Immunization Economics IHEA Pre-Congress Meeting

August 2023

IMMUNIZATION ECONOMICS.ORG

IHEA INTERNATIONAL HEALTH ECONOMICS ASSOCIATION

Overview

On 8-9 July 2023, an Immunization Economics Pre-Congress meeting was organized in Cape Town, South Africa, ahead of the 15th International Health Economics Association (IHEA) Congress.

The Cape Town 2023 meeting marked the second in-person convening of the Special Interest Group, and assembled a wide range of stakeholders from academia, governments, multinational organizations, nonprofit sector, consulting groups, and donor organizations.

The **Immunization Economics Community of Practice** is a platform for those **interested in immunization financing, costing, equity, and value**, and facilitates the dissemination of evidence, tools, and guidance on these topics.

The Immunization Economics Special Interest Group at IHEA was established as a forum to discuss research relevant to the community and bring members of the community together with the broader health economic audience of IHEA.

Organized by

THINK WELL

The aims of the meeting were threefold:

- **Discuss the latest research methods and approaches** in immunization costing, financing, economics, and decision-making
- **Share successes and challenges** in evidence generation and use to help identify best practices
- **Align on research priorities and approaches**

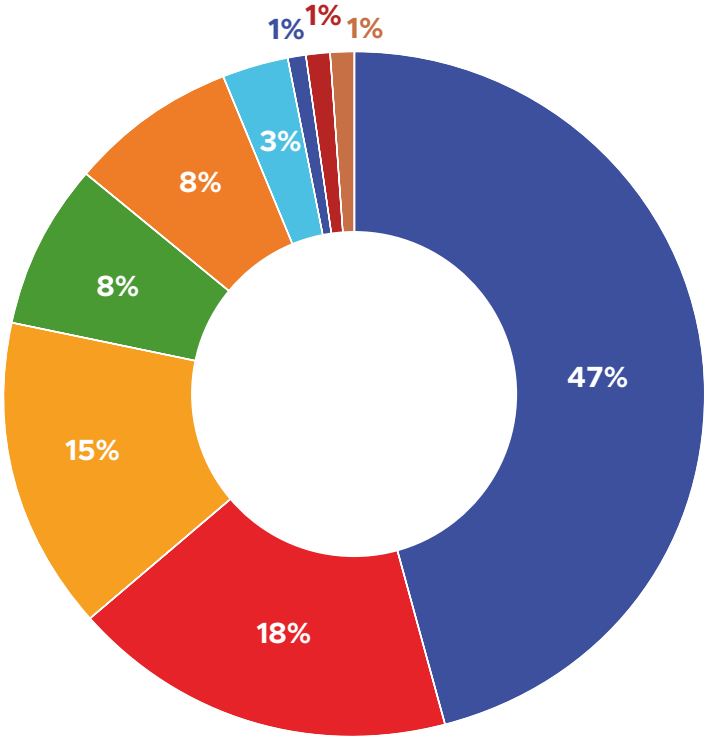
The pre-congress meeting was attended by **155 participants** representing **42 countries** and **81 institutions**

Almost **one third of participants are based in Africa** and nearly **one half represented academia or scientific organizations.**

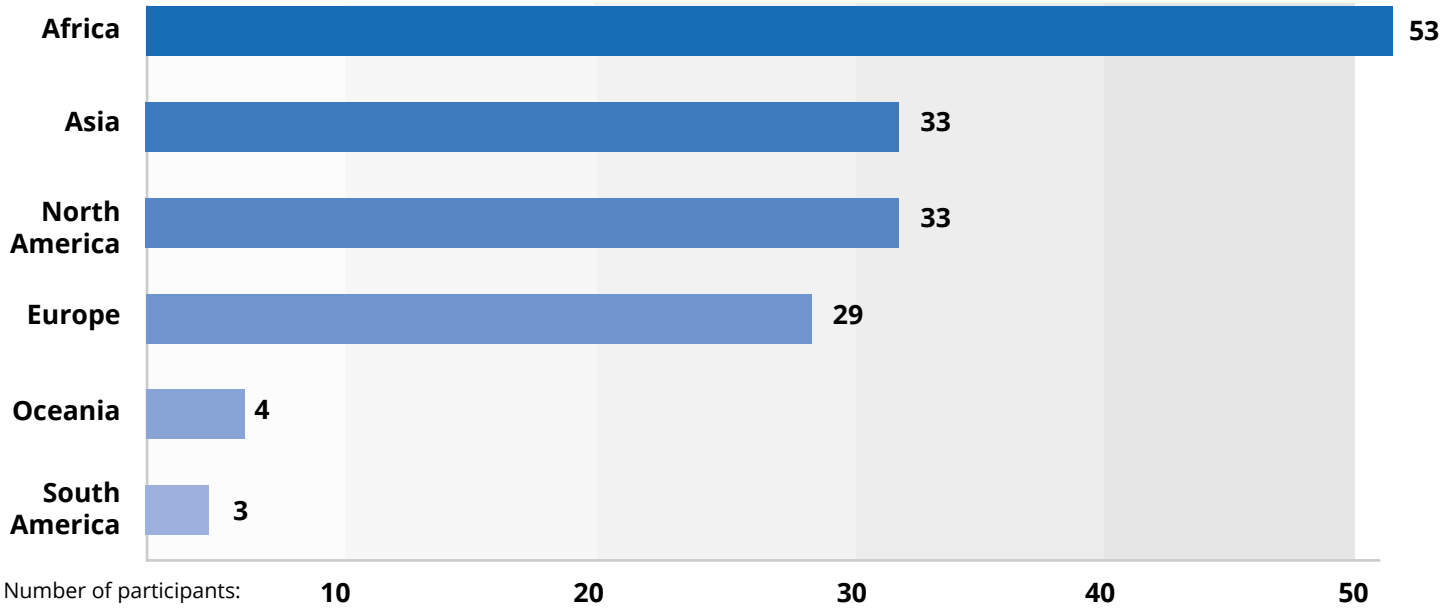
Participants

Types of organizations represented

- Academia or scientific organization
- Non governmental organization
- Global agency (*such as WHO, UNICEF, World Bank, Gavi*)
- Think tank or policy research institute
- Government (*policymakers, EPI managers, health professionals*)
- Independent consultant
- Donors
- Public service authority



Distribution of participants by continent



Agenda

The two-day program featured 36 presentations across 12 sessions including presentations, panel discussions, breakout sessions, plenary, and posters. The agenda was shaped through a survey that was shared to community members and in consultation with the Advisory Board.

The sessions covered a range of topics, including immunization costing, cost of illness, value of vaccines, immunization financing, budget execution, priority setting, donor transitions, use of evidence, and collaborating as a community of practice.

The full agenda is noted on the next two pages and the 36 presentations can be found **here**. The bios of speakers are summarized in the Annex.

We were delighted to be joined by **41 session presenters** and **27 poster presenters.**

The pre-congress presentation and poster pages on www.immunizationeconomics.org have been **viewed over 1100 times**, from **over 400 users** in **63 countries**.

Day 1 - Saturday, July 8

7h30 - 8h30	Walk in, registration, coffee	
8h30 - 9h30	**Welcome, introduction to the community of practice, and overview of existing evidence and tools**	
	• A brief history of the Immunization Economics community of practice: Logan Brenzel (Bill & Melinda Gates Foundation) • An overview of the Immunization Economics community of practice: Laura Boonstoppel (ThinkWell) Overview of the evidence base on the cost of delivering immunization: o Systematic review of new vaccine introduction cost projections: Ann Levin (Levin & Morgan LLC) o Overview of new and existing costing tools: Winthrop Morgan (Levin & Morgan LLC)	
9h30 - 10h40	**Evidence from bottom-up costing studies vs modelled estimates: what have we learned from C19 vaccine delivery costing?**	
	• Lessons from the COVAX global delivery cost model: Ibironke Oyatoye (UNICEF) • The cost of delivering C19 vaccines in 6 countries: Flavia Moi (ThinkWell) • The cost to deliver C19 vaccines in Malawi: Anika Ruisch (MSH/USAID MTaPS) • Learnings from CVIC: Karene Yeung (WHO)	
10h40 - 11h00	Coffee break	
11h00 - 12h00	**Immunization financing: traditional vaccines & budget execution**	
	• Sustainable financing for traditional vaccines: Brendan Kwesiga (UNICEF) • Immunization budget execution in Ghana: Emmanuel Ayifah (SEND GHANA) • M-RITE activities to increase expenditures for operational costs in DRC and Nigeria (Grace Chee, JSI)	
12h00 - 13h00	Lunch break	
13h00 - 14h00	**Topic A: Driving development and introduction based on full value of vaccine assessments**	**Topic B: Priority setting of available vaccines and vaccine innovations**
	Concept, relevance, and examples of a FVVA: Philipp Lambach (WHO), JP Sevilla (HSPH), Allison Portnoy (HSPH)	CAPACITI approach, decision-support and innovation framework: Raymond Hutubessy (WHO)
14h00 - 15h30	Poster session incl coffee break	
15h30 - 16h30	**Plenary discussion: collaborating as a community of practice**	
	How can we ensure alignment among our research efforts? Should we be setting a common research agenda in immunization economics? How can we improve local capacity strengthening as part of our work? Logan Brenzel (Bill & Melinda Gates Foundation), Sarah Pallas (CDC), Ulla Griffiths (UNICEF), Todi Mengistu (Gavi), Raymond Hutubessy (WHO)	
16h30 - 16h45	**Announcement of the winning poster & closing: Rachel Archer (ThinkWell)**	

Day 2 - Sunday, July 9

7h30 - 8h30	Walk in, coffee (from 8h00), registration for new arrivals	
8h30 - 8h45	**Summary of day 1, overview of day 2: Laura Boonstoppel (ThinkWell)**	
8h45 - 10h00	**Immunization financing: donor transitions, sustainability & integration**	
9h30 - 10h40	• Global Survey on C19 vaccination and programmatic and financial integration: Damian Walker (MSH) • Supporting decision making on programmatic and financial sustainability at different stages of Gavi transition in Laos, Nigeria and Kenya: Sebastian Ilomuanya, Praveena Gunaratnam, Faith Mutuku, Victoria Wanjohi, Kikelomo Lambo, Sima Unogu (CHAI)	
10h00 - 10h15	Group photo followed by coffee break	
10h15 - 11h15	**Next questions in costing and modelling methods**	
	• Costing immunization systems improvements: Sarah Pallas & Roopa Darwar, (CDC) • Cost of illness & economic burden of vaccine-preventable diseases: sharing of experiences and panel discussion: Sachiko Ozawa (University of North Carolina at Chapel Hill), Rachel Hounsell (University of Oxford), Sarah Pallas (CDC)	
11h15 - 12h15	**Topic A: Methods and practical challenges in costing HPV and malaria vaccine programs**	**Topic B: Health Technology Assessment of COVID-19 vaccination in Nigeria**
	Learning from 6 HPV costing studies and RTS,S vaccine costing: Mercy Mvundura, Rose Slavkovsky, Ranju Baral (PATH)	Benjamin Uzochukwu, Chinyere Okeke (University of Nigeria, Nsukka), Sergio Torres Rueda (London School of Hygiene and Tropical Medicine)
12h15 - 13h15	Lunch break	
13h15 - 14h45	**Cost & sustainability of reaching zero-dose children**	
	• Financial sustainability of reaching zero-dose children, scoping review and framework: Sarah Tougher (UNICEF) • How much does it cost to reach zero-dose and under-immunized children? A case study of the Electronic Community Health Information System in Uganda: Carol Kamya (IDRC Kampala) • The costs of using drones to transport vaccines to hard-to-reach areas in DRC: Louis Tshituka (VillageReach) • Panel discussion: what are the best methods for estimating the cost and impact of strategies to reaching zero-dose children? Ijeoma Edoka (University of the Witwatersrand, Johannesburg), Stephen Resch (HSPH), Ulla Griffiths (UNICEF)	
14h45 - 15h10	Coffee break	
15h10 - 16h30	**Fostering use of evidence**	
	• Use of modelling evidence for policy and programming: Kaja Abbas (VIMC) • Using IA2030 impact and cost estimates for future decisions: Yoonie Sim (WHO) • Using health and economic impact evidence at Gavi to inform investment decisions and resource mobilization: Todi Mengistu (Gavi) • Learnings from the G20 Joint Finance & Health Task Force for pandemic preparedness: Raymond Hutubessy (WHO)	
16h30 - 17h00	**Summary & closing: Rachel Archer & Laura Boonstoppel (ThinkWell)**	

All respondents found the meeting well organized, and **98% would recommend** the immunization economics pre-congress meeting to others

Plenary discussion

Collaborating as a community of practise

Speakers: Logan Brenzel (Bill & Melinda Gates Foundation), Sarah Pallas (CDC), Ulla Griffiths (UNICEF), Todi Mengistu (Gavi), Raymond Hutubessy (WHO)
Moderator: Laura Boonstoppel (ThinkWell)

The penultimate session on day one was centered on **how we can best move forward as a Community of Practice.** A panel, representing key funders of immunization economics work, held a fruitful discussion centered around the following questions:

How can we improve local capacity strengthening as part of our work?

What are the most important research questions in immunization economics? Are we addressing them? Should we be setting a common research agenda?

How can we better engage the users of evidence generated by our community of practice?

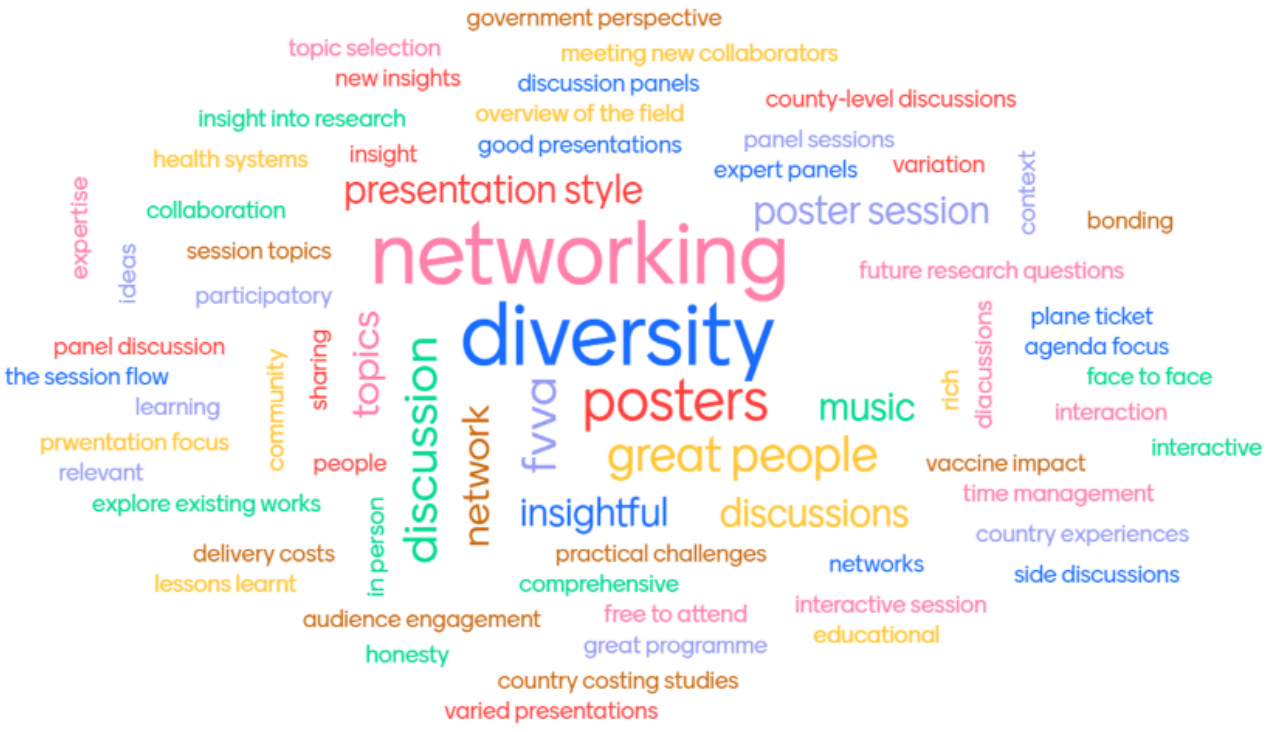
- Our community needs more **touchpoints with policymakers**, where we can get feedback on whether our messages are understandable and resonate.
- We need to broaden our messaging beyond health sector stakeholders, and **target ministries of finance** as well.
- We need to **break out of our silos**, and put out our evidence in **comparable metrics** so that we can compare immunization to other options that decisionmakers are faced with. That might mean we have to move away from cost-effectiveness towards cost-benefit analysis, even if we feel uncomfortable with translating benefits in costs.
- We need to identify and involve the key policy actors within the government from the beginning, and **build up their capacity** to understand economic evidence as a part of our work.
- On the one hand, we need to support immunization programs and ministries of health advocate with the ministry of finance to justify their budget requests, but on the other hand, we need to be realistic and **support countries in prioritizing** and optimizing outcomes given an allocation budget that is much lower than the ask.
- Sometimes we might need to provide countries with protocols and approaches, coupled with **technical assistance to tailor and implement** those, rather than developing complex, standardized tools

Research priorities in immunization economics

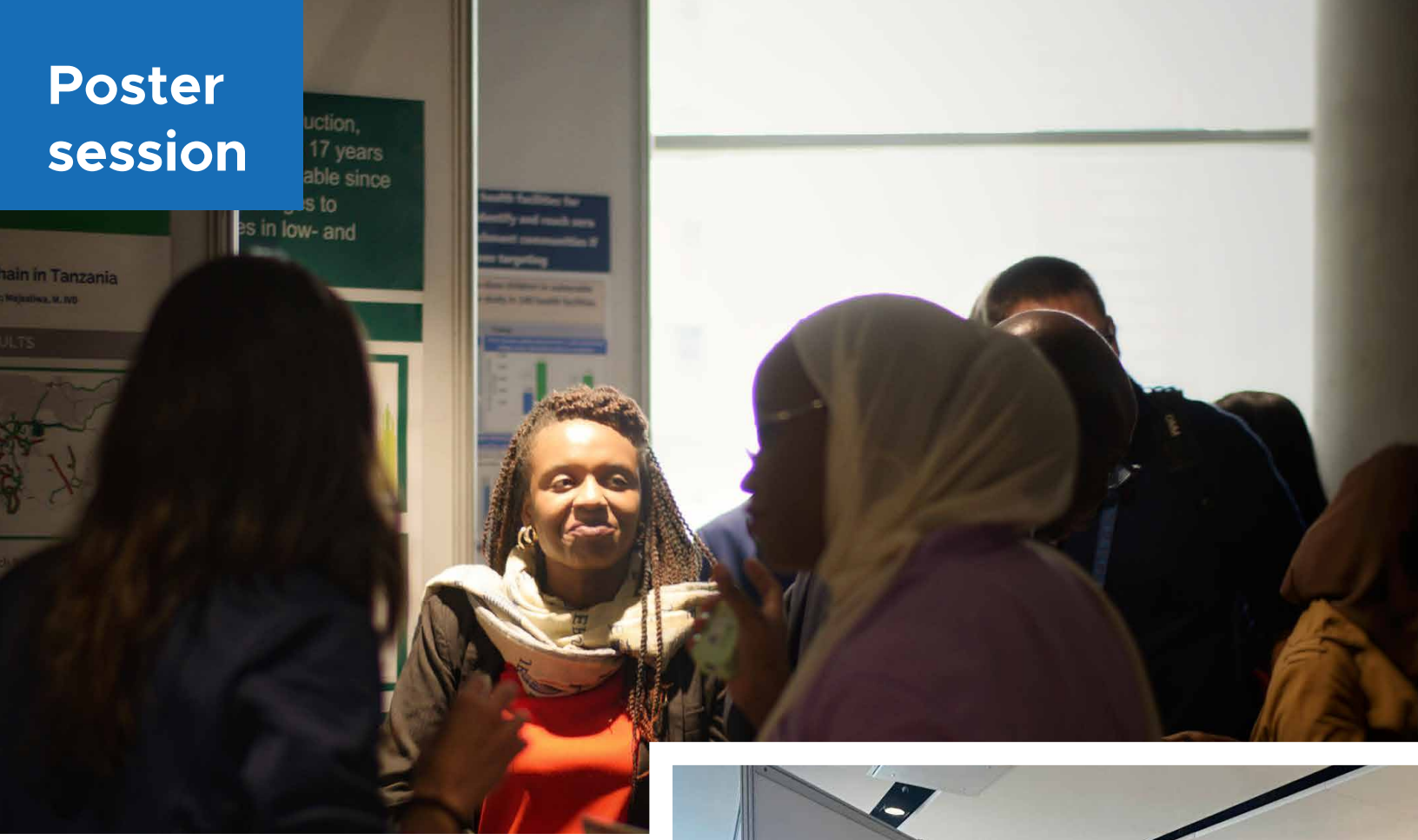
During the discussion, we identified a number of **key global evidence gaps that our community could help fill**, although we recognize that research priorities will ultimately need to be determined at country level:

- The cost, cost-effectiveness, and efficiency of reaching **zero dose children** in different contexts, including targeted local interventions, **campaigns**, but also **strengthening the PHC system**.
- **Integration** of services, even beyond health, as opposed to the incremental cost of adding immunization services, and lessons learned from the C19 pandemic around this.
- Cost, cost-effectiveness, and investment cases of **new vaccines** will remain necessary as they enter the market or as their recommended schedules change.
- The rate of return of **investing in stockpiles** of vaccines (such as those of yellow fever and cholera vaccines, Ebola, etc.)
- Increased focus on developing economic evidence for **subnational level** stakeholders and implementers.
- Evidence around **budget execution** and practical experiences at national and subnational levels, and identifying best practices in improving the **use of evidence** in planning, budgeting, and decision-making.

What did you like best about the Immunization Economics pre-congress meeting?



Poster session



The poster session was an opportunity for researchers at all career stages to present and discuss their research with the wide range of stakeholders in attendance. 41 poster abstracts were submitted and reviewed, and **27 posters** were accepted.

The poster presenters represented **21 institutions** and **17 countries**, on a range of themes.

All posters, supplementary files, and bios of the presenters, can be accessed **here**.

> "The meeting was an excellent and well organised one from the submission of abstracts to presentation"

Theme A: Cost effectiveness, cost of illness, and other economic evaluations

1. Understanding the cost effectiveness of COVID-19 vaccination in Nigeria (Chinyere Okeke, University of Nigeria)

2. Comprehensive estimates of cost-effectiveness support rotavirus vaccine introduction & expansion (Marcia Weaver, University of Washington)

3. Comparative cost-effectiveness analysis of community engagement interventions in LMICs (Monica Jain, International Initiative for Impact Evaluation)

4. Economic impact of Rotavirus vaccination: a comparative modelling study (Phetsavanh Chanthavilay, National University of Singapore)

5. Economic burden associated with adverse effects due to COVID-19 vaccination data from the Queensland COVID-19 vaccination program statewide study (Qing Xia, Queensland University of Technology)

6. Economic and health impact of Pneumococcal vaccination in controlling the growth of antimicrobial resistance in Ethiopia, China, and Indonesia (Sachiko Ozawa, University of North Carolina, UNC Gillings School of Global Public Health)

7. Cost-effectiveness of introducing HPV 9-valent vaccine for women in Japan (Shunya Ikeda, International University of Health and Welfare)

8. Global cost-effectiveness of potential maternal immunization against Group B Streptococcus
(Simon Proctor, LSHTM)

9. Incremental cost and cost-effectiveness of potential interventions against infant respiratory syncytial virus (RSV) in India
(Susmita Chatterjee, George Institute for Global Health)

Theme B. Costing

10. Systematic review of new vaccine introduction cost projections (Ann Levin, Levin and Morgan LLC)

11. The cost of delivering COVID-19 vaccines in The Philippines
(Christina Banks, ThinkWell)

12. The cost of delivering COVID-19 vaccines in Cote D'Ivoire (Elise Smith, Genesis Analytics)

13. The cost of delivering COVID-19 vaccines in The Democratic Republic of the Congo (Flavia Moi, ThinkWell)

14. Implementation of evidenced-based midwifery practices under the midwife-led quality improvement framework in Nairobi, Kenya - analysis of costs and intermediate outcomes (John Kiragu, Kenyatta National Hospital & University of Nairobi)

15. WHO economic tools on HPV vaccine strengthen country and regional capacity to generate economic evidence for immunization programmes (Karene Hoi Ting Yeung, WHO)

16. The cost of delivering COVID-19 vaccines in Vietnam
(Van M Nguyen, Hanoi University of Public Health)

Theme C: Equity and vaccine delivery

17. A review of the cost of identifying and reaching zero-dose children in vulnerable communities against existing health facility budgets (Fredrick Luwaga, CHAI)

18. Equity impact of HPV vaccination
(Kaja Abbas, London School of Hygiene & Tropical Medicine)

19. Revolutionizing vaccine transport: introduction of a novel technology to protect the cold chain in Tanzania (Mariam Johari, Nexleaf Analytics)

Theme D: Immunization financing and public financial management

20. Costing, planning, budgeting, and resource mobilization for immunization program in Indonesia's decentralized setting (Lili Nur Indah Sari, CHAI)

21. A literature review of subnational health financing constraints and opportunities for improving integrated service delivery – Uganda case study
(Lorraine Kabunga, CHAI)

22. Describing the influence of public financial management rules and procedures on vaccine financing of the Government of Sierra Leone (Noemi Schramm Ndao, Centre Africain d'Etudes Supérieures en Gestion)

23. Indonesia immunization financing landscape
(Putri Herliana, CHAI)

Theme E: Use of evidence for decision-making

24. Optimal investment for outcome-oriented immunization program (Apurva Pawar, UNICEF)

25. Guidelines for the economic evaluation of vaccination programs in Canada (Beate Sander, University Health Network and University of Toronto)

26. Uganda immunization investment case
(Charlotte Muheki, ThinkWell)

27. How do we measure the return-on-investment (ROI) of Typhoid Conjugated Vaccine and Oral Cholera Vaccine ? (Salin Sriudomporn, International Vaccine Access Center)

Participants were asked to vote for the best poster, **and the winning poster was...**

Noemi Schramm Ndao on the **influence of public financial management rules and procedures on vaccine financing** of the **Government of Sierra Leone.**

"Original and needed information portrayed efficiently. Bravo!"

"Good visual representation!"

"Such interesting and important work!"


“Organization and coverage of issues was comprehensive and well sequenced.”

Panel discussion

Cost & sustainability of reaching zero-dose children

Speakers: Ulla Griffiths (UNICEF), Ijeoma Edoka (University of the Witwatersrand, Johannesburg), Stephen Resch (Harvard T.H. Chan School of Public Health),
Moderator: Laura Boonstoppel (ThinkWell)

Reaching zero-dose children is paramount to expand immunization coverage, especially after the historic pandemic backslide, and the topic is therefore a central focus for the global health community. A panel discussion convened key experts to share their perspectives on questions such as:

What are the best methods for estimating the cost and impact of strategies to reaching zero-dose children?

What will be the key challenges in filling the evidence gap around the cost and cost-effectiveness of reaching zero-dose children?

How can we ensure that evidence from context-specific studies will also offer useful learnings for other settings and countries?

On measuring the effectiveness of interventions that target zero-dose children:

- How can we provide an estimate of the effect of a single intervention, while there are so many other factors influencing coverage? We need to encourage program managers and policymakers to think of a **priori of designing interventions** that lend themselves to being tested.
- Our models will need to take into account that **zero-dose communities are at higher risk of contracting vaccine-preventable diseases**, which means it makes sense to spend more on reaching them.
- We need **consistent use of terminology** to prevent miscommunication, as interventions targeting zero-dose might be very different from interventions targeting under-immunized children. Whereas reasons for being unvaccinated are often related to cultural and emotional factors, whereas being under vaccinated is more often related to practical factors. There are both access and utilization issues, as many zero-dose children's mothers have often still had at least one recent touchpoint with the health system.
- The importance of **timeliness will depend on the vaccine**, which in turn should drive the strategy to reach zero dose children.
- We might need to include more **sensitivity analysis** around the effectiveness of interventions.
- Our economics work might come at a time when we cannot yet measure the benefits from a given intervention. We will need to **think about proxies** or other approaches to estimating those.

"The pre-conference was great. The presentations were very varied. It was really well organized. Thank you!"

On approaches and methodological considerations to estimating the cost of reaching zero dose children:

- There are several approaches we can consider to estimate the cost of interventions to reach zero-dose children:

  (1) Analyze the budgets of the proposals that have been submitted to Gavi for the Equity Accelerator Fund to get a rough estimate of what countries expect.
  (2) Alternatively, a normative costing approach whereby we ask health worker and program managers what they think they would need to reach zero-dose children. This could be used for advocacy, but as these are interventions that may never get implemented as such, this might not be useful beyond that.
  (3) Better yet, we would collect cost data alongside interventions, though the timing of this is challenging, as we might arrive too late to capture baseline data or to collect start-up costs.
  (4) The ideal would be a clustered randomized trial though those are hard to come by.

- It would be worthwhile to determine how the probability of getting the first vaccine affects the probability of getting any next vaccine. Some interventions might have a cost that is equal for each additional dose delivered. Whereas others might have high initial costs to deliver a first shot, but because they facilitate a link with the health system, the additional cost of additional doses after the first might be then much lower.
- To compare the cost of different interventions, we need to report on standardized resource types, include the full cost of the intervention (inherent to an ingredients-based approach), and cover both the start-up and running costs, and both supply and demand side.
- We need to clarify the outcomes that we want to measure and be consistent: total cost of the intervention, cost per child vaccinated, or cost per additional child covered.
- We need to report sufficient contextual information about the interventions so policymakers can make informed guesses about why costs may have varied.
- We need to be straightforward about what cost-effectiveness can and cannot answer. There might be legitimate social priorities in achieving equity, and such distributional issues are hard to capture in a cost-effectiveness framework.
- Although we might be eager to fill this evidence gap, estimating the cost or cost-effectiveness of an intervention is only useful if that intervention is effective. Therefore, sometimes we might want to wait until their impact has been demonstrated before we embark on costly costing studies.

On Zero-dose approaches vs health systems strengthening and sustainability:

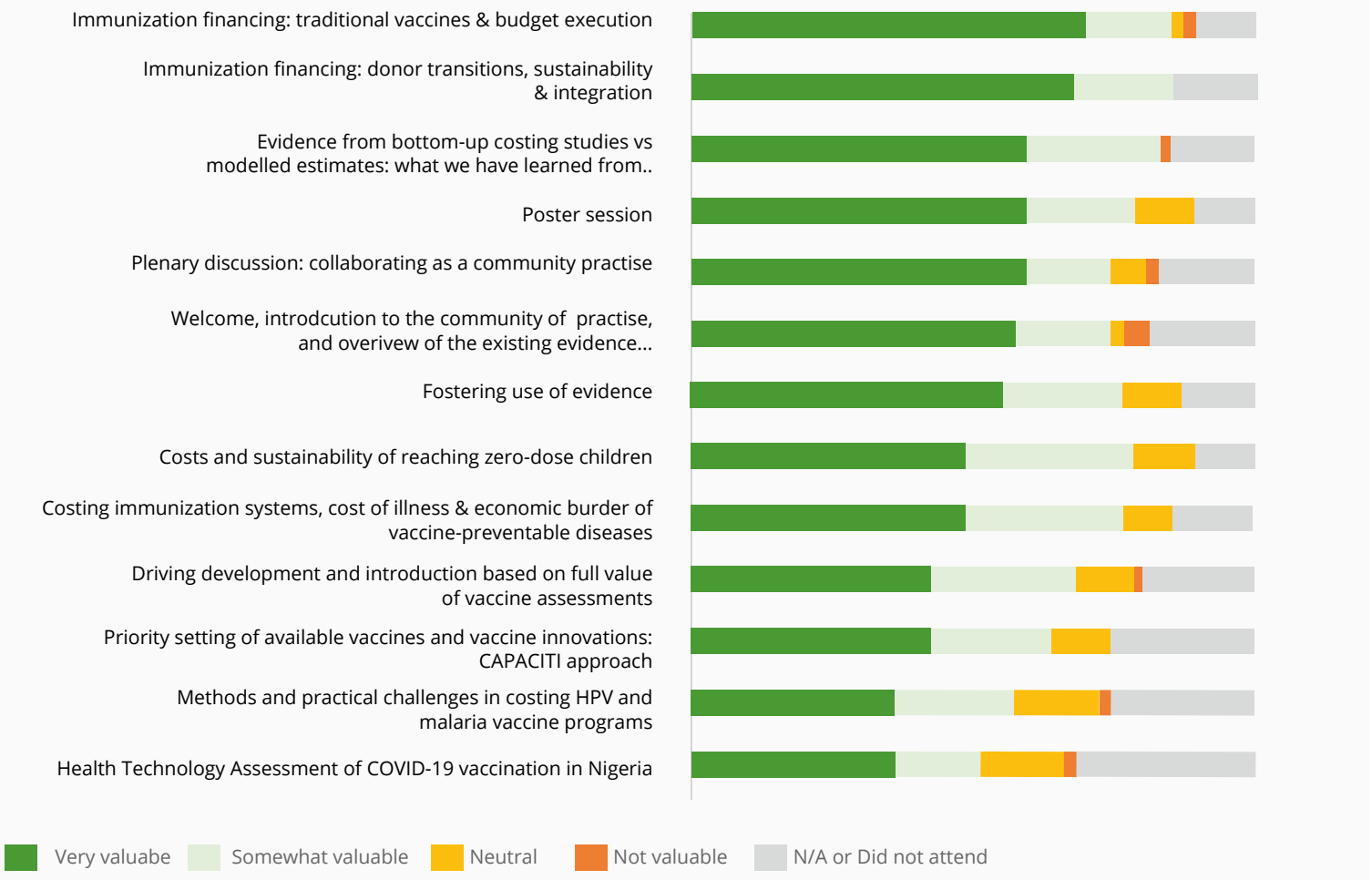
- Beyond the cost, we need to critically assess how interventions to improve equity will be financed. Reaching zero-dose children might be very costly, and possibly unsustainable in the long-run, particularly after donor funding ends.
- Targeting zero-dose children should be a bridge to health systems strengthening. We need to break out of our siloes, and primary healthcare strengthening should be the next frontier for immunization economists.
- There seems to be a reluctance in the global community to focus on the cost of integrated primary healthcare delivery or health systems strengthening, as it is so much more costly than program-specific interventions, and hard to fundraise against.
- To support the general direction of the zero-dose agenda, ideally, we would assess which approach is more cost-effective: pursuing a child-by-child or community-by-community approach vs strengthening the system.
- Although we might be eager to fill this evidence gap, estimating the cost or cost-effectiveness of an intervention is only useful if that intervention is effective. Therefore, sometimes we might want to wait until their impact has been demonstrated before we embark on costly costing studies.

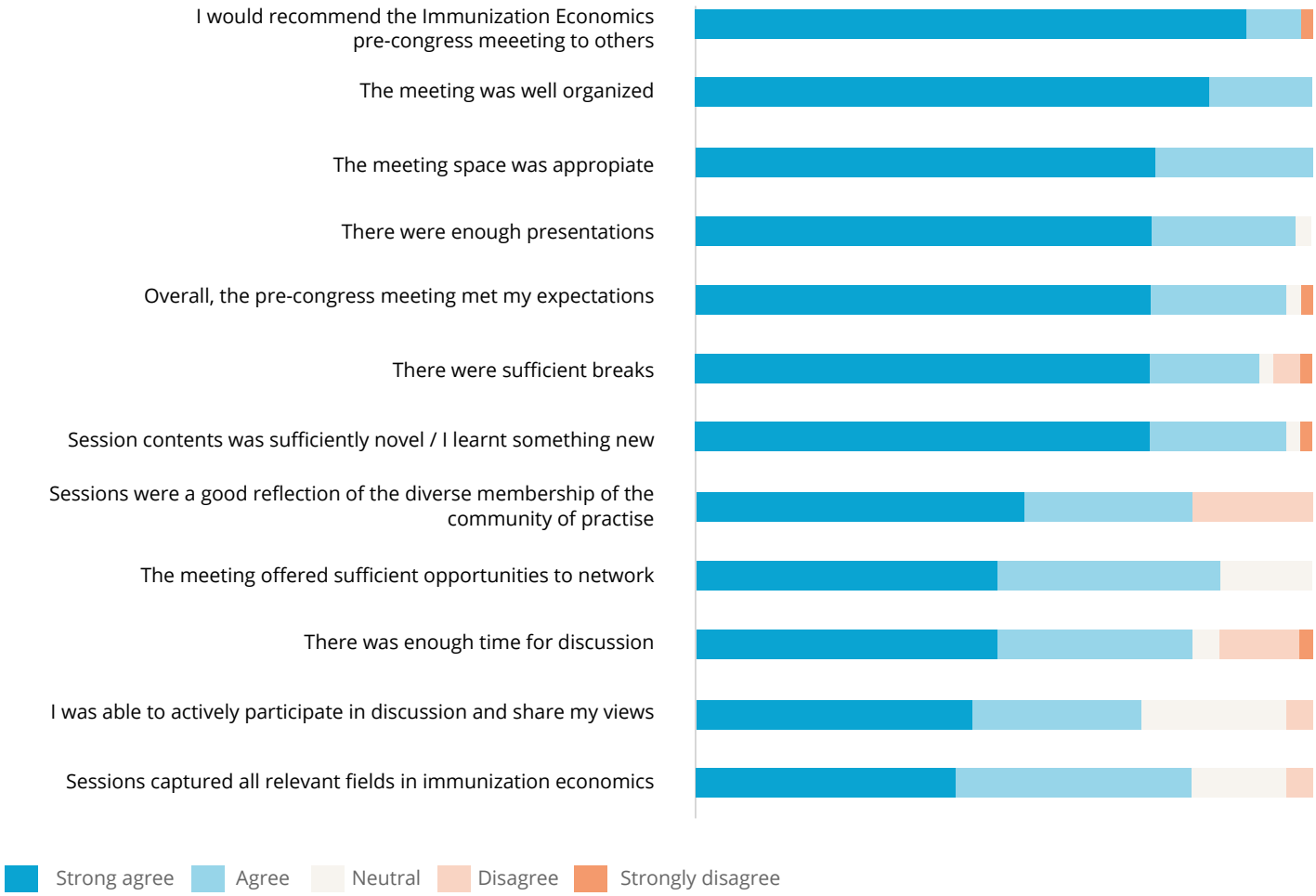
What are your key takeaways from the Immunization Economics pre-congress meeting?

96% of participants maintained that the session contents was sufficiently novel/ they learned something new

Post-meeting feedback

During the closing session, participants completed a quick survey via Menti.com to gather their initial thoughts on how they experienced the meeting. Following the meeting, a survey was circulated to obtain detailed feedback from attendees to help **improve future convenings** as well as the **strategic direction of the community of practice**. The survey was emailed to all 155 in-person attendees and 47 individuals responded (*response rate 30%*).





Suggested improvements:

Respondents were also asked to note what was missing from the meeting (if anything), and provide any further recommendations for future convenings or the wider community of practice. Suggested improvements are summarized below:

- **More time with the posters**, and to position them more centrally, such as in the tea break area (which unfortunately was not allowed at the CTICC)
- **More time for networking**, potentially consider informal activities to facilitate connections for community members that do not know many others
- While there was one suggestion to focus more on the academics, most suggested an even **stronger emphasis on policy implications**, and there was a recommendation to encourage including these in all presentations
- **Additional in-country perspectives:** ministry of health representatives, policy makers and subnational level stakeholders, and additional sponsorship to support this.
- **Better representation of the French-speaking community** and offering translation services.
- Suggestions for topics: more on integration, resource tracking for immunization, innovative financing for immunization, less on C19 immunization

All sessions were highly rated, and the immunization financing sessions were particularly appreciated

"It was really well organized and I enjoyed it more than the main congress from Monday"

Speaker Bios

Welcome, introduction to the community of practice, and overview of existing evidence and tools

Logan Brenzel, Bill & Melinda Gates Foundation

loganbrenzel@gmail.com

Logan Brenzel is a health economist with more than 35 years of worldwide experience providing policy and strategic advice to governments and global health partners, including Gavi, the Vaccine Alliance; leading, designing and managing complex multi-country implementation research on the cost, cost-effectiveness, financing and sustainability of PHC interventions including immunization; coordinating and leading multi-partner engagements; and building capacity of country counterparts. Logan has supported countries in areas such as health systems strengthening; results-based financing; resource tracking; transition from donor support; and aid-effectiveness in her work with the Bill & Melinda Gates Foundation, the World Bank, the US Agency for International Development, and John Snow, Inc. Logan has a PhD from the Johns Hopkins University School of Hygiene and Public Health, and a graduate degree from the Harvard University School of Public Health. She is a graduate of Stanford University. Logan currently is an independent consultant based in Paris, France.

Laura Boonstoppel, ThinkWell

lboonstoppel@thinkwell.global

Ms. Laura Boonstoppel is a Program Director at ThinkWell, leading its immunization economics portfolio, which covers the development of methods for, and implementation of, numerous country studies to estimate the cost of delivering immunization and other essential health services, including integration of campaigns, COVID-19 vaccine delivery, and reaching zero-dose children. In this capacity, she also oversees the management of the immunizationeconomics.org global community of practice. She is a health economist, primarily with expertise in immunization costing, financing, and modeling, efficiency analysis, fiscal space analyses, and other health financing studies.

Ann Levin, Levin & Morgan

ann@levinmorgan.com

Dr. Ann Levin is a Senior Health Economist with over 30 years of experience conducting economic analyses and modelling in the areas of health financing and costing in low and middle-income countries. She has a PhD in Public Health Economics and Master of Public Health from Johns Hopkins University. She is President of Levin and Morgan LLC. Dr. Levin has been involved in several economic evaluations of vaccines and immunization, health services as well as nutrition programs. She has also lived for seven years overseas in Niger, Ghana, and Bangladesh.

Winthrop Morgan, Levin & Morgan
win@levinmorgan.com

Winthrop "Win" Morgan is a public health strategist at Levin & Morgan, LLC, which provides technical assistance for global health projects in developing countries. He helps decision makers introduce and scale up new vaccines, screening tests, and treatments in Low and Middle-Income Countries (LMICs). He holds a Master in Public Health in International Health from the Johns Hopkins University School of Hygiene and Public Health

Evidence from bottom-up costing studies vs modelled estimates: what have we learned from C19 vaccine delivery costing?

Ibironke Oyatoye, UNICEF
ioyatoye@unicef.org

Dr. Ibironke Oyatoye is a Health Economist with UNICEF - New York Headquarters' Immunization Financing Team. She has led and co-led UNICEF's health financing and economics initiatives focused on COVID-19 vaccination across low- and middle-income countries (LMICs). This includes costing, coordination and deployment of financial resources, and budgeting to promote scaleup of COVID-19 vaccination. Ronke has 14 years of experience in health systems strengthening including health financing and health policies. Prior to joining UNICEF, she worked with UNFPA, the World Bank and Clinton Health Access Initiative. Her work experience spans Nigeria, Ethiopia, Lesotho, Liberia, Sierra Leone, Ghana, Samoa, Niue, Tokelau and Cook Islands in addition to other LMICs she supports under the UNICEF portfolio. Ronke is a licensed Medical Doctor in Nigeria. She also holds a Master of Science in Health Policy, Planning and Financing from the London School of Economics & Political Science (LSE) and the London School of Hygiene & Tropical Medicine (LSHTM).

Flavia Moi, ThinkWell
fmoi@thinkwell.global

Flavia Moi, MA is a health economics practitioner with 8 years of experience conducting research, economic evaluations, and assessments. As a Senior Technical Advisor at ThinkWell-Switzerland, she is managing several studies on the cost of delivering COVID-19 vaccines in low- and middle-income countries. Previously, she supported the implementation of an integrated campaign costing study in Nigeria and the development of the Immunization Delivery Costing Catalogue. During her time at ThinkWell-Mozambique, she worked on a nation-wide time and motion study and was the principal investigator for a patient flow analysis in a high-volume PHC facility. Flavia has also provided direct technical assistance to the HRH directorate of Mozambique's Ministry of Health and contributed to several HIV and TB projects.

Anika Ruisch, MSH/USAID MTaPS
aruisch@msh.org

Anika Ruisch is a Technical Advisor with the Health Economics and Financing Team at Management Sciences for Health (MSH). At MSH, she's been leading the development of a guide on Health Technology Assessment and two costing studies estimating the investment needed to deliver COVID vaccinations in Malawi and seasonal malaria chemoprevention in West and Central Africa. Anika has over eight years of experience in research, epidemiology, and health economics working in public, private and non-profit settings. Anika received her MSc in epidemiology from the London School of Hygiene and Tropical Medicine and MSc in global health from the University of Copenhagen.

Karene Yeung, WHO
yeungh@who.int

Dr Karene Yeung is a long-term consultant of the Value of Vaccines, Economics, and Modeling (VoV) team, Department of Immunization, Vaccines and Biologicals (IVB), World Health Organization (WHO). Dr Yeung is the technical focal point of immunization economics in the department and coordinating economic work of several vaccines (e.g., COVID-19, HPV and influenza). She is from Hong Kong and holds a PhD in Medical Sciences from The Chinese University of Hong Kong, and is also an epidemiologist working on immunization and infant feeding research.

Immunization financing: traditional vaccines & budget execution

Brendan Kwesiga, UNICEF
bkwesiga@unicef.org

Brendan Kwesiga is a Health Economist currently working as a Senior Health Specialist (Immunization Financing) working with UNICEF Headquarters. In his current role, he is responsible for supporting the strengthening financing for primary health care and immunization and preparing countries for donor transition. Prior to joining UNICEF, he worked for the WHO as a Technical Officer (Health Financing) supporting countries within the WHO African Region in health financing policy formulation and implementation of reforms towards Universal Health Coverage. He has also worked with Ministries of Health in supporting health economic analysis, health system performance reviews and use evidence for decision making. He has also previously worked as a health financing technical advisor with Management Sciences for Health (MSH) in Uganda and as health economics and financing consultant on behalf of various bilateral, multilateral agencies and academic institutions. Brendan is from Uganda and holds a BSc. in Quantitative Economics from Makerere University (Uganda) and Masters in in Health Economics from University of Cape Town (South Africa) and training in Public Finance from SOAS University of London (United Kingdom).

Emmanuel Ayifah, SEND GHANA
eayifah@gmail.com

Emmanuel Ayifah PhD is an Economist with remarkable experience in teaching, research, monitoring and evaluation, project cycle management and policy influencing. He is currently the Deputy Country Director of SEND GHANA, a policy research and advocacy organization. He is also a Guest Lecturer in the Master of Health Economics Program at the School of Public Health, University of Ghana. His research interest is broadly in health and development economics, with a particular focus on health financing and budgeting, as well as policy/program evaluation. His current research is on immunization, epidemics, HIV/AIDs, adolescent nutrition, and reproductive health.

Grace Chee, JSI
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Grace Chee is with JSI Research and Training Institute and serves as the Project Director for USAID's MOMENTUM Routine Immunization Transformation and Equity project. She has more than 25 years of experience in health financing, health system strengthening and maternal and child health programs. Prior to her current role, she led the coordination team for Gavi's Learning Network for Countries in Transition (LNCT,) supporting countries transitioning from Gavi support to self-sustainable immunization programs. She was also the Health Systems Strengthening and Equity Team Lead for USAID's Maternal and Child Survival Program (MCSP.) She has led work in health system and health financing assessment, program evaluation, and technical assistance to support program implementation.

Driving development and introduction based on full value of vaccine assessments

Philipp Lambach, WHO
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Dr Philipp Lambach, MD, MBA, PhD works at the World Health Organization's Department of Immunization, Vaccines and Biologicals. He serves as Secretary of the organization's Immunization and vaccines related implementation research advisory committee (IVIR-AC) and as acting lead of the Value of Vaccines, Economics, and Modeling (VoV) team. In this capacity he coordinates the review of quantitative methods in vaccine-related research as well as implementation research related to estimating the performance, impact and value of vaccines. In addition to these activities, Dr Lambach leads WHO research efforts on the public health and economic "full" value of specific vaccines (e.g., Influenza and Group B Streptococcus vaccine).

JP Sevilla, HSPH
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JP Sevilla is a health economist doing research on theoretical and empirical aspects of the full public health and socio-economic value of vaccination. He leads a vaccine evaluation group at Data for Decisions, LLC and is a Research Associate at the Harvard T.H. Chan School of Public Health. He has a Ph.D. in Economics from Harvard University.

Allison Portnoy, Boston University
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Dr. Allison Portnoy is an assistant professor in the Department of Global Health at the Boston University School of Public Health. Her research interests include economic evaluation and public health policy, simulation modeling, health equity, and the impact of vaccination on population health and economic outcomes. Dr. Portnoy received a Doctor of Science in the Department of Global Health and Population and completed a postdoctoral fellowship at the Center for Health Decision Science, both at the Harvard T.H. Chan School of Public Health.

Priority setting of available vaccines and vaccine innovations

Raymond Hutubessy, WHO
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Raymond Hutubessy works as the Team Lead of the Value of Vaccines, Economics, and Modeling (VoV) team, Department of Immunization, Vaccines and Biologicals (IVB), World Health Organization in Geneva. As of March 2022 he is seconded to the G20 Joint Finance and Health Task Force on pandemic preparedness, prevention and response Secretariat hosted at the World Health Organization. As a senior health economist, he has over 25 years over work experience in economic analysis in health in both in low and middle income countries in particular.

Plenary discussion: collaborating as a community of practice

Logan Brenzel, Bill & Melinda Gates Foundation *(see bio on page 22)*

Sarah Pallas, CDC

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Dr. Pallas leads the Economics Unit of CDC's Global Immunization Division, which conducts economic evaluations of immunization interventions and provides technical assistance on economics and financing for global immunization programs. She has served as a member of the WHO SAGE Working Group on COVID-19 Vaccines, co-chairing its Impact Modelling subgroup. She completed her Prevention Effectiveness Fellowship in CDC's Division of Global HIV/AIDS, serving as the PEPFAR Expenditure Analysis Advisor for Haiti and the Dominican Republic. Previously, Dr. Pallas worked for Development Finance International, Inc., and with Population Services International. She served as a Peace Corps volunteer in Morocco and Togo.

Ulla Griffiths, UNICEF

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Dr Ulla Kou Griffiths is a health economist specializing in the economics of vaccines. She has extensive experience in cost-effectiveness analysis, health outcome measurement and public financial management. At UNICEF HQ, Ulla leads approximately ten staff and consultants who are part of the Immunization Financing Team. Before joining UNICEF in 2016, Ulla worked at the London School of Hygiene and Tropical Medicine for ten years, and before that she was at the WHO in Geneva for six years. She has also worked as a health economist in the Ministry of Health in Guyana (1995-1997). Ulla is originally from Denmark and holds an MSc in Economics from Copenhagen University and a PhD from LSHTM.

Todi Mengistu, Gavi

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Tewodaj (Todi) Mengistu is a Senior Program Officer in the Measurement and Strategic Information team at Gavi, the Vaccine Alliance. She supports data and analysis needs for key strategic decisions around Gavi investments and ensures the provision of robust estimates of health and economic impact of Gavi-supported vaccinations. As part of this, she is the Gavi focal point for the Vaccine Impact Modelling Consortium (VIMC), a global consortium aiming to generate disease burden and vaccine impact estimates and to advance the research agenda in the field of vaccine impact modelling. Todi has a PhD in Policy Analysis (Economics concentration) from the Pardee RAND Graduate School. Prior to Gavi, she worked at the Centers for Disease Control and Prevention (CDC) as a health economist with the Division of Global HIV/AIDS evaluating the effectiveness of delivery services for HIV prevention, care, and treatment in countries with high HIV burden.

Raymond Hutubessy, WHO *(see bio on page 26)*

Immunization financing: donor transitions, sustainability & integration

Damian Walker, MSH
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Dr Damian Walker is a health economist with more than 25 years of experience. Currently he serves as a Senior Technical Director at Management Sciences for Health, where he oversees the health economics and financing practice area. He spent a decade at the Bill & Melinda Gates Foundation as Deputy Director of Data and Analytics. Before BMGF he was an Associate Professor at the Bloomberg School of Public Health, Johns Hopkins University. He is a non-resident fellow at the Center for Global Development, and a member of the Global Fund's Technical Review Panel.

Sebastian Ilomuanya, CHAI
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Dr Sebastian Ilomuanya is a medical doctor and public health specialist. He has over 10 years of progressive experience in designing and implementing health systems strengthening strategies across different programs and countries in Africa and Southeast Asia. He has worked in both the private and public sectors where he has used business management principles to improve health outcomes. He is currently a Senior Program Manager with the Clinton Health Access Initiative, a role that enables him to provide thought leadership on management systems and capacity, and immunization financing and sustainability.

Praveena Gunaratnam, CHAI
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Dr Praveena Gunaratnam is an epidemiologist and public health specialist with over 20 years of experience in Australia, the Asia Pacific region and at the global level. She is currently the Director, Primary Health Care for CHAI Laos, where she has worked for the last 5 years including with the Government of Laos and other partners to support an effective and sustainable transition of the Lao EPI away from Gavi support.

Faith Mutuku, CHAI
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Faith Mutuku is a program management specialist with over 10 years of diverse experience in designing evidence-based health interventions. Faith has rich technical experience in vaccines and immunization, that goes beyond service delivery to data, policy and health system strengthening. In life and at work, Faith is passionate about equality and supporting people to make informed decisions. Before joining CHAI, she worked as a Consultant at Deloitte EA with a focus on public sector consulting and is currently leading CHAI's work in service delivery and new vaccine introductions.

Victoria Wanjohi, CHAI
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Victoria Wanjohi, a seasoned Public Health Professional with 11 years of work experience, is the Program Manager for Health Financing at Clinton Health Access Initiative (CHAI) Kenya. She plays a vital role in supporting the Ministry of Health and County Governments in establishing sustainable health financing strategies to optimize the process of raising, utilizing, and allocating financial resources to drive impactful improvements in service delivery in PHC facilities. She is passionate about enhancing access to quality healthcare at PHC and actively contributes to the development and implementation of impactful initiatives related to health financing.

Kikelomo Lambo, CHAI
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Kikelomo Lambo, MPH is a public health expert with over 10 years of progressive experience in health system planning and development, including maternal and child health, while working with government, donors, and partner agencies within the public and private sectors. Kikelomo Lambo is currently a Senior Manager at Clinton Health Access Initiative (CHAI), where she leads a team that provides strategic and technical guidance on the immunization supply chain, Immunization Financing, Service Delivery, Campaign effectiveness, and institutional capacity strengthening of health system interventions to the government of Nigeria. She also leads a team that advocates and sensitizes for increased allocation to health and Immunization which has resulted in the allocation and release of ~$231M for immunization from Domestic resources.

Sima Unogu, CHAI
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Sima Unogu is a finance professional with vast experience in audit and financial reporting, transaction advisory, and business process redesign. Sima started her career in the audit and assurance unit of one of the Big 4 accounting firms in Nigeria and later transitioned to the deals advisory unit where she led projects on capital raising, financial due diligence, and business analysis. She is currently an associate on the vaccines program at CHAI where she leverages her prior experience to provide support to the Federal Government of Nigeria on immunization financing. This support includes accurately estimating the country's annual immunization funding need and advocating for the timely release of the country's obligation to immunization financing.

Next questions in costing and modelling methods

Sarah Pallas, CDC *(see bio on page 27)*

Roopa Darwar, CDC

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Roopa Darwar works for the Economics Unit, Global Immunization Division, Global Health Center, U.S. Centers for Disease Control and Prevention to conduct economic evaluations of immunization systems and interventions in low- and middle-income countries. Her research interests include vaccine-preventable disease surveillance, supplementary immunization activities/campaigns, vaccine introductions, rapid diagnostic tests, and school immunization screenings. Previously, with the Africa Team of the Polio Eradication Branch in the CDC Global Immunization Division, she assessed outbreak responses to circulating vaccine-derived polioviruses in the context of the global switch from trivalent to bivalent oral poliovirus vaccine.

Sachiko Ozawa, University of North Carolina at Chapel Hill

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Sachiko (Sachi) Ozawa, PhD, MHS, is an Associate Professor at the University of North Carolina at Chapel Hill (UNC) Eshelman School of Pharmacy and an Adjunct Associate Professor in Maternal and Child Health at UNC Gillings School of Global Public Health in the United States. She is a health economist whose work focuses on generating evidence to improve access to vaccines and quality-assured medicines, working at the interface between pharmacy and public health. She has published over 80 articles in peer-reviewed journals conducting research on the value of vaccines, the economic impact of substandard and falsified medicines, and the threat of illegitimate online pharmacies. Her work has been presented at the National Press Club, became Health Affairs' top 10 most read articles in 2016, cited by the Prime Minister of Canada, and was tweeted by Bill Gates. Her work has been reported by the Washington Post, Forbes, CNN Business, Reuters, National Public Radio (NPR), and other news media.

Rachel Hounsell, University of Oxford

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Rachel is a health economist and mathematical modeler with an interest in applied research to support policy-making. She holds a Master's in Development Finance from UCT's Graduate School of Business and an MSc in International Health and Tropical Medicine from the University of Oxford. Rachel is currently a PhD candidate at Oxford and a research fellow at the Modelling and Simulation Hub, Africa (MASHA) at UCT. Before joining MASHA, Rachel worked as a technical advisor for the WHO, as an economic consultant for SADC, in project management and research at LSHTM, and co-founded an international initiative in social innovation for health in partnership with WHO.

Methods and practical challenges in costing HPV and malaria vaccine programs

Mercy Mvundura, PATH
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Mercy Mvundura, PhD works as a health economics technical advisor at PATH. She has over 15 years of experience designing and conducting economic evaluations of health care programs, interventions, and technologies. Dr. Mvundura holds a doctorate and Master of Economics from Georgia State University and a Master of Science degree in economics from the University of Zimbabwe. She previously worked for the Centers for Disease Control and Prevention as a Prevention Effectiveness Post-Doctoral Fellow and prior to that she was an assistant professor of economics at the University of Zimbabwe.

Rose Slavkovsky, PATH
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Rose Slavkovsky is a program officer in health economics and outcomes research at PATH. Her work includes economic analyses related to human papillomavirus and other vaccines. She has 10 years of experience working in cervical cancer prevention, including vaccination, screening, and precancer treatment. She holds a master's degree in public administration from the University of Washington Evans School of Public Policy and Governance.

Ranju Baral, PATH
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Ranju Baral is a senior health economist at PATH. In this role, she designs and conducts economic evaluation studies including costing, health impact modeling, cost-effectiveness analysis, budget impact analysis, and demand forecasting for vaccines and vaccine delivery. She holds a Master's degree in Public Health from Tribhuvan University and a PhD in Economics from Virginia Tech.

Health Technology Assessment of COVID-19 vaccination in Nigeria

Benjamin Uzochukwu, University of Nigeria, Nsukka
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Benjamin S. Chudi UZOCHUKWU (FAS, FAMedS) is a Public Health Physician and Professor of Public Health, Health Policy and Systems, University of Nigeria. On Research.com, a prominent academic platform for scientists, he is ranked 2nd in Nigeria and 2939 globally as of June, 2023. He has acted as a policy adviser and consultant to Nigeria's Federal Ministry of Health, ECOWAS, West Africa Health Organization, and African CDC in various areas of health systems. His area of work includes health systems, policy and management, implementation research, healthcare financing, Health Technology Assessment and getting research evidence into policy and practice.

Chinyere Okeke, University of Nigeria, Nsukka
chinyereokeke83@yahoo.com

I am Dr. Chinyere Okeke. I am a fellow of the West African College of Physicians (FWACP) in Community Health. I have been carrying out health policy and systems research to produce evidence for policymaking in my states and in the country. I have undertaken health technology assessments in the past. I have for the past 7 years been lecturing undergraduate and postgraduate students. My main research interests are health systems, policy and management, health technology assessment, and health financing.

Sergio Torres Rueda, London School of Hygiene and Tropical Medicine
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Dr. Sergio Torres-Rueda is an Assistant Professor in Health Economics at the London School of Hygiene & Tropical Medicine. He specializes in economic evaluation and priority setting. He has conducted research across low- and middle-income settings in Africa, Asia and Latin America and has expertise in a range of areas, including HIV, COVID-19 and prevention of violence against women and girls. He has also provided technical assistance in system-wide reforms to strengthen primary health care and universal health coverage, including health benefit package design and institutionalization of health technology assessments.

Cost & sustainability of reaching zero-dose children

Sarah Tougher, UNICEF
stougher@unicef.org

Sarah Tougher is a health economist with a decade of experience conducting applied research into improving access to maternal and child health services and health commodities in low- and middle-income country settings. Her expertise includes the evaluation of complex health systems interventions and equity measurement. Sarah is a consultant with UNICEF working on the economics of immunization in zero-dose communities.

Carol Kamya, IDRC Kampala
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Carol is a Health Economist with over a decade of experience in health financing, health systems, health equity, monitoring, and evaluation. She has extensive experience in health economics research, resource tracking, cost effectiveness analysis, costing studies and budget impact analysis for health programs. Her research interests and experience revolve around maternal and child health, specifically in immunization, malaria, HIV, and other infectious diseases. She is currently evaluating malaria chemoprevention alternatives for children with sickle cell anemia in east and Southern Africa. Carol enjoys developing innovative, effective, and efficient ways to integrate economic evaluation into diverse projects and turning complex data into actionable results that drive decision making and creative solutions.

Louis Tshituka, VillageReach
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Louis K. Tshituka is Team Lead, Monitoring and Evaluation at VillageReach in the DRC. He is currently a doctoral student in health and social protection economics after having obtained a specialization in quantitative and econometric methods for health research from the Public Health Master of Aix-Marseille University in France. He has more than 10 years of experience in the field of monitoring and evaluation of public health projects and programs. His current work focuses on monitoring and evaluation, medico-economic evaluation, demand and use of evidence for decision-making, quality of services, capacity building and research on health inequalities.

Ijeoma Edoka, University of the Witwatersrand, Johannesburg
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Dr Edoka is a principal research consultant at the Health Economics and Epidemiology Research Office, University of the Witwatersrand, Johannesburg and an honorary lecturer at the Wits School of Public Health. Her research interests are broad and have included the application of cost-effectiveness analyses for informing resource allocation decisions in low- and middle-income countries, advancing methods for economic evaluation and the application of quasi-experimental methods for assessing the impact of health policies. She currently leads an assessment of the costs and cost-effectiveness of the COVID-19 vaccination program South Africa.

Stephen Resch, Harvard T.H. Chan School of Public Health
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Stephen Resch is the Deputy Director of the Center for Health Decision Science (CHDS) and a Lecturer in the Department of Health Policy and Management at the Harvard T.H. Chan School of Public Health.

Ulla Griffiths, UNICEF *(see bio on page 27)*

Fostering use of evidence

Kaja Abbas, VIMC
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Kaja Abbas is an Associate Professor in the Department of Infectious Disease Epidemiology at the London School of Hygiene & Tropical Medicine. His research area is vaccine impact modelling with a focus on estimating the health, economic, and equity impact of vaccination programmes to support evidence-based public health decision-making and inform vaccine policy in collaboration with partners and stakeholders at the global, regional, and national levels.

Yoonie Sim, WHO
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So Yoon (Yoonie) Sim is Technical Officer from Value of Vaccines, Economics, and Modeling (VoV) team, Department of Immunization, Vaccines and Biologicals (IVB), World Health Organization. In her current role, Yoonie coordinates epidemiological and economic modeling initiatives to inform the Immunization Agenda 2030, convenes experts to advise on modeling methods and evidence to inform global immunization policies, and collaborates with partners to increase capacity for generating and using modeled evidence inform decisions in LMICs. Yoonie is from the Republic of Korea and holds a dual MA/MSPH degree from the Johns Hopkins University and a BA from Yale University.

Todi Mengistu, Gavi *(see bio on page 27)*

Raymond Hutubessy, WHO *(see bio on page 26)*

Annex

Countries of residence of participants

Angola
Australia
Botswana
Brazil
Canada
China
Democratic Republic of Congo
Egypt
Ethiopia
France
Gabon
Ghana
Hong Kong
India
Indonesia
Italy
Japan
Kenya
Lao People's Democratic Republic
Liberia
Malawi
Mexico
Nepal
Netherlands
Nigeria
Pakistan
Peru
Philippines
Qatar
Rwanda
Senegal
Singapore
South Africa
Spain
Switzerland
Taiwan
Tanzania
Uganda
United Kingdom
United States of America
Vietnam
Zambia

Affiliations of participants

Aga Khan University
Ateneo de Manila University
Bang for Buck Consulting
Bill & Melinda Gates Foundation
Biovac
CEMA
Centre Africain d'Etudes Supérieures en Gestion
Cermel
Clinton Health Access Initiative
Egyptian Drug Authority.
Gavi, the Vaccine Alliance
Genesis Analytics
George Institute for Global Health
Guangzhou University of Chinese Medicine
Hanoi University of Public Health
Harvard T.H. Chan School of Public Health
IAVI
Imperial College London
Infectious Diseases Research Collaboration
Inst Nacional de Cardiologia
Institute of Health Metrics and Evaluation
International Initiative for Impact Evaluation (3ie)
International University of Health and Welfare
Irrua Specialist Teaching Hospital
Johns Hopkins Bloomberg School of Public Health
Juno Global Health
KEMRI-Wellcome Trust Research Programme
Kenyatta National Hospital
Kyoto University
Last Mile Health
Levin & Morgan LLC
London School of Hygiene and Tropical Medicine

Annex

Malaria Consortium
Management Sciences for Health
Ministry of Health and Population, Nepal
Ministry of Health, Botswana
Ministry of Health, Tanzania
Ministry of Health, Zambia
National Institute of Cardiology, Brazil
National University of Singapore
National Yang Ming Chiao Tung University
Nexleaf Analytics
Nnamdi Azikiwe University Awka
Office of Health Economics, UK
Ohio State University
PATH
Peking University
Public Health Foundation of India
Queensland University of Technology
SEND GHANA
Society for Health and Demographic Surveillance
Tecnologico de Monterrey
ThinkWell
U.S. Centers for Disease Control and Prevention
UKHSA
UKZN
UNICEF
University Health Network
University of Calgary
University of Cape Town
University of Genova
University of Glasgow
University of Hong Kong
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University of the Witwatersrand
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University of Washington
University of York
Victoria University
VillageReach
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World Health Organization
Yokohama City University School

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