrick Semukasa, Angellah Nakyanzi

Background

Available literature indicates that Results-based Financing (RBF) can improve availability of Emergence Medicines and Health Supplies (EMHS) but there is mixed evidence from the experiences of different countries (e.g., Burkina Faso and Cameroon). Recently, RBF aimed to expand provision of high-quality and cost-effective reproductive, maternal, newborn, child, and adolescent health (RMNCAH) services in Uganda. To help address chronic shortages, the RBF project authorized public health facilities to use their RBF revenue to procure medicines, supplies (EMHS) and equipment through the Joint Medical Stores (JMS). This represented an expansion of autonomy for public facilities, which were otherwise only able to access EMHS via their credit lines with the National Medical Store (NMS).

We undertook an exploratory analysis to determine whether RBF revenue closed the funding and availability gaps for EMHS, and whether JMS had the capacity to handle orders from public facilities.

Methods

We analyzed administrative data on all RBF-related orders sent to JMS between Quarter 3 of 2018/19 and Q4 of 2020/21. Data were compiled on facilities' RBF claims, the EMHS funding gap for RBF-eligible public facilities, and EMHS availability and stockouts. Qualitative data on facility experiences in purchasing inputs from JMS were gathered through focus group discussions.

Findings

We found that 826 health facilities placed at least one order with JMS using RBF revenue. Using their RBF revenue, health facilities placed orders with a total value of UGX 7.8 billion (USD 2.12 million). The aggregate value of JMS orders was equal to 6.9% of total RBF claims between Q3 of FY 2018/19 and Q4 of FY 2019/20. Facilities ordered 1,491 distinct items from JMS, of which 632 (42.4%) were medicines, 467 (31.3%) were equipment, and 392 (26.3%) were supplies. JMS delivered nearly all (98% of) items ordered by facilities.

RBF revenue filled 6.5% and 13.4% of the funding gap for credit line commodities (medicines, supplies, and equipment) in FY 2019/20 and FY 2020/21, respectively. The rapid analysis of routine indicators of the availability and stockouts of tracer EMHS items was inconclusive. Aggregate data from public facilities during RBF implementation did not provide evidence that the availability of commodities increased or that the frequency or intensity of stockouts lessened.

Health facility staff appreciated the flexibility to use RBF revenue to order EMHS and equipment from JMS. Some facilities also purchased EMHS from local private pharmacies, especially when JMS failed to provide them with certificates of non-availability for desired items. In their view, these purchases helped to fill critical gaps and shortages, enabling their facilities to better meet their clients' health needs.

Conclusion

Findings from the analysis confirmed that there is a significant unsatisfied demand for EMHS and equipment at public health facilities in Uganda, which was addressed using RBF revenue. The study did not find evidence that the availability of commodities increased or that the frequency or intensity of stockouts lessened, which is consistent with findings from other country experiences. However, JMS generally proved capable of fulfilling orders with more than 98% of ordered items were delivered.

Evidence-Based Decision Making: Employing Historical Health Data to Inform the Design of a Sustainable Provider Payment Mechanism in Rwanda

PRESENTER: **Regis Hitimana**, Rwanda Social Security Board (RSSB)
AUTHORS: John Etebong Etuk, Teslim Aminu

Background

Rwanda's Community Based Health Insurance (CBHI) scheme, established in 2000, has seen an increase in membership coverage from 7% in 2003 to 85% in 2022. Presently, the Rwanda Social Security Board (RSSB) is adopting a payment reform for the CBHI to transition from a fee-for-service model to a capitation payment system for PHC services. This is to increase CBHI sustainability and improve the quality of care.

This transition necessitated the implementation of a model that links the defined health services package to be covered by the CBHI scheme to their cost determinants including base per capita rate, enrolment, clinical contacts, and individual/provider level adjustments. Evidence generation through these datasets was essential to developing a capitation approach that encourages financial risk-sharing and sustainability for the RSSB and service providers.

Rwanda's capitation design approach will provide guidance on relevant health metrics to consider in defining and implementing a sustainable payment mechanism. The study's primary research question is "What is the ideal capitation rate based on historical data and future projections?"

Methods

The RSSB examined studies on capitation implementation strategies used by nations with comparable health systems. Data on facility catchment and patient distribution was collected from the HMIS to estimate the amount to be paid to each facility. Information on historical claims, patient encounters, and other CBHI-specific data on previous facility payments was collected from the RSSB invoice database.

The per capita capitation allocation was calculated by multiplying the annual service utilization rate by the median cost per encounter. This per-capita allocation was adjusted for each facility based on the roaming rates and utilization of private health posts. Capitation amount for health facilities was calculated by multiplying the adjusted per capita allocation by the population enrolled in CBHI in each facility's catchment area.

Capitation and FFS payments were projected using historical payment and population growth data to calculate the expected difference in costs, with adjustments made accordingly. Projected cost difference was computed for 2023 to 2028 coinciding with the next Health Sector Strategic Plan development.

Results

The capitation rate, defined as RwF4,583 and RwF1,852 for medicalized and non-medicalized health centers respectively, represents the relationship between the average utilization rate and cost per encounter within the last financial year. Major design choices to support CBHI sustainability were made using historical data from HMIS and CBHI databases, including the base per capita rate, CBHI enrolment, and clinical contacts. The capitation rate excludes risk factors such as ambulance services while permitting patients roaming across facilities.

In the first year of implementation, projected annual capitation spending will be 2% less than historical FFS spending and could increase to 41.2% in five years. Capitation will cover all services delivered by providers as defined by the health package with a 40:40:20 allocation of funds to medicines and consumables, human resources, and facility operations.

Significance

Rwanda's approach demonstrates the importance of a robust health data management system in making evidence-based decisions when designing a capitation model, to ensure the solvency of health facilities and CBHI sustainability.

Baseline Assessment of Primary Healthcare Facility Managers' Knowledge of and Adherence to Nigeria's Basic Health Care Provision Fund (BHCPF) Expenditure Guidelines for Strategic Purchasing in Six States

PRESENTER: **Adekemi Gbolade**, Clinton Health Access Initiative Nigeria

Aims: Nigeria's National Health Act of 2014 established the Basic HealthCare Provision Fund (BHCPF) to be a sustainable model to ensure financial risk protection and equitable access to a basic minimum package of health services for vulnerable populations. The Clinton Health Access Initiative with funding from Global Affairs Canada initiated a program in 2022 across six states in Nigeria (Bayelsa, Ekiti, Kaduna, Katsina, Niger, Ondo) which is aimed at improving the operationalization of BHCPH at state, local government area (LGA) and health facility level. To ensure BHCPF funds are being received, allocated and utilized efficiently by health facilities to enable access to high quality primary healthcare services, including to vulnerable beneficiaries covered under BHCPF's subsidized insurance scheme, an assessment was conducted on PHC facility managers to assess their knowledge and adherence to the 2020 BHCPF Operational Guidelines and corresponding service availability and utilization.

Methods: In August 2022, information was gathered from 459 facility managers (one per facility) through self-administered questionnaires on mobile devices to assess both their knowledge of and reported adherence to BHCPF guidelines. The sample included all PHC facilities selected for the CHAI program based on accreditation status, security situation, provision of health services, and financial systems in place. Data from the questionnaires were analyzed using STATA.

Results: All 459 facility managers completed the questionnaire. 100% of the facility managers assessed reported being trained on BHCPF guidelines. Only 4%, 9% and 12% of facility managers correctly selected the percentage of BHCPF funds that can be used for drug procurement, facility maintenance, and human resources respectively. 35% of facilities reported adherence to BHCPF guidelines, ranging from 5% adherence in Ekiti to 62% adherence in Kaduna. For example, 46% of facility managers reported not having mechanisms for referring patients to specialized levels of care which is a guideline requirement. Given that initial BHCPF disbursements in some states have recently begun, correlations with service availability and utilization will be analysed mid-2023 after additional releases occur.

Conclusion: Poor adherence to BHCPF guidelines can result in facilities not purchasing the right mix of inputs to provide high quality services to patients, which limits access to care and can lead to patients paying out of pocket for drugs. Poor financial reporting can lead to delayed release of subsequent tranches, to facilities being made to return funds, or to de-accreditation and transfer of empanelled patients. While detailed knowledge of the guidelines was limited across states, self-reported adherence was high in some states such as Kaduna, where extensive monitoring has been conducted and communities have been empowered to monitor and hold facilities accountable to BHCPF use.

Policy Implications: Improving guideline adherence will strengthen facilities' resource allocation by ensuring the right inputs are purchased on time, subsequent funds are received, and empanelled patients can receive services. The state PHC boards and insurance agencies will design strategies to boost adherence and ground-test them in 459 facilities. Lessons will be shared through state and federal BHCPF oversight committees to inform BHCPF reform improvements nation-wide.

Estimation of Technical Efficiency in Health Spending at the Subnational Level in Kenya.

PRESENTER: **David Khaoya**, Palladium

AUTHOR: Theresa Ndavi

Introduction

Kenya is faced with inadequate domestic resources, an over-reliance on donors, particularly for key commodities for strategic diseases, and households, to finance the delivery of essential quality healthcare services. Moreover, the country continues to confront the inefficient allocation and use of resources, and inequitable access to affordable quality healthcare services. Out-of-pocket payments by households have the undesirable effects of restricting access to care and can be catastrophic and impoverishing. Donor financing on the other hand is declining due to the refocusing of priorities.

Kenya devolved the system of government following the promulgation of the new constitution in 2010. The implementation of the decentralised system of governance however commenced in FY 2013/14 where health service delivery was transferred to the 47 counties. The counties however continue to face severe resource constraints and inefficiencies in the allocation and use of the limited health resources that are available.

Given this background, the national government and counties need to optimise the use of existing resources. Despite this, there is a dearth of evidence on the input outlays and their combinations that yield the highest outputs and health outcomes. Understanding the degree of efficiency with which scarce health resources are utilised at the county level for better health outcomes will provide policy makers with relevant information and guidance on better use of resources to achieve maximum health outcomes.

Methodology

This paper uses a panel of health expenditure data and selected health outcome data from all counties in Kenya to estimate efficiency ratios for the health outlays. The health outcomes include maternal mortality ratio, under-5 mortality rate, neonatal mortality rate, child mortality rate, life expectancy and infant mortality rate. The expenditure-health outcome ratios (efficiency ratios) indicate how technically efficient the county governments were able to convert expenditure outlays to health outcomes. Efficiency ratios obtained are used to categorise counties into three groups, low, medium, and high. A multinomial fixed effects regression model is used to establish the marginal effects of health expenditure categories. The panel data for all counties covers the period of six years staring FY 2017/18 to FY 2021/22. The health expenditure data is obtained from the Office of Controller of Budgets while health outcome data is drawn from the Kenya Health Integrated System (KHIS/DHIS II).

Conclusion

This study identifies technically efficient and inefficient counties regarding health expenditure. In addition, it distinguishes expenditure categories that contribute to improved efficiency in health spending at the county level. Such evidence is crucial as it provides an opportunity for county staff to compare themselves against their peers in terms of how they convert health inputs into better health outcomes. Policymakers will also use the evidence generated to reorganize spending patterns to improve efficiency within the health sector.

Estimating Primary Healthcare Resource Requirements: A Standardized Normative Cost Tool and Approach for Low- and Lower-Middle Income Countries

PRESENTER: **Lyubov Teplitskaya**, Management Sciences for Health

AUTHORS: Colin Michael Gilmartin, Rodrigo Munoz, Marjorie Opuni, Abebe Alebachew, Yewande Ogundeji, Damian Walker

Background: Strong and sustainable primary healthcare (PHC) systems are essential for achieving universal health coverage (UHC). However, for many individuals in low-income settings, PHC services are unavailable, inaccessible, or unaffordable. Decisionmakers and planners need to understand the costs and resource requirements to deliver their country's unique PHC service package to mobilize and allocate sufficient resources. To support countries in PHC budgeting, planning, and advocacy, Management Sciences for Health (MSH) developed a tool and approach to cost normative PHC resource requirements in Ethiopia, Kenya, and Nigeria (Kano and Kaduna states).

Research Question: What is the normative cost to deliver a package of PHC services based on standard treatment protocols (STPs) and expected levels of service volume in Kenya, Ethiopia, and two states in Nigeria (Kano and Kaduna)?

Methods: Normative costs reflect the expected cost of providing high-quality, efficient services based on STPs, their associated costs, and targeted utilization rates based on each country's PHC targets. Each STP was reviewed by members of an expert panel with a subsequent internal audit conducted by a physician with experience in global health and PHC. MSH developed an approach to conduct supplemental review of STPs (cost drivers and specific inputs) for high-cost services (those comprising 50% of the total PHC service package cost). Within each country and state, normative costs were calculated based on the existing population structure, disease incidence or prevalence rate, and required resources (medicines, supplies, diagnostics, and human resource requirements by cadre). Data on disease incidence and prevalence rates were sourced from the Institute for Health Metrics and Evaluation (IHME) Global Burden of Disease database, peer-reviewed journal articles in each country, and Ministries of Health.

Results and Discussion: PHC normative cost per capita by sub-county in Kenya ranged from USD 47 in Ganze to USD 124 in Kajiado East. Overall PHC normative cost per capita totaled USD 95 in Kenya, which is higher than prior WHO and IHME estimates in Kenya (USD 64 and USD 40, respectively). PHC normative cost per capita was USD 30 in Ethiopia, which is lower than other estimates by Hailu and colleagues (2021) in Ethiopia (USD 54 to USD 107). Normative costs in Ethiopia were highest for outpatient services (34% of the total PHC package cost) and lowest for immunization and family planning services (2% of the total PHC package cost). Normative costs were USD 44 in Kano and USD 45 in Kaduna, which are lower than WHO's 2019 estimate of average PHC per capita cost in low-income countries (USD 65).

Implications: This evidence on PHC normative costs is being used by country stakeholders to support decision-making on PHC planning, resource allocation and budgeting, and to improve PHC system performance. Country decision-makers at national and subnational levels can use the PHC costing tool to update PHC resource requirement projections annually based on new targets and changes in service delivery. Moreover, normative costs can help identify potential inefficiencies and issues of quality in service delivery, inform provider payment, and strategic planning and budgeting in the health sector.

Cape Town International Convention Centre | CTICC 1 – Room 1.42

The social determinants of health, and disability: international applications in child and adult populations

MODERATOR: **David Bishai**, Johns Hopkins University

Financial Literacy and Behaviors Among Autistic Adults

PRESENTER: **Monica Galizzi**, University of Massachusetts Lowell

Despite the increased awareness of the importance of financial education, we have extremely limited research on the financial literacy of vulnerable populations, such as individuals with mental health diagnoses. This study assessed conceptual understanding and financial behaviors of autistic adults as compared to a matched group of individuals without an autism diagnosis. Participants completed a questionnaire with items drawn from the 2018 National Financial Capability Survey (NFCS), and the 2011 OECD International Network on Financial Education Survey (INFE). We present a statistical descriptive analysis where we compare results across our two surveyed samples and data from a national sample of neurotypical adults. Preliminary results suggest that autistic individuals exhibit more conservative behavior in terms of money management, as well as less knowledge of their financial situation, and much more anxiety toward their present and future economic wellbeing. While their financial literacy varies considerably across literacy domains, they tend to underestimate their competency and remain more uncertain of their understanding. This study highlights the need to promote financial literacy programs that are specifically designed both in modality and content to address the needs of autistic individuals and those with other developmental or related disabilities.

The Cost of Inaction on the Global Nutrition Targets for Stunting, Anemia, Breastfeeding, Low Birthweight: Results from New Modelling Tools

PRESENTER: **Dylan David Walters**, Nutrition International
AUTHORS: Sakshi Jain, Sameen Ahsan

Undernutrition costs the world billions of dollars every year in lost opportunities for economic growth due to preventable child and adult morbidity and mortality, health system costs, human capital losses and lower workforce productivity. At present, the world is off-track to meet the World Health Assembly global nutrition targets for 2025 created stimulate action for global and national investment into nutrition. Reducing the prevalence of stunting in children, low-birthweight, and anemia in women as well as increasing breastfeeding are among the select global nutrition targets for all countries, yet there is a gap in evidence on the human capital and economic cost of inaction on preventing malnutrition to inform policy decisions and investments national-level.

The new Cost of Inaction tool and Cost of Not Breastfeeding tools, based on open access data, were developed to present the health, human capital and economic costs associated with current levels of stunting, anaemia in women and children, low birth weight and sub-optimal breastfeeding practices for over 120 countries as well as aggregate estimates for regions and the world.

The results of this analysis indicate that preventable undernutrition costs the world over US$ 750 billion per year. In addition, every year undernutrition leads to 1.3 million cases of preventable child and maternal deaths, and over 300 million IQ points lost. In children, sub-optimal breastfeeding results in the largest economic burden yearly at US$548 billion (0.6% of GNI), followed by US$ 440 billion for stunting (0.5% global GNI), US$250 billion (0.3% of GNI) for low birth weight and US$160 billion (0.2% of GNI) for anaemia. Anaemia in WRA costs US$180 billion (0.2% of GNI) globally in current income losses. Of the global total of child mortality, over 60% occurs in Sub-Saharan Africa and 97% occur in low and lower-middle-income countries. Sub-Saharan Africa experiences the largest economic burden of anemia in women relative to GNI (0.7%) followed by South Asia (0.3%).

Country-level estimates illustrate variation in the human capital and economic costs across geographies, which reflect the contextual drivers of malnutrition in each setting. A "What-if" scenario analysis function within the tools can be used by users to estimate the potential avertible health, human capital and economic losses if targets are reached. The data generated from these tools are powerful information for advocates, governments, and donors to inform policy decisions and investments into nutrition. This study illustrates the substantial costs of inaction, and the potential economic benefits that could be generated by government and development partners' investments in scaling up effective interventions and systems strengthening.

An Equity Analysis on Zero Dose Children in India from the National Family Health Survey Data: Where We Stand and the Road Ahead

PRESENTER: **Gunjan Taneja**, Bill & Melinda Gates Foundation
AUTHORS: Eshita Datta, Mahima Sapru, Mira Johri, Kapil Singh, Harkabir Singh Jandu, Shyamashree Das, Arindam Ray, Kayla Laserson, Veena Dhawan

Introduction: Globally immunization programs have been adversely impacted by the COVID-19 pandemic, with the number of Zero Dose (ZD) children (those who have not received a single dose of Diphtheria, Pertussis and Tetanus containing vaccine) increasing from 13 million in the pre-pandemic period to 18 million in 2021. Reflecting global trends, the immunization program in India has also been

impacted with the country accounting for the most un and under vaccinated children. The number of ZD children has increased from 1.6 million in 2019 to 3.1 million in 2020, the highest rise across all the countries. ZD children and missed communities have now been prioritized as a key cohort for identification and integration with the health systems as we build back from the pandemic.

Methods: Using National Family Health Survey (NFHS) data, the current status of ZD children in India, the challenges, and next steps are explored. Progress achieved between the last two NFHS rounds (NFHS 5 (2019-21) and NFHS 4 (2015-16)) is analyzed for equity determinants as gender, place of residence, religion, birth order, caste, and mother's schooling. Key determinants studied include the change in ZD prevalence at the national, state and district levels, proportion of reduction in ZD for equity determinants and states with maximum improvements and disparity across these indicators. A correlation analysis was also conducted to understand the nature of association between ZD prevalence and critical Maternal and Child Health indicators.

Results: The overall ZD prevalence between the two rounds has reduced by 4.1% (10.5% - 6.4%). Data is available and comparable for 30 states in the country between the two rounds out of which in NFHS 5; 9 states reported a ZD prevalence of 0 - <5%, 17 states a prevalence of 5% - <10% and 2 states each a prevalence of 10% - <15% and 15% and above. The corresponding figures for NFHS 4 being 9, 9, 5 and 7, respectively. Data was analyzed for 680 districts from NFHS 5, out of which 324 districts have reported a prevalence of 0 - <5% and 145 districts a prevalence of 10% and higher. The equity parameters reflect a slow-footed reduction among ZD for girl children, across urban geographies, first born child, mothers with 12 or more years of schooling and children in families with highest wealth quintiles. A negative correlation which is accentuated between the two NFHS rounds is established between first trimester registration, four or more antenatal visits, institutional deliveries and ZD prevalence.

Conclusion: The analysis provides important insights into the current status of ZD children in India and the need for continued efforts. The data from the NFHS rounds corresponds to the period before the pandemic and therefore needs to be assessed accordingly. Moreover, the early trends sourced from the NFHS reports need to be complemented with detailed analysis from the NFHS micro data to better identify and understand the inter-play of the equity determinants at the national, state and district levels.

"Examining Inequities in Child Vaccination Coverage in Urban (Slum and Non-slum) and Rural Areas of Bangladesh"

PRESENTER: **Deborah Odihi**, Johns Hopkins University
AUTHORS: Bryan Patenaude, Gatien de Broucker, Joshua Mak

Background

Bangladesh is the 8th most populous country in the world. Possessing one of the highest rates of urbanization, over the last 40 years the proportion of the population living in urban areas in Bangladesh has increased from 5% to 28% with over 45 million people living in urban areas. The growing urban population puts additional pressure on already weak infrastructure in cities like Dhaka, resulting in the creation of slums. Effective and equitable vaccination coverage strategies that take into account slum settings has become vital to reducing outbreaks and the burden of child morbidity and mortality from infectious disease, especially within high population density communities. According to the national EPI coverage evaluation survey in 2016, the children in slums have lower rates of immunization – 67% compared to the national rate of 82%.

Methods

Primary data collection

Inequities in full vaccination coverage were examined through household surveys with caregivers of children aged 12-23 months. The study was conducted in urban areas (slum Kawran Bazar, non-slum Kawran Bazar, slum-Bandar, non-slum Bandar) and rural areas (Bancharampur Upazila and Dhamrai Upazila).

Equity Analysis

The Equity in coverage of the vaccines was analyzed through the Vaccine Economics Research for Sustainability & Equity (VERSE) tool. This toolkit generates a composite equity concentration index that accounts for multiple factors associated with inequities in vaccination status (maternal education level, sex of the child, child age, household wealth, urban/rural designation, geopolitical location, and insurance coverage influencing equity). The tool also runs a decomposition analysis that evaluates the contribution of each factor to vaccine coverage.

Results

The coverage of vaccines in our study is comparable to the national estimates, with most vaccines having a coverage of over 82%. The concentration index for fully immunized for age is 0.121 with an absolute equity gap of 0.195, showing that childhood immunization would have to increase by 19.5 percentage points to have comparable fully immunized for age coverage between the most and least advantaged quintiles in our sample. The rural districts are the highest performing districts in our sample; Brahmanbaria and Dhaka districts have the highest levels of fully immunized for age children and equity. Decomposing the drivers of inequity for fully immunized, urban/ rural (which accounts for slum and non-slum in urban areas) is the primary driver, accounts for 71% of the variation in immunization status, even after controlling for socioeconomic status and maternal education suggesting supply-side barriers to access.

Decomposing the equity in coverage for BCG and Penta3, similar trends are observed, with urban/rural status or districts being the major drivers of inequity.

Conclusion

Overall, Bangladesh has achieved high coverage rates for most vaccines. However, to sustain the health gains from vaccinations and contain potential future outbreaks, special attention and health interventions will need to target urban areas, especially urban slums that are lagging behind in vaccinations. Evidence from our study suggests that even after controlling for wealth and education, urban/rural (including slum and non-slum) designations remain important drivers of inequity in the coverage of vaccines in Bangladesh.

Effects of Extreme Weather Events on Morbidity, Mortality and Economic Burden in German Inpatient Healthcare

PRESENTER: **Jona Jannis Frasch**, University Medical Center Hamburg-Eppendorf
AUTHORS: Hans-Helmut König, Claudia Konnopka

Climate change results in extreme weather events such as heat waves, cold waves, storms, and torrential rain with higher frequency, intensity, and longer duration in Germany. These hazards in turn lead to increased morbidity and mortality, putting further health and health-economic pressure on an already strained healthcare system. To mitigate these negative effects, improve public health and increase the resilience of the healthcare system, a detailed understanding of the effects and their preconditions are paramount. We aimed to quantify the effects of heat and cold waves as frequent extreme weather events on admission rates, mortality, and the economic burden in German emergency care.

In this observational study, we combined the Diagnostic Related Group (DRG) Statistic of the German Federal Statistical Office containing anonymized information on all emergency hospital admissions to German hospitals and possible subsequent deaths between 2010 and 2019 with daily measurements of weather stations of the German Meteorological Service. Using inverse distance weighting, we estimated weather conditions at the patients' county of residence on the day of hospital admission. We calculated emergency admission costs from the payers' perspective based on the DRG cost weights. Days were classified into temperature bins, with the daily maximum temperature being decisive for heat days and the daily minimum temperature being decisive for cold days. Extreme heat and cold days were defined as maximum temperature $> 30°C$ and minimum temperature, $< -5°C$ respectively. As a non-extreme reference, we chose days with a minimum and maximum temperature between 10 and 15°C. Using Fixed Effects Models, we estimated the effect of temperature on the rates of emergency admissions, their associated mortality, and costs.

In total, 78,486,368 emergency admissions were observed within 10 years. Patients had a mean age of 57.5 years and 53.0% were female. The average length of stay was 6.3 days. On average, we classified 19.9 days as cold days and 11.6 days as heat days per county per year. Our analyses showed that heat days were associated with higher mean emergency admission, mortality, and cost rates (admission rate: $\beta=0.87$, $p<0.001$; mortality rate: $\beta=0.11$, $p<0.001$; cost rate: $\beta=2605.96€$, $p<0.001$). In contrast, cold days were associated with lower emergency admission and cost rates (admission rate: $\beta=-0.79$, $p<0.001$; cost rate: $\beta=-1032.05€$, $p=0.009$) while cold days showed no association with the emergency admission mortality rate (mortality rate: $\beta=0.02$, $p=0.162$).

This study corroborates findings from existing literature on the effect of heat and cold waves on emergency care and broadens our understanding of the health-economic impact of climate change. Its effects on public health are substantial and pervasive, putting further emphasis on the necessity of climate change prevention and adaptation measures.

The Impact of Gas Flaring on Child Health in Nigeria

PRESENTER: **Omoniyi Babatunde Alimi**, University of Waikato
AUTHOR: John Gibson

Burning off the gas coming out of oil wells—gas flaring—is a common practice in oil-producing developing countries. This economically wasteful and environmentally damaging process occurs because infrastructure has been built with a focus on oil production rather than gas capture and because weak regulations and limited environmental monitoring makes flaring an attractive choice for oil producers. Moreover, gas flaring is harmful to human health, especially because of pollutants. This research focuses on Nigeria, where over 10 percent of all gas produced is flared and where about two million people in the Niger Delta live within four kilometres of a gas flare. While several studies from developed countries examine relationships between gas flaring and human (especially infant) health, a lack of data limits what research is possible in developing countries. This paper uses infant health data from Demographic Health Surveys, and satellite-detected data on gas flaring to examine effects of flaring on disease incidence and infant mortality for oil-producing regions of Nigeria. The findings show a strong positive association between gas flaring and the incidence of respiratory diseases and fever among children under-5 years old. The study contributes to the literature measuring the wider cost to society of oil and gas production and adds to a growing body of work using satellite data to understand well-being in places where conventional data sources are unavailable or unreliable.

Cape Town International Convention Centre | CTICC 1 – Room 2.63
New insights in health financing: evidence from innovative study designs

MODERATOR: **Susan Cleary**, University of Cape Town

Experimental Evidence on the Influence of Health Events, Aging, and Information on Switching Behavior

PRESENTER: **Ana Cecilia Quiroga Gutierrez**, University of Lucerne
AUTHOR: Stefan Boes

Understanding the effects of health events and costs on health insurance switching behavior is crucial to shed light on the health insurance decision-making process. This understanding can inform the design of effective decision-support tools for health insurance. Our study aims to contribute to this discourse by addressing two primary questions: (1) How do health events of varying costs and durations influence health insurance switching behavior? (2) What type of decision-support information can help minimize out-of-pocket expenditures when costs can be anticipated? We analyzed data from a computer laboratory experiment with twelve rounds to answer these questions. In each round, participants could modify their health insurance contract. Points could be earned through a fixed income and by answering incentivized trivia questions. Conversely, points could be lost by paying health insurance premiums and deductibles due to health events. The probabilities of health events and their costs were communicated throughout all rounds. At the end of each round, two types of health events could occur: minor events affecting costs during a single round and major health events leading to higher costs over two consecutive rounds. Using a staggered treatment approach, participants were randomly assigned to one control group and four distinct treatment groups. The control group received no decision-support information, while treatments 1 to 4 had access to generic information. Additional personalized aids featuring expected cost information were given to treatment groups 2 and 3 in visual and numerical formats, respectively. Treatment 4 received both visual and numerical information. Utilizing these personalized aids was optional for the participants. Preliminary findings suggest that participants were more likely to switch to a health insurance plan with higher expected costs after experiencing a minor health event of moderate but short-term cost and after experiencing a major health event affecting two rounds. Personalized information about expected costs reduced the likelihood of switching to a health insurance that would increase out-of-pocket costs when these events occurred. Our findings corroborate previous literature demonstrating that providing personalized decision-support information can help individuals reduce costs in health insurance choices. However, the timing and format of the information presentation may significantly affect its efficacy.

Prospect Theory in Pay-for-Performance: Stated Preference Evidence from a National Survey

PRESENTER: **Justin G Trogdon**, University of North Carolina at Chapel Hill
AUTHORS: Aveena Khanderia, Kathryn Brignole, Tara Queen

Background: Prospect theory suggests that individuals are often loss averse; they dislike losses more than they like equivalent gains. This implies that pay-for-performance schemes could incentivize similar levels of effort with smaller financial incentives if framed as a loss.

Objective: This study reports the size of financial incentives required for primary care clinical staff to exert effort to increase their HPV vaccination rates using a randomized framing experiment in a national survey.

Data: In 2022, we conducted a national survey of clinical staff working in primary care clinics that provided HPV vaccination to children (N=2,527). WebMD Market Research recruited participants through their Medscape Network. Respondents were 1) certified to practice in the US; 2) practiced as a physician, physician assistant (PA), nurse practitioner, advanced practice nurse (APN) including nurse practitioner, registered nurse (RN), licensed practical/vocational nurse (LPN/LVN), medical assistant (MA), or certified nursing assistant (CNA); 3) worked in pediatrics, family medicine, or general medicine specialties; and 4) had a role in HPV vaccination for children ages 9 through 12 years. We set quotas for roughly equal numbers of pediatricians, family physicians and other physicians, PAs and APNs, RNs, and MAs/CNAs. The response rate was 57% (AAPOR response rate 3). The University of North Carolina Institutional Review Board approved the study protocol.

Methods: We randomized survey respondents to one of two hypothetical HPV vaccine incentive programs. Those randomized to a gain frame saw: "Imagine you get an annual bonus for reaching a target HPV vaccination rate among your patients. What is the smallest bonus that would motivate you to try to increase your HPV vaccination rate?" Those randomized to a loss frame saw: "Imagine your pay is lowered if you do not reach an annual target HPV vaccination rate among your patients. What is the smallest penalty that would motivate you to try to increase your HPV vaccination rate?" We report the mean and median for responses to each question and test for differences across framing. We also pool responses and run a linear regression as a function of frame (gain versus loss), characteristics of the clinic (rurality, specialty, number of clinics in the system, ownership structure, number of prescribers, % of children using Vaccine for Children, and number of patients ages 9-12), and of the respondent (training, gender, race/ethnicity, and years in practice).

Results: In unadjusted analyses, the mean amount required to motivate effort was $2,155 under gain frame and $1,185 under loss frame (difference = $970, p<0.000). The difference in means was $967 (p<0.000) in adjusted analyses. The median amount required to motivate effort was $1,000 under gain frame and $500 under loss frame (difference = $500, p<0.000).

Conclusions: Stated preference data from primary care clinical staff suggests that effective incentives could be half as large if framed as losses rather than gains.

The Development of a Resource Allocation Model Driven By Population Health Needs and Equity: A Potential Health Budgeting Model in Western Cape, South Africa

PRESENTER: **Plaxcedes Chiwire**, Western Cape Government: Health
AUTHORS: Emma Finestone, Jodi Wishnia, Olufunke Alaba

Background: South Africa's public health budgeting and resource allocation system is dominated by a historical budgeting approach. This has created an unresponsive budgeting process regardless of changing health needs and embeds inefficiencies (where they exist). Therefore, developing a more equitable way of allocating resources between health districts and sub-districts has become a priority of the Western Cape Government: Health system.

Aim: To develop a strategic budgeting model that allocates resources equitably to geographically defined health sub-districts in the Western Cape Province.

Setting: Western Cape Province, South Africa

Methods: An Equitable Resource Allocation (ERA) model was developed in Excel. The model outputs recommend resource allocations for each health sub-district (also summarized at a health district level) based on population health needs (estimated using available demographic and epidemiological data) and demand for health services (estimated using utilization data) in each sub-district. These factors (health need and demand for health services) are combined as a weighted average to achieve the final model outputs. Secondary model outputs included recommendations for resource allocation to each facility within the relevant health district based on the total allocation recommended for that particular district. This methodology aligns with the National Treasury allocation of the national health budget across the country's nine provinces, utilizing the Provincial Equitable Share formula. The ERA development has been done using the problem-driven iterative adaptation (PDIA) approach to ensure that the model accurately considers the local context, integrates well into existing processes and systems, and achieves buy-in at all levels. The model is to be implemented using a phased-in approach to avoid major shocks to the system. Health outcomes and costs will be tracked over time to assess whether the ERA Model improves equity and value delivered.

Results: When compared to historical allocation at a sub-district and district level, the ERA Model recommends increases in allocation to some sub-districts/districts (indicating historical underfunding) and decreases in allocation (indicating historical over-funding) to others. This demonstrates the lack of equity in current allocation methods and highlights the potential to see improvements in equity, value delivered, and health outcomes under implementing the ERA Model for health resource allocation in the Western Cape.

Conclusion: Ensuring greater equity in resource allocation is central to achieving equity in health outcomes across the Western Cape, and moving away from historically embedded inequities. The ERA Model will serve as a tool to improve the budgeting process so as to promote equity and unlock higher value for the health system (better health outcomes at lower costs).

Using Instrumental Variables to Identify the Medical Care Costs Burden of Traumatic Brain Injury on Health Systems

PRESENTER: **Patrick Richard**, Uniformed Services University

Traumatic brain injury (TBI) imposes a significant economic burden on patients, families, caregivers, the healthcare system and society at large in the United States. A study conducted by the RAND Corporation that used data on veterans diagnosed with TBI found the average annual cost per patient with a mild TBI (mTBI) ranged from $27,259 to $32,759 in 2007 dollars. Costs were much higher for patients diagnosed with moderate to severe TBI (msTBI), ranging from $268,902 to $408,519, in 2007 dollars. The current study contributes to the literature by using a large dataset that is representative of the military and civilian populations, propensity score matched samples, augmented by an econometric approach that used risk taking behavior and deployment as an identification strategy to address issues of endogeneity in costs.

The current study used retrospective data from the 2021 Military Health System Data Repository (MDR), which contains socio-demographic, costs, and deployment data for 9.6 million TRICARE beneficiaries including active-duty personnel, military retirees, and their families receiving care in Military Treatment Facilities (MTFs, also called Direct Care) or civilian clinics or hospitals (Private Care). Study subjects were between 18 and 64 years old at the time of the TBI diagnosis with one outpatient or hospital inpatient admission in 2021. Total Costs including outpatient, inpatient and prescription drugs costs were the dependent variable and TBI status (No TBI, mTBI, and msTBI) were the main predictor. Generalized linear models with log link and gamma distribution (with and without instrumental variables) were used and we controlled for an extensive set of socio-demographic, clinical, and pre-comorbid conditions.

Descriptive results showed that care provided in the Private Care System to all three categories of military patients (Active-Duty Service Members (ADSMs); Guards and Reservists (GRs); and Military Retirees (MRs)) diagnosed with TBI was much more expensive compared to care provided to these same patients in the Direct Care System. This was much more so for patients diagnosed with msTBI. For instance, the average annual cost per patient for care provided to patients diagnosed with msTBI in Direct Care was $4,203 while this

increased to $32,600 in Private Care. Multivariate findings showed similar results. Further, it was important to control for omitted variable biases as we saw significant increases in the size of the coefficients in the GLM+IV (β = 0.40***) compared to the GLM (β = 0.34***) for ADSM patients diagnosed with mTBI and GLM+IV (β =1.17***) compared to the GLM (β = 1.13***) models for ADSM patients diagnosed with msTBI. The F-tests of the first stage equations for both instruments were respectively 13.00 and 5.05. We hypothesize that the GLM+IV models may be picking up some of the omitted variable biases that occurred when patients with msTBI selected private care hospitals or rehabilitative services as opposed to direct care settings. In terms of implications, there could be potential cost savings by treating most of these patients in the direct care system if the quality of care is comparable.

1:30 PM –3:00 PM   WEDNESDAY   [Health Care Financing & Expenditures]

Cape Town International Convention Centre | CTICC 1 – Room 2.41-2.42
Using Economic Evidence to Update Health Benefits Packages: From Theory to Practice.

MODERATOR: **Peter Baker**, Center for Global Development

ORGANIZER: **Javier Guzman**, Center for Global Development

DISCUSSANT: **Sebastian Bauhoff**, Harvard University; **Pamela Gongora-Salazar**, University of Oxford; **Sudha Chandrashekhar**, National Health Authority

A Multistep Approach to Systematically Update HBPs Using Economic Evidence
PRESENTER: **Ursula Giedion**, Center for Global Development
AUTHORS: Amanda Glassman, Abha Mehndiratta

It is being increasingly recognized that Health Benefits Packages (HBPs) are a dynamic policy instrument that needs to be periodically and systematically updated. Changing demand, new technologies, new evidence, changing resources, different costs, learnings from the implementation of the HBP and adjustment of goals and priorities all warrant a periodic revision of HBPs to maintain the legitimacy of this social contract on what's in and what's out. Most of the literature in that regard has focused on the use of Health Technology Assessment (HTA) as a tool to make the inclusion of new technologies more evidence-based. Much less has been said however about the many other steps that a systematic updating of the shape, size, and budget envelope of an HBP involves and how economic evidence (cost, budget, thresholds, prices, opportunity cost of coverage gaps, among others) can inform these processes and how these processes can be pragmatically approached in LMICs where resources to finance the HBP but also time as well as human and financial resources and information sources are scarce. This session will present a framework of the main steps involved in comprehensively updating HBPs in LMICs and the role economic evidence plays along the whole process. It will conclude by highlighting current knowledge gaps related to the pragmatic updating of HBPs, and provide guidance on opportunities and needs for future research on methods and evidence.

Systematic Priority-Setting for UHC in India Using Economic Evidence
PRESENTER: **Shankar Prinja**, Postgraduate Institute of Medical Education and Research
AUTHORS: Sudha Chandrashekhar, Ursula Giedion, Abha Mehndiratta, Y-Ling Chi, Javier Guzman

The Government of India in 2018, in a step towards its goal of Universal Health Coverage (UHC) and to protect the economically weaker section of society from catastrophic health expenditure, launched the world's largest health insurance scheme called Ayushman Bharat Pradhan Mantri Jan Arogya Yojana (PM-JAY). The scheme is managed by the National Health Authority (NHA) and provides a health cover of INR 500,000 per family per year for secondary and tertiary care hospitalization covering approximately 500 million beneficiaries that form the bottom 40% of the Indian population. The PM-JAY scheme has a defined health benefits package (HBP) which specifies the scope and price of healthcare services provided. However, to achieve more benefits with the same resources it is important to have an explicit process of priority setting, which includes use of economic evidence to inform periodic revisions of health benefits and setting of prices.

This paper aims to share the experience of the NHA in iteratively reforming its HBP updating process for greater alignment with the PM-JAY strategic goals of improving access and financial risk protection by taking into account cost and cost-effectiveness data, budget allocations and health system constraints for overall allocative efficiency. In this paper we provide insights on the methods and processes adopted by the NHA in relation to the use of economic evidence for updating the PM-JAY HBPs. This includes the use of adaptive and traditional health technology assessments to inform decisions on inclusions of new interventions in the HBPs; rate setting through financial analysis of cost evidence and available budget and the assessment of fiscal impact through budget impact analysis. The paper also highlights the participatory process followed and the challenges in translating economic evidence into policy through appraisals done by committees and subsequent stakeholder engagement and feedback.

Our paper provides useful lessons for other LMICs on a similar trajectory towards UHC.

Updating the Cost of HBPs in Latin America. A Hidden Treasure Requiring a Pragmatic Approach
PRESENTER: **Rodrigo Muñoz**, Interamerican Development Bank

Updating the costing information is a key building block in systematic HBP updating efforts as it is a necessary ingredient for planning, budget and resource mobilization, affordability and cost-effectiveness considerations related to inclusions and rate setting. However, most exercises remain static, in-point exercises. While these costing studies provide valuable information for mobilizing the resources necessary to finance HBPs, they often lack the level of detail and flexibility that local decision-makers need to understand how different ways of providing and procuring the prioritized interventions and different coverage levels will impact the cost of their updated HBP. In addition, they don't provide the necessary tools to routinize and institutionalize costing in low- and middle-income countries (LMICs), where time, human resources and data tend to be scarce. The aim of this study is to build on our work in three Latin-American countries where we supported the costing of HBPs (Argentina, Honduras and the Dominican Republic) to discuss a pragmatic approach to routinize the costing of HBPs in the context of HBP updating efforts in LMICs.

Costing is useful not only to determine the financing requirements for an HPB and inform provider payments, but it can also help policymakers understand how changes in coverage goals of services included in the HBP and changes in the way services are being delivered with the purpose of addressing inefficiencies will impact the cost and sustainability of the updated HBP. Governments in LMICs don't have the time nor the capacity to carry out detailed HBP costing studies, nor do they have the resources to redo their costing from scratch for each new round of the HBP updating process. Based on the former we have used two approaches in Latin America: i) normative costing where production functions of each intervention is extracted from local guidelines and protocols and unit cost of inputs (human resources, medicines, medical devices, etc.) is collected from local databases, and, ii) a costing tool that offers substantial space for local adaption and simulations while facilitating the task of doing the updating of the HBP costing by providing cost reference cases for common intervention packages.

Normative costing is extremely powerful, because it gives governments a detailed view of the production functions, associated input prices and optimal population coverage levels for each intervention and offers a starting point for simulations and discussions on how the interventions included in the HBP will be implemented and procured. To facilitate the routinization of costing in the context of updating HBPs we have developed "reference cases" of the intervention packages and their cost and provided governments with training and software tools to review the costing assumptions, make policy-relevant simulations, and add new interventions. We have seen favorable responses from governments, when we presented our HBP updating costing studies as a flexible tool as opposed to the provision of a static set of results and when "reference cases" were prepared in advance for discussion and adaption to the local context.

Prioritize Your Priority-Setting Efforts When Updating a HBP: A Framework for LMICs

PRESENTER: **Natalia Jorgensen**, Interamerican Development Bank
AUTHORS: Pamela Gongora-Salazar, Ursula Giedion, Lucia Bettati, Manuel Espinoza

Background: Health benefits packages (HBPs) are considered a cornerstone of health systems aiming to progress toward universal health coverage (UHC). They are, however, not static and considering constant changes in health technologies that are available, evidence, budgets, prices, and national priorities, HBPs should be updated periodically. Nevertheless, only few low-middle-income countries have a systematic and evidence-based revision process in place, partly due to a lack of data, time constraints, and limited technical or administrative capacity. In 2021, Argentina, a middle-income Latin American country, decided to tackle these challenges and develop a value framework to review and periodically update PMO (mandatory health plan) and to extend its scope to all Argentineans.

Aims: To develop an explicit evidence-based priority-setting framework to update Argentina's HBP.

Methods: After setting the goals and defining the structure of the HPB, a three-phased approach was developed to adjust the contents of the HPB. First, disease control priorities were defined using a multi-criteria decision analysis model (MCDA). Assessment criteria were defined by 18 members from the Ministry of Health and the Superintendency of Health Services, and the PAPRIKA method was then used to determine the relative criteria weights. For the second phase, we identified the universe of potential health services candidate for inclusion and all health services or benefits were classified into three groups: (i) "Yes-Yes" benefits, which do not require additional evaluation and should be automatically included to the HPB. These benefits are strongly recommended by clinical guidelines and are highly cost-effective; (ii) "NoNo" benefits, which due to either the low quality of the available evidence (according to the GRADE approach) or the negligible clinical added-value should not be considered by the country; and (iii) "Grey Zone" benefits, which require additional evaluation due to their high cost and uncertainty concerns. Phase three deals with "Grey Zone" benefits are starting to be evaluated by applying an adaptive health technology assessment (aHTA) methodology.

Results: Four assessment criteria, aligned with UHC objectives, were defined to establish disease control priorities. The criteria, in order of importance (mean weights in parentheses), were: magnitude of clinical benefit (33%), burden of disease (29%), severity of disease (21%) and equity of access to healthcare (17%). In total, 130 health conditions were prioritised and ranked. After applying the 3-tier triage method, 3,083 interventions were classified as "Yes-Yes" (e.g. metformine for diabetes II), 318 as "NoNo" (e.g. insulin pump) and 634 as belonging to the "Grey Zone" (e.g. GLP-1 antagonist) and will be scrutinized by health technology assessment (HTA or aHTA). When confronted with the costing and budget analysis it became evident that the HBP will not be able to finance anything but the "Yes-Yes" benefits while services from the "Grey Zone" will only be gradually evaluated and incorporated.

Conclusions: A sound triage approach based on general inclusion/exclusion criteria and aHTA is a way for LMICs wishing to introduce periodic, systematic and evidence-based HBP updating processes while keeping in mind the serious time, skills and resource restrictions that exist to carry out these processes.

Cape Town International Convention Centre | CTICC 1 – Room 2.64-2.65

Cannabis use and abuse [ECONOMICS OF RISKY HEALTH BEHAVIORS SIG]

MODERATOR: **Estelle Dauchy**, Campaign for Tobacco Free Kids

State Recreational Cannabis Laws and Racial Disparities in the Criminal Justice System

PRESENTER: **Adrian Rubli**, ITAM
AUTHORS: Angelica Meinhofer, Jamein Cunningham

Overview. In the US, racial disparities in law enforcement of drug prohibition are widespread and longstanding, with Black communities disproportionately affected. We studied the effect of cannabis legalization on racial disparities in the criminal justice continuum using a difference-in-differences framework. Preliminary findings indicate sizable reductions in arrest rates for cannabis across all groups, narrowing the gap between minorities and White populations. However, this is offset by increases in non-drug arrests, particularly for less serious offenses and with larger effects for Black persons. We found no changes in incarceration rates nor increases in street violence. Although cannabis legalization may be a policy lever for addressing historic racial disparities, additional provisions in the law may be crucial for reducing inequalities.

Background. As of 2022, 20 states have passed recreational cannabis laws (RCLs), allowing individuals ages 21+ to possess, use, and supply limited amounts of cannabis for recreational purposes. Supporters of cannabis legalization espouse that RCLs will create hundreds of thousands of jobs, generate tax revenue, take business away from illegal markets, lower street crime and violence, reduce law enforcement costs, and close racial and ethnic disparities in criminal justice outcomes.

Research question. What are the effects of RCLs on racial and ethnic disparities in the criminal justice continuum, particularly among law enforcement and street violence outcomes?

Methods. We leveraged a variety of administrative datasets spanning 2007-2019, each providing complementary strengths and allowing for a validation check of findings, which is necessary given the inherent challenges in measuring criminal justice outcomes. We exploited the staggered timing of RCL implementation across states, using effective dates in a difference-in-differences (DID) framework. We showed event study plots and static DID estimates, and verified that main results were robust to recent advances in the DID literature.

Results. Preliminary findings suggest that legalization led to sizable reductions in arrest rates for cannabis possession and sales across all racial groups, resulting in declines in the rate ratio and rate difference for Black relative to White populations. While arrest rates for possession of other drugs did not change significantly, arrests for sales of other drugs decreased across all racial groups. However, declines in drug arrests were accompanied by offsetting increases in arrests for disorderly conduct and simple assault, which are less serious offenses that often reflect discretionary police behavior. There were no significant changes in incarceration rates. Moreover, there were no increases in street violence following legalization and in some cases, we documented declines among Black and Hispanic populations.

Contributions. Elucidating the impact of RCLs on racial and ethnic disparities in the criminal legal system is important for designing successful regulation that works in reparative ways. This timely study is of critical importance as it can inform the cannabis legalization debate, guide federal and state governments regulating cannabis possession and distribution, and identify unintended consequences.

Flying High? the Economics of Cannabis Legalization

PRESENTER: **Tiffanie Perrault**, McGill University

To which extent do cannabis legalization policies undermine the black market? I assemble a novel dataset on US city-level prices and THC potencies, used as proxies for quality, in both prohibition and legalization environments. Taking advantage of this data, I document the equilibrium responses of the black market throughout legalization and provide estimates for consumer behavior with regards to changes not only in price, but also in quality (here measured by THC potency).

Using difference-in-difference techniques, I show that legalizing recreational cannabis results in illegal cannabis prices dropping by more than 20% and quality rising by almost 1.4% on average. Besides, the price effect of legalization is heterogeneous across products of different THC potencies: it is driven by low and medium potency products, whereas the price of more potent products does not necessarily decrease. This result is new to the literature. It suggests that after legalization, the black market does not only differentiate in prices. Strategic responses are more complex and also include adjustments in potency. One concern is that post-legalization the black market could target the demand for more potent products, which are more damageable to health.

To better understand the role of price and quality on consumer choices for legal and illegal cannabis, I estimate a random utility model of discrete choice for cannabis. This model rationalizes preferences with regards to quality. I combine price and quality data for legal and illegal cannabis with consumption microdata for the state of Washington (BRFSS). The BRFSS does not allow to distinguish legal from illegal consumption without any supplementary assumption. The model design accounts for this feature, exploiting a two-step estimation strategy on the probability of consuming cannabis (illegal or not) before and after legalization. It yields estimates for consumer

sensitivity to price and THC potency on both sectors, legal and illegal. Cross-price elasticities indicate little substitution between the two sectors following changes in price. However, a 10% improvement in quality in the legal retail sector involves a decrease of the demand for black-market cannabis by 5%. In this line, counterfactual analysis derives best-response functions of the black market to changes in legal price and quality and presents high quality provision as a creditable tool to drive illegal retailers out of the market.

This paper contributes to the state of knowledge on cannabis legalization by being the first to quantify the responses of consumption to combined changes in policy and product characteristics. Taking advantage of a newly assembled dataset, it provides estimates for consumer behavior with regards to changes not only in price, but also in quality. While previous studies have focused on the sensitivity to price, availability and risk, this paper is the first to investigate the quality dimension. Finally, the two-step procedure developed in the second part adds up to the literature on contraband markets: it proposes a solution to evaluate substitution patterns between the legal and the illegal sectors, while the respective market shares of these are not observed by the econometrician.

The Savings Associated with Decriminalisation of Drug Use in New South Wales, Australia: A Comparison of Four Drug Policies

PRESENTER: **Anh Dam Tran**, University of New South Wales
AUTHORS: Donald Weatherburn, Suzanne Poynton

Background

Concern about the large amounts spent on drug law enforcement has prompted some influential commentators to call for reform of the law concerning illicit drug use and possession. In Australia, most Australian States and Territories have established some form of scheme to divert minor drug offenders from court. However, the number charged with drug possession continues to rise. We aim to develop a microsimulation model calibrated to the New South Wales criminal justice system. We then use this model to examine cost savings from four alternatives to existing policy responses to people apprehended by police using or in possession of a prohibited drug.

Methods

We construct a Markov micro-simulation model to examine four policies: (1) current policy; (2) expanding the existing cannabis cautioning scheme to all drug use/possession offences; (3) issuing an infringement notice to all those found using or in possession of a prohibited drug; (4) prosecuting all drug use/possession offences in the courts. The cycle length is one month. Since our aim is to examine the cost to the Government, all costs are taken from the Government perspective and are in 2020 Australian dollars. There are five health states in the model: Free, Detected, Court, Prison, Supervised Order. Probabilities were taken from NSW Bureau of Crime Statistics and Research 2020. Costs were taken from Australian Productivity Commission Report on Government Service and the NSW Legal Aid Commission. The model was implemented by TreeAge Pro Healthcare 2021 version R2.1 software. Our paper followed Consolidated Health Economic Evaluation Reporting Standards (CHEERS) checklist.

Results

The current estimated annual cost per offence is $977 (SD: $293). Policy 2 costs $507 per offence per year (SD: $106). Policy 3 turns into a net revenue gain of $225 (SD: $68) per offence per annum. Policy 4 lifts the current cost of processing from $977 to $1,282 per offence per year (SD: $321).

Conclusions

The current findings suggest that the monetary savings should be regarded as a consideration in deciding whether to decriminalise illicit drug use or remove cases of prohibited drug use/possession from the court system. Minor drug offenders may make up bulk of those appearing in court, but a large part of the drug law enforcement budget appears to be directed at apprehending those involved in importation, cultivation, manufacture, and trafficking. An arguably more relevant consideration is whether the costs imposed on those convicted of using illegal drugs for possessing a small quantity of illicit drugs for personal use is worth the benefit gained in terms of public safety. Considering the adverse consequences of criminal conviction on an individual's employment and earnings prospects, and the evidence that more severe sanctions are not a deterrent to drug use, this seems doubtful.

Cost-Effectiveness of Medical Cannabis for Treatment of Chronic Pain: A Longitudinal Cohort Study of a Large German Hybrid Telemedicine Platform

PRESENTER: **Martin Julian Keller**, University of Gothenburg - Sweden
AUTHORS: Despoina A Bygvraa, Christian Scholze

Cost-Effectiveness of Medical Cannabis for Treatment of Chronic Pain: A Longitudinal Cohort Study of a Large German Hybrid Telemedicine Platform

Background: Despite a growing body of evidence indicating that medical cannabis may mitigate symptoms in chronic pain patients, associated treatment costs are still considered higher than standard of care, with insurances in many countries rejecting cost reimbursement. This study aimed to evaluate the effectiveness of medical cannabinoids for both health and economic aspects based on a retrospective analysis of a large cohort of patients treated with cannabinoids via a specialized German hybrid telemedicine platform.

Methods: We performed a quantitative longitudinal cohort study using anonymized data of chronic pain patients treated via a German hybrid telemedicine platform between 06/2021 and 03/2022. Symptom severity indices were assessed using a 0-10 numeric rating scale. The quality of reporting of economic evaluations was assessed using the Consolidated Health Economic Evaluation Reporting Standards checklist.

Results: A total of 119 patients were ultimately included. Treatment with medical cannabis led to a significant improvement of symptom severity indices for pain (6.752 ± 0.125 to 2.945 ± 0.202), sleep (7.853 ± 0.174 to 1.927 ± 0.186) and appetite (4.580 ± 0.270 to 1.077 ± 0.329) compared to baseline (all $P<0,0001$). Quality-adjusted life years (QALY) improved significantly from 3.170 ± 0.250 for T0 to 8.132 ± 0.833 ($P<0.0001$). The average number of physician visits reduced significantly by 64.2% ($P=0.0007$) from 1.12 visits per month to 0.40 physician visits. Average annual medication cost was estimated to be €5,269.08 EUR. Average German willingness to pay (WTP) per 1-unit gain in QALY was €20,000.00 - €80,000.00 EUR. Cannabinoid therapy was highly cost-effective as its costs were less than 1 x gross domestic product (GDP). After applying a discount rate of 3%/year, the average yearly WTP for the experienced overall improvement was €194,172.08 EUR.

Conclusions: Treatment with medical cannabis may reduce symptom severity, improve quality of life and may be cost-effective compared to the standard of care in patients with chronic pain.

1:30 PM –3:00 PM   WEDNESDAY   [Demand & Utilization Of Health Care Services]

Cape Town International Convention Centre | CTICC 1 – Room 1.62
Healthcare delivery and equity in special populations
MODERATOR: **Allen Goodman**, Wayne State University

Dengvaxia Controversy and Children's Vaccination in the Philippines
PRESENTER: **Jianan Yang**, Stanford University
AUTHOR: Emma Dean
Background

Vaccination is critical for the prevention and control of infectious diseases. However, vaccination hesitancy is growing in many regions across the globe. Misinformation is arguably one of the key contributors to vaccine hesitancy. One well-known example is the misclaim that measles vaccine causes autism. Originally published in the Lancet, although later proven false and retracted, it contributed to a persistent trend to delay vaccination during 1998–2011 in the U.S. In developing countries, vaccine hesitancy caused by misinformation could have more dire consequences due to heavier infectious disease burden. Years of effort made by global and government organizations to procure and deliver vaccinations could be hampered by growing rates of vaccine hesitancy.

We examine the impact of vaccine hesitancy in the context of the Dengvaxia controversy in the Philippines, which resulted largely due to inadequate social preparation and risk communication. In 2016, the Philippines initiated a school-based mass vaccination campaign with the first licensed dengue vaccine (Dengvaxia®), reaching around 800,000 children. In November 2017, a media frenzy erupted after the manufacturer of Dengvaxia®, Sanofi Pasteur, revealed that the vaccine increases the risk of disease severity in children without previous dengue infection. The controversy led to the public's loss of confidence in vaccines. The aim of this study is to study its impact on vaccination rates and other measures of healthcare utilization, especially those related to maternal and child health.

Methods

We use geocoded household survey data from the Demographic and Health Surveys (DHS) data, data on school locations published by the Philippines Department of Education, and aggregate data on vaccination from UNICEF in a difference-in-difference framework. First, we compare vaccination rates and other measures of healthcare utilization before and after the Dengvaxia controversy in the Philippines, using as the control a set of other Southeast Asian countries, as well as Brazil - where the Dengvaxia vaccine had also launched but where the media outrage was not as strong as in the Philippines. We also look at within-country variation in exposure to the scandal using a number of measures of exposure: region (as some regions did not have a vaccination campaign), age of older children (as the mass vaccination program targeted children ages 9 and 10), exposure to news and media (collected via survey data) and distance to school (as the Dengvaxia program was school-based). As outcomes, we consider childhood vaccination rates in addition to a broad set of measurements of healthcare utilization.

Results

Following the Dengvaxia controversy, there is a significant decline in childhood vaccination rates in the Philippines. Childhood vaccination rates for the Bacille Calmette-Guerin (BCG) vaccine in the Philippines declined from 90% in 2016 to 70% in 2019. The rates of neighboring countries, including Thailand and Vietnam, are staying stable at around 95% during this period.

Conclusion

The Dengvaxia controversy led to the declining use of childhood vaccination in the Philippines, with potentially serious public health consequences. Our findings highlight the importance of risk communication and trust building in improving vaccination coverage among the population.

Does the Fulfillment of Contraceptive Method Preferences Affect Contraceptive Continuation? Evidence from Three Urban Areas of Sub-Saharan Africa

PRESENTER: **Carolina Cardona**, Johns Hopkins University
AUTHORS: David Bishai, Philip Anglewicz

BACKGROUND

Although interest in patient-centered family planning measures is growing, little is known about women's preferences for contraceptive methods and whether these preferences influence contraceptive behaviors.

OBJECTIVE

We assessed whether the fulfillment of contraceptive preferences affected women's decisions to continue, switch, or stop using contraception.

METHODS

Longitudinal data came from the Urban Reproductive Health Initiative (URHI) collected in urban areas of Kenya, Nigeria, and Senegal between 2010 and 2015. Women's data were collected over three rounds implemented every two years, and health facility data were collected twice and four years apart.

Women of reproductive age who were not using contraception at baseline and intended to use contraception reported their preferred contraceptive method. In the second round, they reported their contraceptive use. This reporting permitted us to measure whether they fulfilled their baseline preference.

We examined whether fulfilling their contraceptive preference was associated with the decision to continue, switch, or stop using contraception by the third round estimating a set of probit and seemingly unrelated bivariate probit models. URHI improved the reproductive health of the urban poor through a set of interventions on both the demand and supply sides. The health system women accessed in Round 1 differed from the health system they accessed in Round 3. We took advantage of these improvements in the health system to estimate the seemingly unrelated bivariate probit models.

RESULTS

Our sample consisted of 1,150 women who participated in all three survey rounds, of whom 470 reported their preferred method of contraception. Among women with observed contraceptive preferences, only 41.5% adopted at Round 2 their preferred method reported in Round 1. Continued use of the same method of contraception reported in Round 3 was 37.1%, contraceptive stopping was 25.0%, and contraceptive switching was 37.8%.

Adjusting for individual, household, and health system characteristics, women with fulfilled contraceptive preferences, were 25 percentage points less likely to stop or switch contraceptive methods than women with unfulfilled contraceptive preferences. This difference was reduced to 19 percentage points between women with fulfilled and unobserved contraceptive preferences.

We also tested an alternative outcome definition of contraceptive continuation/switching that used stopping as the reference category. We found that women with a contraceptive preference-use match (as opposed to unobserved preferences) were 9 percentage points more likely to continue using any method of contraception (as opposed to stopping).

CONCLUSIONS

Fulfilling contraceptive preferences is associated with later contraceptive behavior, which demonstrates the importance of these preferences for family planning goals.

CONTRIBUTION

This study is important because it is the first research looking at the relationship between the fulfillment of contraceptive method preferences and contraceptive continuation in a developing country context. Women have a high probability of adhering to their contraceptive method when using a method that satisfies their contraceptive preferences.

"Unravelling Factors and Inequities Associated with Provider Preference for Management of NCD Care in Urban Areas: A Case Study of Mysuru City, India"

PRESENTER: **Fenghang Li**, Wuhan university
AUTHORS: Veenapani Rajeev Verma, Rajeev Sadanandan

Background: India underwent rapid epidemiological transition in last decades with NCDs accounting for 63.7% of all mortality, mostly driven by diabetes and hypertension. To address this, India started a National Programme to provide free prevention and management facilities in public facilities. In urban areas, this is provided through the Urban Primary Health Centres. However, the uptake of services in public health facilities remained low in India.

Objectives: a) Identify the socio-economic-contextual determinants of and barriers to utilization of public health facilities for Diabetes/Hypertension in urban India b) Estimate horizontal inequities in uptake of public facilities.

Study Setting: Mysuru, city located in the Karnataka state of India with a population of 920,000 with 18% residing in slum and like areas. Free services are provided at 23 public health facilities.

Study Design: Concurrent embedded Mixed-method design where Qualitative strand is embedded within Quantitative component (QUAN+ qual typology)

Participants: Adults >30 years

Methods: a) *Community Survey*: Multistage sampling culminating to 11,978 adults above 30 years to collect information on prevalence of *Diabetes Mellitus and Hypertension* and health-seeking behaviour b) *Facility Survey:* Facility audit to assess *Structural Quality* of care with tools modelled after *WHO's SARA guidelines* and *Indian Public Health Standards* c) *Patient Exit Survey:* 177 adults to gauge *Process Quality* of care d) *Qualitative Tools:* Multistakeholder-15 KIIs, 4 Public Engagement, 15 FGDs, 9 In-depth interviews and 15 Field notes. *Polychoric Principal Component Analysis* employed to estimate Provider Quality, Socio-economic-status and Healthy Lifestyle scores by coalescing tracer indicators. Community, Facility and Patient Exit Surveys linked using *Geospatial Ecological linking* where Euclidean buffer of 2 kms taken to define catchment area. Median structural and process quality scores of all public facilities within catchment area of household assigned to each case. Using *Andersen's conceptual framework*, a *Nested logistic model* estimated to glean factors impacting uptake of public facilities where choice of provider was nested within choice of seeking care. Extent of inequities in utilization of public health facilities ascertained by Regression-based Need-standardized *Erreyger's concentration indices*.

Results: Prevalence of Diabetes/Hypertension was 17.3%, out of which 31.7% seek routine care from public facilities. Wealth-inequalities in provider choice was found as lowest quintile group prefer public facilities (40.1%) more than richest quintile (22.0%). Concomitantly, Inequity indices were significant and pro-poor (-0.106) for Public and Pro-rich (0.016) for Private facilities. Suboptimal facility readiness score (54.6) for Diabetes/Hypertension care was found. Higher education, association with non-marginalized caste & religious group, lower average quality and satisfaction score of catchment facilities, lower lifestyle score and privately purchased insurance decreased odds of seeking care at public facilities.

Policy Prescriptions: Qualitative and Quantitative findings converge towards targeting both demand and supply side of service delivery. The skewed worker/population ratio of Community, Healthcare and Outreach workers and shortfalls in diagnostic facilities, equipment and medicines in government facilities need to be addressed. Behavioural change communication aimed to address the lack of acceptance and cooperation from population concurrently with supply side strengthening is needed to improve uptake of services in public facilities.

Keywords: *NCDs, Provider-Preference, Urban-Healthcare, Inequities*

Does the Covid-19 Pandemic Threaten Equity in Healthcare Use in Europe?

PRESENTER: **Florence Jusot**, Université Paris Dauphine
AUTHORS: Louis Arnault, Thomas Renaud

Promoting equity are among the main objectives of health systems. In the field of health care utilisation, two principles have been defined to assess equity. Ensuring horizontal equity implies to guarantee the same use of the healthcare system for a given level of need, irrespective of the ability to pay or education. Respecting vertical equity requires the sickest to receive more care than others, regardless of their socio-economic characteristics. However, the outbreak of the COVID-19 crisis has compelled countries to undertake major reorganisations of their healthcare systems, which has led to drastic healthcare rationing. This study explores the extent to which the COVID-19 pandemic has jeopardized equity in healthcare use among individuals aged 50 or more in Europe.

Using the variance as our inequality measure, we assess horizontal equity based on a well-known measure (fairness gap). We also address the normative question of vertical equity and propose a new method for measuring it empirically. The sample includes 24 648 respondents of the SHARE survey living in 18 European countries, who have taken part in three separate operations of data collection: the eighth survey wave, conducted between October 2019 and March 2020, as well as the first and second SHARE Corona surveys (SHARE Covid-19 1 & 2), conducted in June-July 2020 and June-July 2021 respectively.

Healthcare utilisation is assessed by binary indicators of physician and hospital care utilisation at each period. Three socioeconomic variables (income, education, economic vulnerability) are used to measure illegitimate sources of inequity in healthcare use, according to the horizontal equity principle. A large set of health indicators (needs) aims to capture legitimate sources of inequality in healthcare use, according to the vertical equity principle. Probit regressions are also controlled for demographics and country fixed effects.

Although we demonstrate the existence of moderate ("pro-rich") horizontal inequities in doctor utilisation among people aged 50 or more in Europe before the epidemic, we do not observe any strong evidence that the level of horizontal equity evolved significantly during the pandemic. Nevertheless, vertical inequity in physician utilisation has significantly increased, especially in in most Baltic or eastern European countries. A significant increase in vertical inequity in hospital care is also observable in many European countries, especially from western or central Europe. These results may give rise to concerns about medium-term adverse health effects for high-need individuals and demonstrate the need for public policies to be implemented to restore their access to healthcare.

Drivers of Health Disparities and Consequences for COVID-19 Vaccine Choices: Modelling Health Preference Heterogeneity Among Underserved Populations

PRESENTER: **Eline M. van den Broek-Altenburg**, University of Vermont
AUTHORS: Adam Atherly, Jamie Benson, Stephane Hess

Objectives: Reducing the extra burden COVID-19 is having on people already facing disparities is among the main national priorities for the COVID-19 vaccine rollout. Early reports from states releasing vaccination data by race show that White residents are being vaccinated at significantly higher rates than Black residents. Public health efforts are being targeted to address vaccine hesitancy among Blacks and other minority populations. However, health care interventions intended to reduce health disparities that do not reflect the underlying values of individuals in underrepresented populations are unlikely to be successful. The objective of this study was to identify key factors underlying the disparities in COVID-19 vaccination.

Methods: We gathered longitudinal data asking respondents to imagine a situation where a number of vaccines for COVID-19 had been developed. These vaccines would have undergone all required testing and received regulatory approval for use in humans. They were then faced with six scenarios, or choice tasks, where in each task, two possible vaccines were described with seven attributes. We estimated five sets of choice models and compared model fit, including a simple multinomial logit, a nested logit (NL) grouping together all vaccine options, an NL with socio-demographic effects, a latent class (LC) with purely random heterogeneity and a LC with the same socio-demographic effects as the NL models. Respondents were sampled from an online Qualtrics panel from August 10 through September 3rd, 2020, and were representative with respect to the state and U.S. population in terms of age, gender and race.

Results: Overall, we found that individuals who identify as Black had lower rates of vaccine hesitancy than those who identify as White. This was true overall, by latent class and within latent class. This suggests that, contrary to what is currently being reported, Blacks are not universally more vaccine hesitant. Combining the respondents who would not consider a vaccine (17%) with those who would consider one but ultimately choose not to vaccinate (11%), our findings indicate that more than 1 in 4 (28%) persons will not be willing to vaccinate. The no-vaccine rate is highest in Whites and lowest in Blacks.

Discussion: Lower rates of vaccination among Black Americans do not reflect lower rates of racially motivated vaccine hesitancy. Instead, these lower rates reflect a higher proportion of Blacks among groups with vaccine hesitancy – lower income and lower educated individuals. To reduce racial disparities in vaccination rates, it will be necessary to address vaccine hesitancy more broadly in disadvantaged populations. Our model results help point the way to more effective differentiated policies.

The Interaction between Disability Support and Healthcare: The Example of Australia

PRESENTER: **Bernice Hua Ma**, Monash University

Background: Social care plays a critical role in the health and wellbeing of people with a disability. It can complement healthcare access by overcoming the barriers people with a disability face when accessing healthcare, but it may also provide a substitute for healthcare, especially for allied health and mental health care where there is a fine line between therapy (healthcare) and daily-living support (social care). More generally, enhanced social care may improve the health of people with a disability over time and reduce the need for future healthcare. Thus, it is unclear how providing enhanced social care will impact healthcare utilisation for people with disabilities. The Australian National Disability Insurance Scheme (NDIS) was established in 2013 and implemented through a staggered rollout across Australia. It provides enhanced personalised support (e.g., daily activities, non-clinical therapies) to people with a long-term profound or severe disability. In this paper, we examine whether providing enhanced social care via NDIS affected the healthcare use of people with disability.

Methods: Linked Australian population-wide administrative datasets, provided detailed information about healthcare utilisation, NDIS status and population demographics from 2011 to 2020. Using the staggered rollout, we estimate a Difference in Difference model to assess the impact of the NDIS on healthcare use. Specifically, we focus on healthcare services (e.g., visits to general practitioners (GPs), mental healthcare providers, allied health professionals and specialists) and filled mental health prescriptions.

Results: Our results show that the NDIS decreased the quarterly use of mental health services (b=-0.035 time/quarter, 95%CI: -0.061 to -0.009) and allied health services (b=-0.017 time/quarter, 95%CI:-0.030 to -0.003) in the six quarters after enrolment, but has not yet impacted the visits to GP or specialists. The decrease in mental health services comes from fewer mental health visits to GPs, allied health professionals, and psychologists, but the use of psychiatrists remains stable. These changes seem driven mainly by children and young adults aged 0-24. We also find no change in the mental health prescriptions.

Conclusion: The decreased use of mental health and allied health services suggests that the NDIS may have a substitution effect on healthcare services it directly funds. Before the NDIS, the healthcare system potentially bore more of the burden of both the clinical and

non-clinical sides of the therapies and care. The NDIS seems to be able to relieve some of that burdens, especially on non-clinical care by healthcare professionals. Longer-term follow-up is needed to see whether enhanced social care has longer-term effects on reducing healthcare needs.

3:15 PM –4:45 PM   WEDNESDAY   [Special Sessions]

Cape Town International Convention Centre | CTICC 1 – Auditorium 2
CLOSING PLENARY: Reframing Health Economics in the Context of Climate Change

MODERATOR: **Paula Lorgelly**, University of Auckland | Waipapa Taumata Rau

SPEAKER: **Elizabeth Robinson**, Grantham Research Institute, London School of Economics and Political Science; **Josephine Borghi**, London School of Hygiene & Tropical Medicine (LSHTM); **Martin Hensher**, Deakin University

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4:45 PM –6:00 PM   WEDNESDAY   [Social Events]

Cape Town International Convention Centre | CTICC 1 – Clivia, Jasminum & Strelitzia conservatories
Closing Reception