Immunization Economics Pre-Congress Meeting

Bali, July 19-20th, 2025

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Efficiency, prioritization, and vaccine portfolio optimization: strengthening capacity to use economic evidence in decision-making for immunization programs

Bali, July 20, 2025

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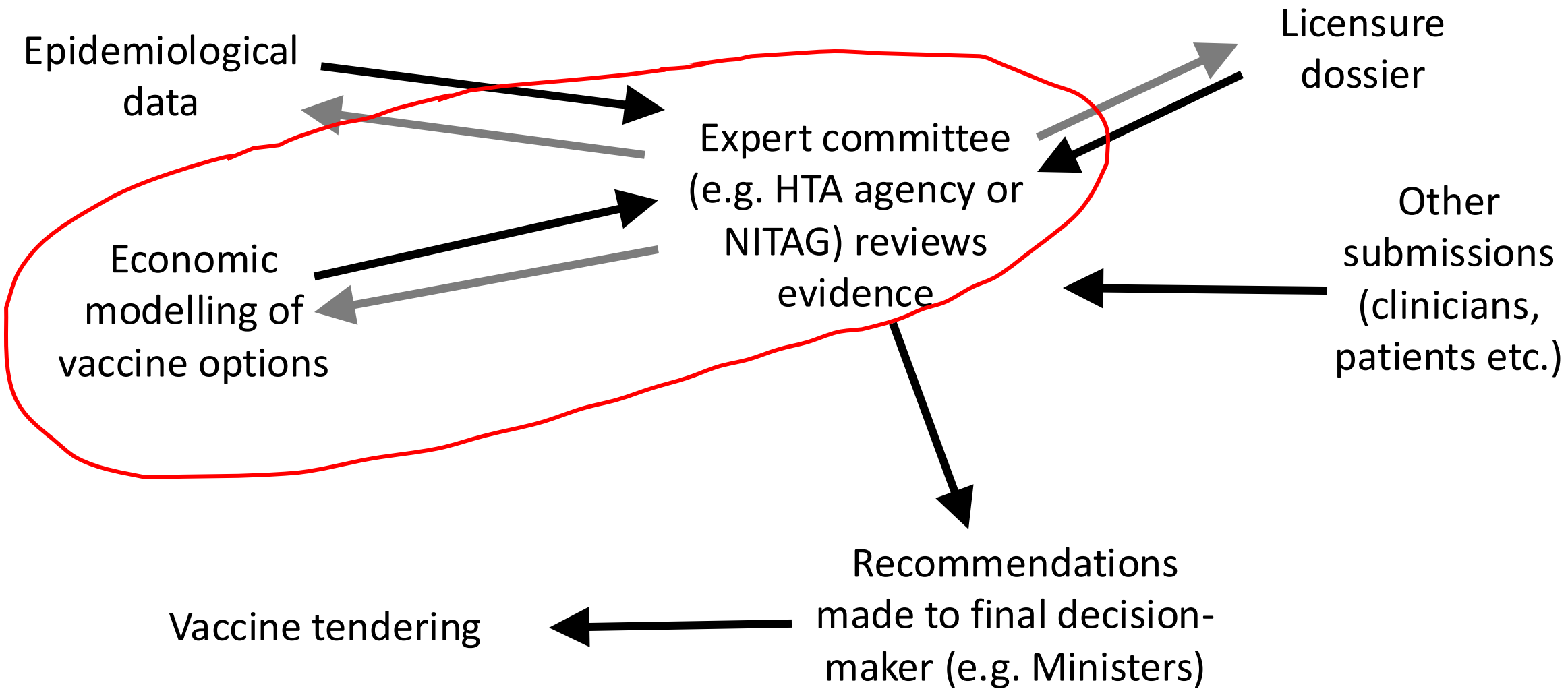
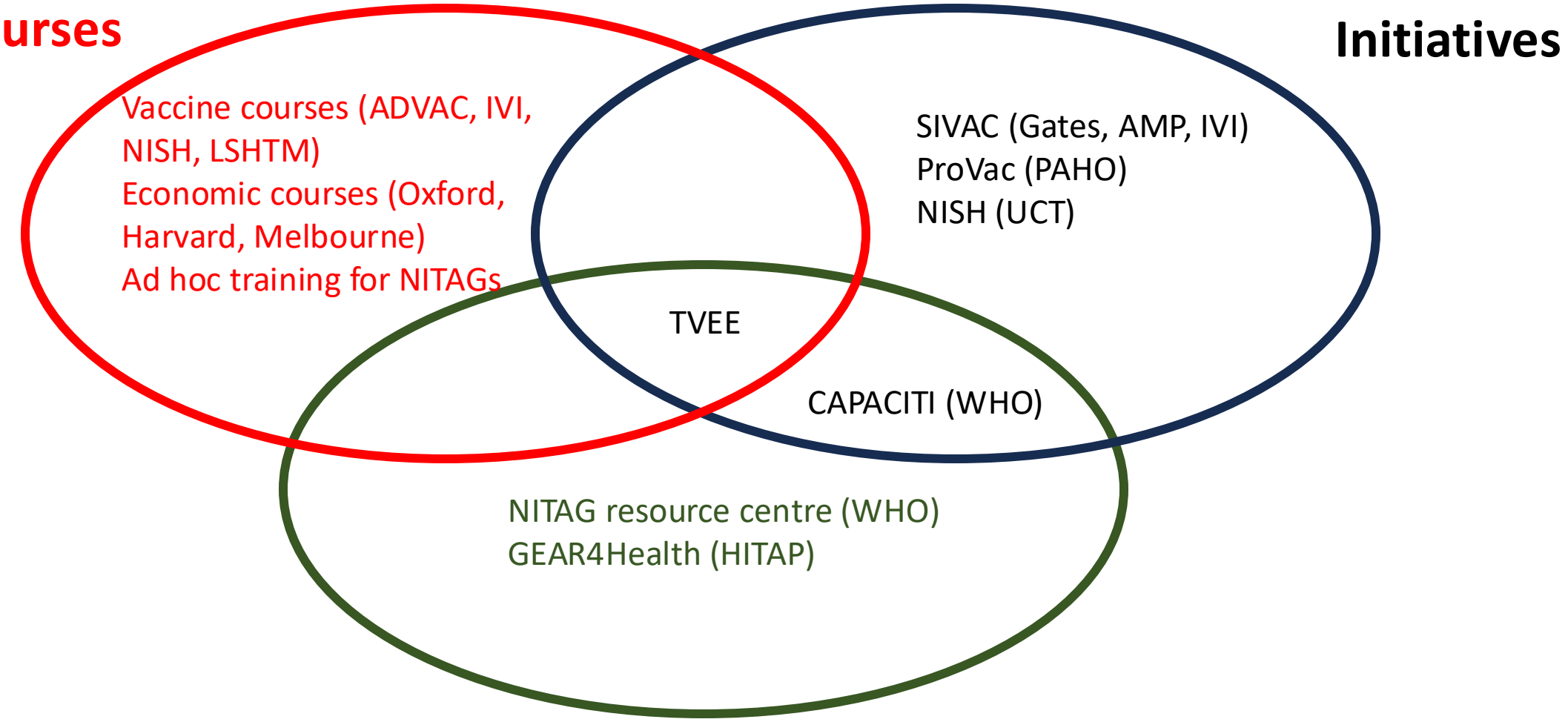
The role of economic evidence in vaccine decision-making



Capacity strengthening resources



Today’s session

Mark Jit (NYU)

Moderator

Palwasha Anwari (WHO EMRO)

Integrating health economics expertise in EPI programs in 22 EMRO countries

Natalie Carvalho (University of Melbourne)

Lessons learned from the Global NITAG Network (GNN) Vaccine Economics Training

Process, Content and Lessons Learned from the Global NITAG Network (GNN) Vaccine Economics Training

Associate Professor Natalie Carvalho
University of Melbourne

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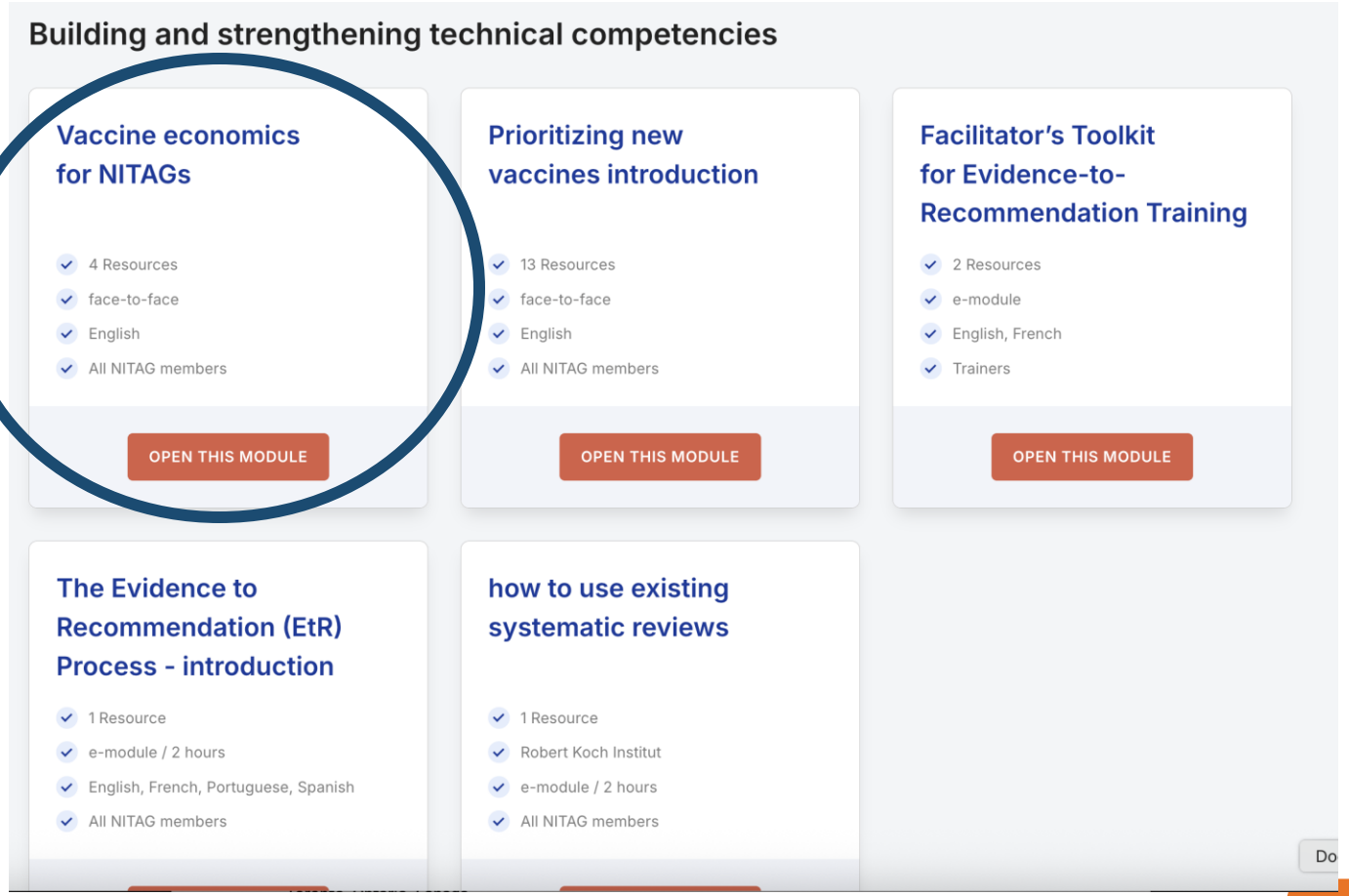
Acknowledgements

- WHO & GNN
- University of Melbourne
- Expert advisory group members
  - Health Economists
  - NITAG representatives
- Existing trainings (ex: TVEE)
- Pilot testing audience, including NITAG members and secretariats
- Lanxuan Zhao (MPH PPU student, slides)

GNN overview and existing trainings

GNN
GLOBAL - NITAG - NETWORK

- Platform open to all NITAGs
- Promote shared learning, regional collaboration, and improved evidence-informed decision-making
- Guided by representatives from WHO's six regions



https://www.nitag-resource.org/training

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Purpose of GNN Vaccine Economics Trainings

- Aim: To develop two vaccine economic training modules (Beginner & Advanced)
- Target audience: New and existing NITAG members and secretariats
- Mode & duration: Face-to-face delivery (~3 hrs each) with short lectures, interactive sessions and case studies
- Learning objectives: Specific to each module

Overall, the trainings aim to **introduce NITAGs to vaccine economics** and to demonstrate how NITAGs can **consider and support the use of economic evidence** in the development of immunisation recommendations.

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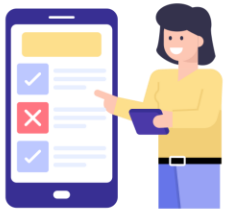
Overview of process

Module Refinement

- Incorporated expert feedback (WHO, GNN, NITAG members)

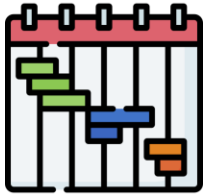
→To ensure the modules are technically sound and user-friendly



Pre-and post-module Surveys (Qualtrics)

- Applied logic functions and scoring

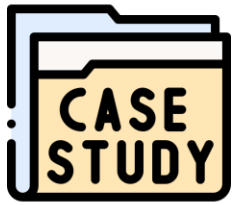
→ To easily evaluate learning outcome and improve training effectiveness



Pilot Testing

- Conducted pilot testing among NITAG members

→ To obtain feedback from relevant audience to refine modules



Case Study Compilation

- Scanned for real-world cases of NITAG vaccine recommendations and developed Q&A sets

→ To illustrate practical real-world application of economic evidence

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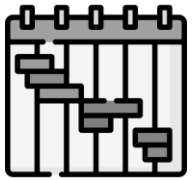
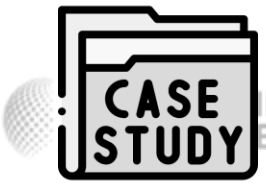
Module Development





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GNN
GLOBAL - NITAG - NETWORK

Home Resources Diseases Training SYSVAC

Home / Training / Vaccine economics for NITAGs

Training

Vaccine economics for NITAGs

Overview

- Explain why economic evidence can be useful in developing immunization recommendations
- Recognize which elements of the Evidence to Recommendation (ETR) framework link to economic evidence
- Identify economic question(s) that may be of relevance to the NITAG
- Link different types of economic assessments to specific economic questions relevant to NITAGs
- Interpret the results of a cost-effectiveness analysis for decision-making

Content

1. Why and how to consider economic evidence in developing immunisation recommendations?
2. Costing studies and budget impact analysis
3. Introduction to economic evaluation
4. Additional resources and takeaways

With

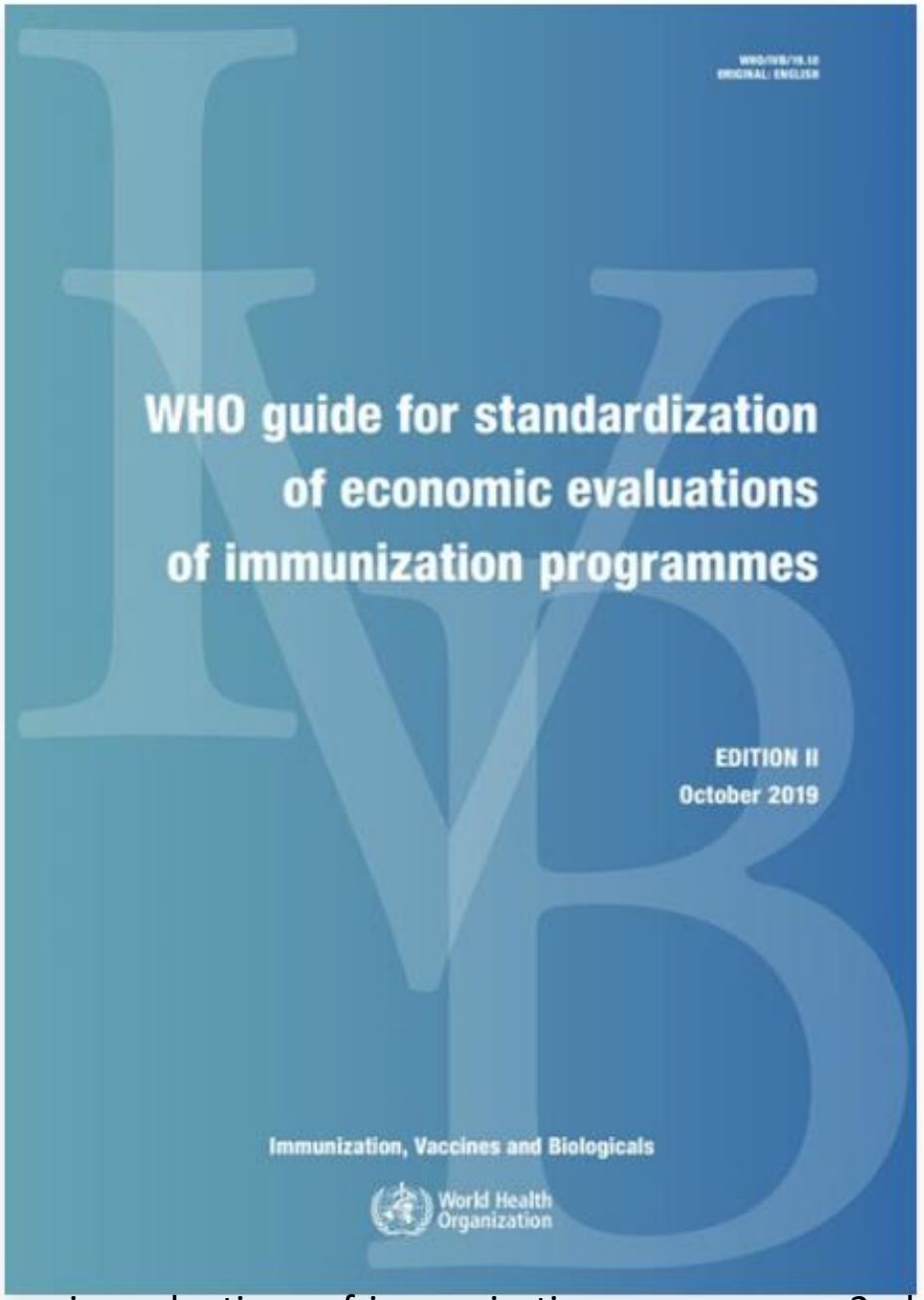
- **Facilitated discussions**
- **Case studies**
- **Hands on exercises**
- **Pre- and post-module quizes**

Role of the WHO

- Alignment to WHO guidance documents:

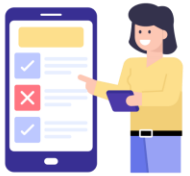
"WHO Guide on Standardization of economic evaluations of immunization programmes" (2019)

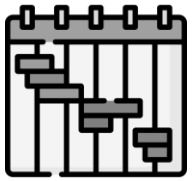
- Provides clear and concise guidance emphasizing what to do, rather than how to do it
- WHO normative role in supporting countries in capacity building on economic evaluations for country-owned decision making

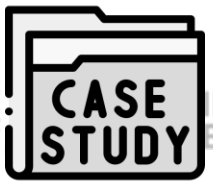


https://www.who.int/publications/i/item/who-guide-for-standardization-of-economic-evaluations-of-immunization-programmes-2nd-ed

Pre- and Post-Module Quizes







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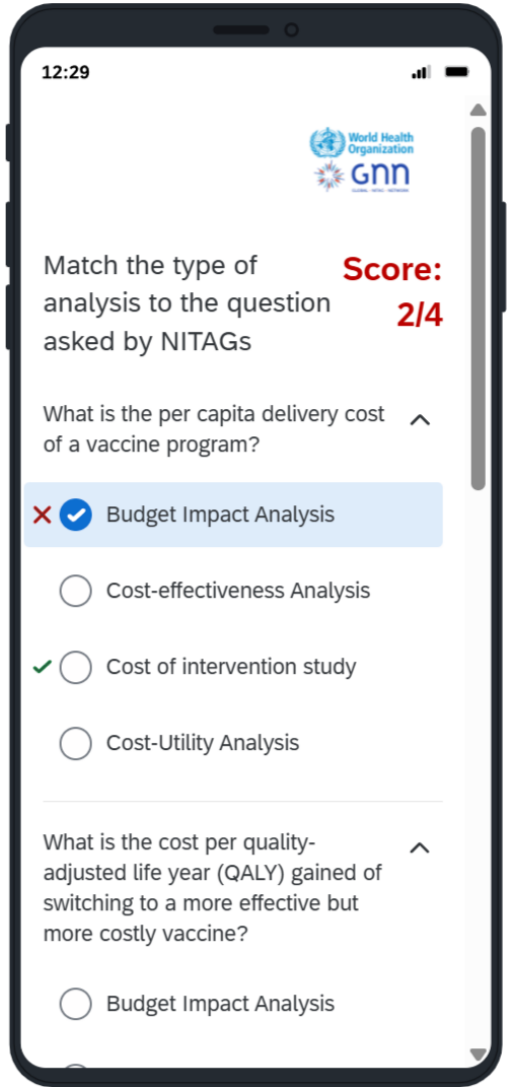
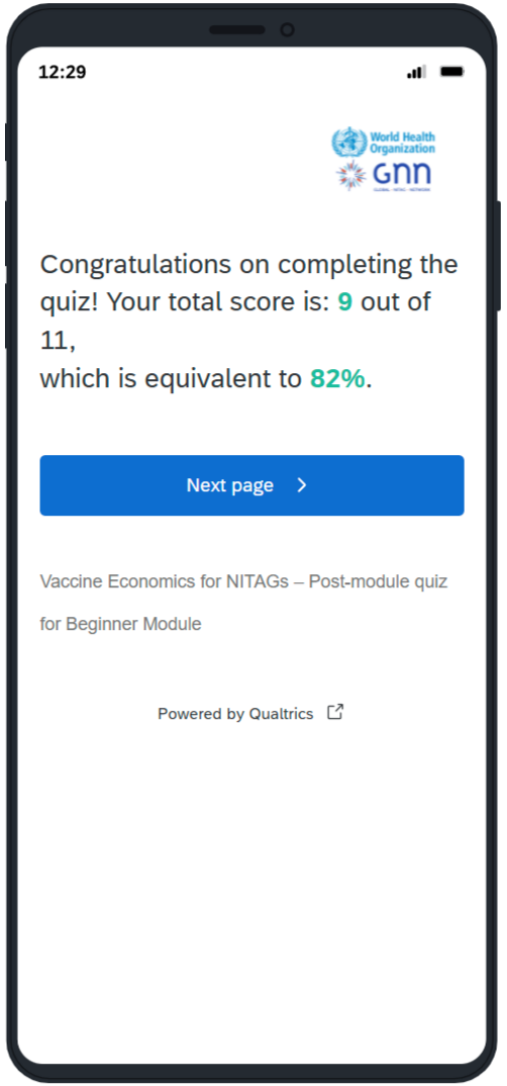
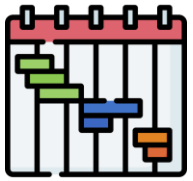
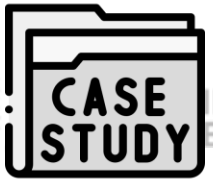




Piloting

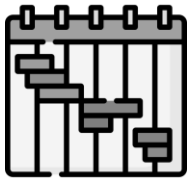


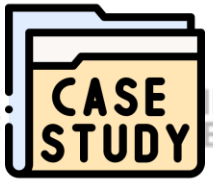


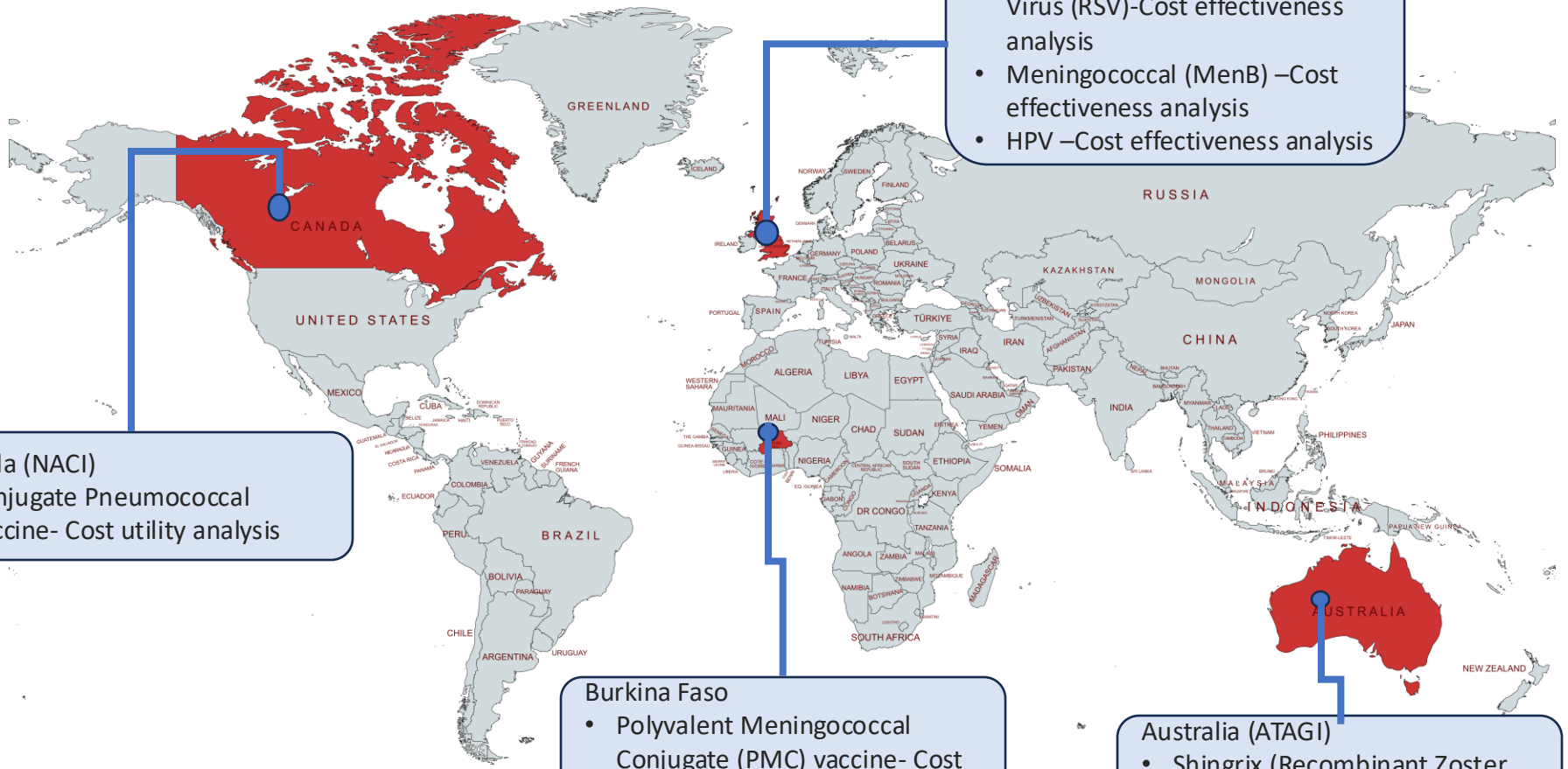
Piloting course schedule

1	2	3	4	5	6	7
2024.5.7	**2024.5.15**	**2024.6.7-6.12**	**2024.6.13**	**2024.6.13**	**2024.6.24-6.26**	**2024.9.9**
Beginner course with DFAT Australia Awards Fellow	Advanced course with DFAT Australia Awards Fellow	Beginner course with AVCN	Beginner course with Iraq NITAG	Advanced course with Laos NITAG	Beginner course with SEAR NITAG	Beginner course with EMRO

Case Studies







UK (JCVI)
- Potential Respiratory Syncytial Virus (RSV)-Cost effectiveness analysis
- Meningococcal (MenB) –Cost effectiveness analysis
- HPV –Cost effectiveness analysis

Canada (NACI)
- Conjugate Pneumococcal Vaccine- Cost utility analysis

Burkina Faso
- Polyvalent Meningococcal Conjugate (PMC) vaccine- Cost effectiveness analysis

Australia (ATAGI)
- Shingrix (Recombinant Zoster Vaccine - RZV) –Budget Impact analysis

Lessons learned: Context

- **NITAGs are set up differently** across countries:
  - Some NITAGs have a working group that conducts economic studies;
  - Some NITAGs commission economic studies and have experts who can critique these studies;
  - Some NITAGs lack this expertise and rely on a separate Health Technology Assessment (HTA) process or other decision-making process

Ex: Canada (NACI) developed guidelines in 2023[1] because CDA (formally CADTH) guidelines are not vaccine specific. Previously not taken into account.

- **Need for contextualisation** of module examples, case studies, exercises for NITAGs in different regions/income levels

1. https://www.canada.ca/content/dam/phac-aspc/documents/services/immunization/national-advisory-committee-on-immunization-naci/methods-process/incorporating-economic-evidence-federal-vaccine-recommendations/guidelines-evaluation-vaccination-programs-canada.pdf

Lessons learned: Collaboration

- Need for **experienced trainers** across different countries/regions who have knowledge of countries' NITAGs & processes

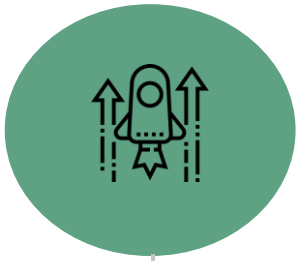
- Need for **central repository of relevant case studies** to provide real world examples that have influenced policy.

- Need for **sharing of resources, guidelines, processes, training materials** & more understanding of **training needs**

Next steps

Beginner Module

- Finalised and on website*



Advanced Module

- Further refinement
- Future piloting
- Expanded case studies library

Future trainings

- Groundwork for online learning journey (SAGE, 2025)

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https://www.nitag-resource.org/training/building-and-strengthening-technical-competencies/vaccine-economics-nitags

Thank you

natalie.carvalho@unimelb.edu.au

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Efficiency, prioritization, and vaccine portfolio optimization: strengthening capacity to use economic evidence in decision-making for immunization programs

Bali, July 20, 2025

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Efficiency, prioritization, and vaccine portfolio optimization: tools & way forward

Bali, July 20, 2025

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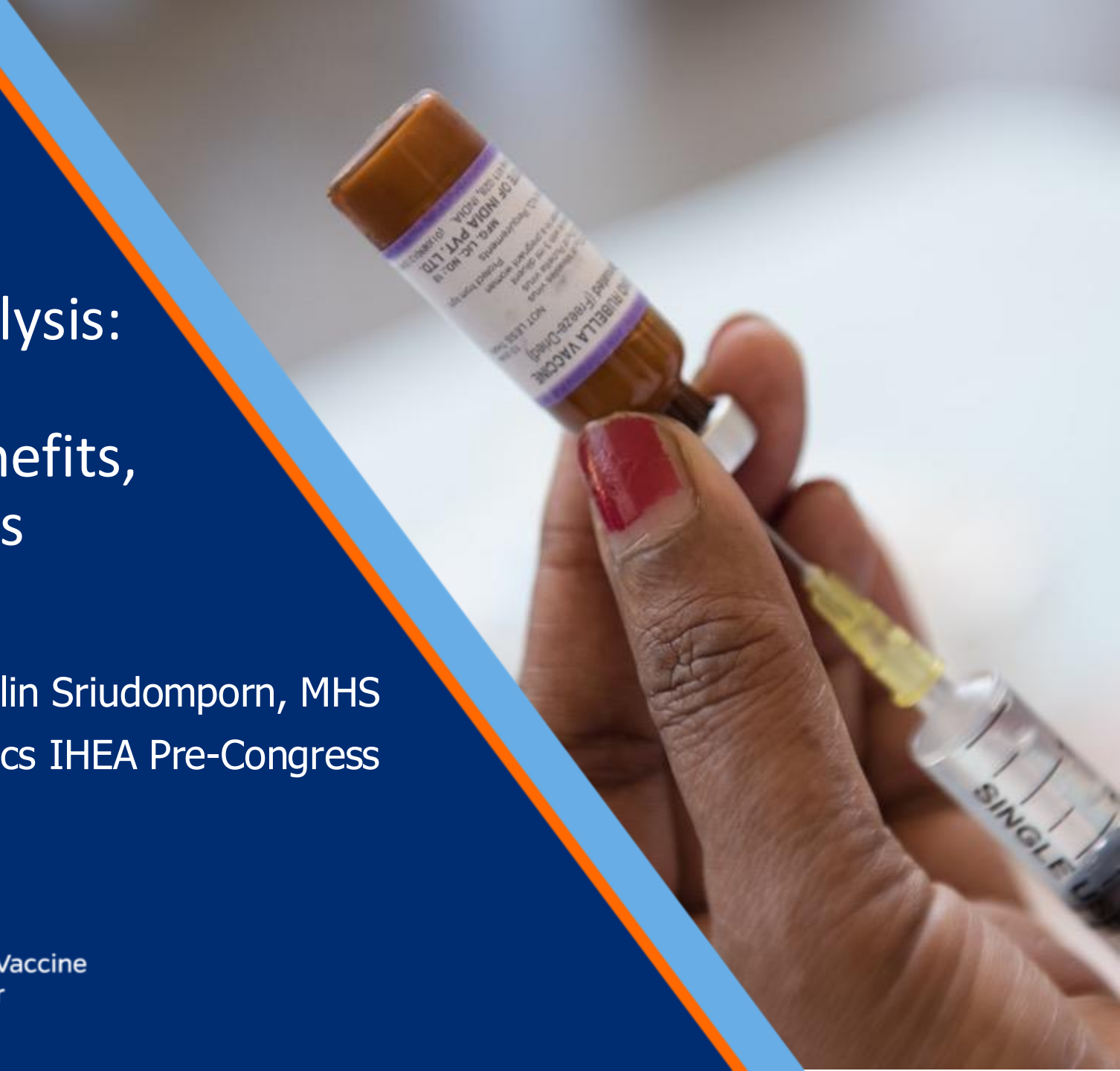
July 20, 2025

The R-Shiny tool for immunization program analysis: an interactive web-based approach to estimating benefits, costs, ROI, and funding gaps



Salin Sriudomporn, MHS

2025 Immunization Economics IHEA Pre-Congress

JOHNS HOPKINS
BLOOMBERG SCHOOL
of PUBLIC HEALTH

IVAC
International Vaccine
Access Center

GLOBAL HEALTH POLICY

By So Yoon Sim, Elizabeth Watts, Dagna Constenla, Logan Brenzel, and Bryan N. Patenaude

Return On Investment From Immunization Against 10 Pathogens In 94 Low- And Middle-Income Countries, 2011–30

ABSTRACT Estimating the value of global investment in immunization programs is critical to helping decision makers plan and mobilize immunization programs and allocate resources required to realize their full benefits. We estimated economic benefits using cost-of-illness and value-of-a-statistical-life approaches and combined this estimation with immunization program costs to derive the return on investment from immunization programs against ten pathogens for ninety-four low- and middle-income countries for the period 2011–30. Using the cost-of-illness approach, return on investment for one dollar invested in immunization against our ten pathogens was 26.1 for the ninety-four countries from 2011 to 2020 and 19.8 from 2021 to 2030. Using the value-of-a-statistical-life approach, return on investment was 51.0 from 2011 to 2020 and 52.2 from 2021 to 2030. The results demonstrate continued high return on investment from immunization programs. The return-on-investment estimates from this study will inform country policy makers and decision makers in funding agencies and will contribute to efforts to mobilize resources for immunization. Realization of the full benefits of

GLOBAL HEALTH POLICY

By Joshua Mak, Salin Sriudomporn, William J. Moss, and Bryan N. Patenaude

An Estimate Of The Return On Investment Of A Malaria Vaccine In 20 Sub-Saharan African Countries, 2021–30

ABSTRACT Malaria is a leading global health problem that was responsible for an estimated 619,000 deaths worldwide in 2021. We modeled the return on investment (ROI) for the introduction and continuation of a four-dose malaria vaccine, RTS,S/AS01, from 2021 to 2030 in twenty sub-Saharan African countries supported by Gavi, the Vaccine Alliance. We used the Decade of Vaccine Economics benefits and costing outputs to calculate an ROI using health impact data modeled by the Swiss Tropical and Public Health Institute (hereafter "Swiss") and Imperial College London (hereafter "Imperial"). The Swiss estimates with a base vaccine price of US$7.00 resulted in an ROI of 0.42, and the Imperial impact estimates with the same base vaccine price resulted in an ROI of 2.30. Inclusion of the fifth seasonal dose for ten countries exhibiting high seasonal disease burden increased the Swiss ROI by 143 percent, to 1.02, and the Imperial ROI by 23.5 percent, to 2.84. To improve ROI, decision makers should continue to improve delivery platforms, decrease vaccine

Contents lists available at ScienceDirect

Vaccine: X

journal homepage: www.elsevier.com/locate/jvacx

Achieving immunization agenda 2030 coverage targets for 14 pathogens: Projected product and immunization delivery costs for 194 Countries, 2021–2030

Salin Sriudomporn [a,b,*], Elizabeth Watts [c], So Yoon Sim [d], Raymond Hutubessy [d], Bryan Patenaude [a,b]

[a] International Vaccine Access Center, Johns Hopkins Bloomberg School of Public Health, Baltimore, MD, USA
[b] Department of International Health, Johns Hopkins Bloomberg School of Public Health, Baltimore, MD, USA
[c] Division of Health Policy and Management, University of Minnesota School of Public Health, Minneapolis, Minnesota, USA
[d] Immunization Analysis & Insights (IAI) unit, Department of Immunization, Vaccines and Biologicals (IVB), World Health Organization, Geneva, Switzerland

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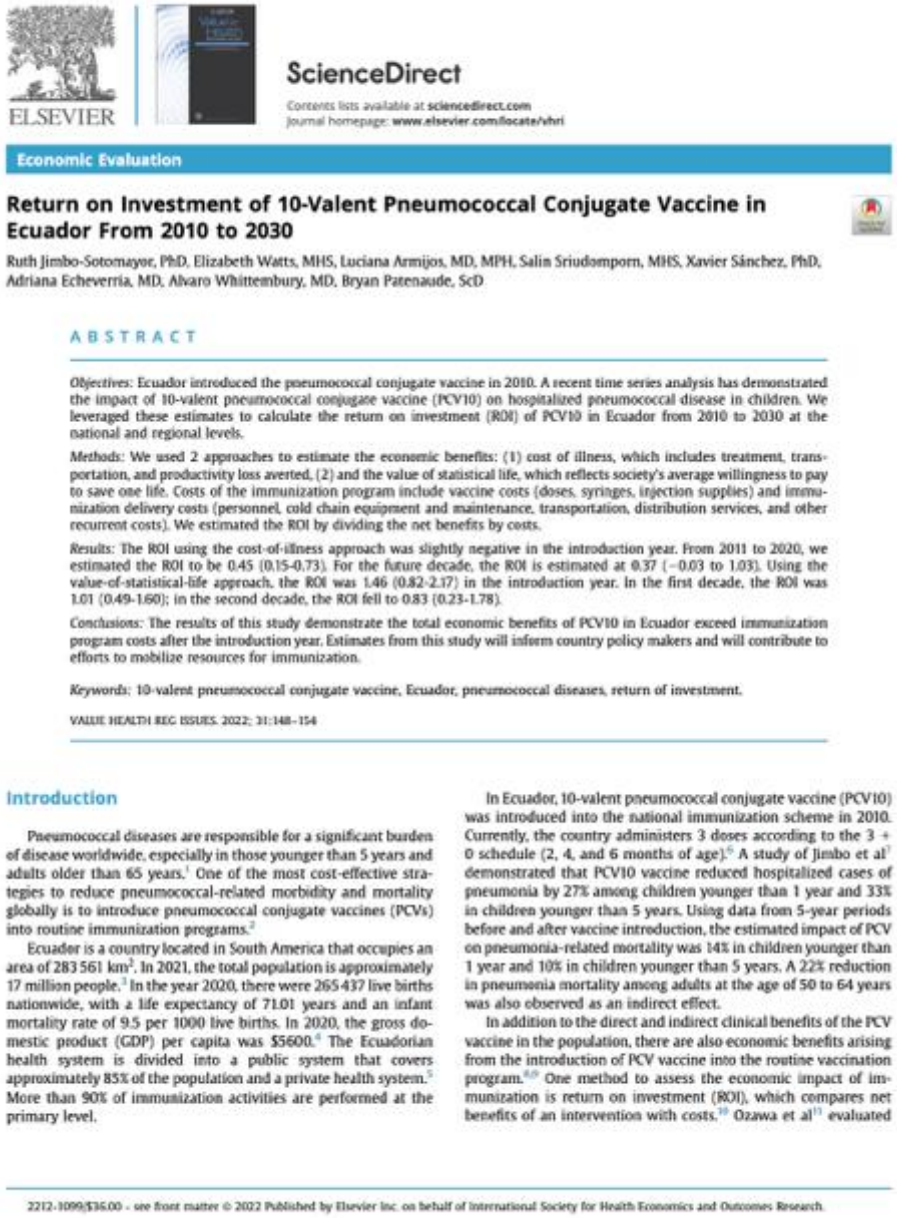
Themed Section: Vaccines

Economic Benefits of Immunization for 10 Pathogens in 94 Low- and Middle-Income Countries From 2011 to 2030 Using Cost-of-Illness and Value-of-Statistical-Life Approaches

Elizabeth Watts, MHS, So Yoon Sim, MA, MSPH, Dagna Constenla, PhD, Salin Sriudomporn, MHS, Logan Brenzel, PhD, Bryan Patenaude, ScD

PCV ROI analysis in Ecuador supported the decision to retain PCV10 in their immunization program



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Economic Evaluation

Return on Investment of 10-Valent Pneumococcal Conjugate Vaccine in Ecuador From 2010 to 2030

Ruth Jimbo-Sotomayor, PhD, Elizabeth Watts, MHS, Luciana Armijos, MD, MPH, Salin Sriudomporn, MHS, Xavier Sánchez, PhD, Adriana Echeverría, MD, Alvaro Whittembury, MD, Bryan Patenaude, ScD

ABSTRACT

Objectives: Ecuador introduced the pneumococcal conjugate vaccine in 2010. A recent time series analysis has demonstrated the impact of 10-valent pneumococcal conjugate vaccine (PCV10) on hospitalized pneumococcal disease in children. We leveraged these estimates to calculate the return on investment (ROI) of PCV10 in Ecuador from 2010 to 2030 at the national and regional levels.

Methods: We used 2 approaches to estimate the economic benefits: (1) cost of illness, which includes treatment, transportation, and productivity loss averted, (2) and the value of statistical life, which reflects society's average willingness to pay to save one life. Costs of the immunization program include vaccine costs (doses, syringes, injection supplies) and immunization delivery costs (personnel, cold chain equipment and maintenance, transportation, distribution services, and other recurrent costs). We estimated the ROI by dividing the net benefits by costs.

Results: The ROI using the cost-of-illness approach was slightly negative in the introduction year. From 2011 to 2020, we estimated the ROI to be 0.45 (0.15-0.73). For the future decade, the ROI is estimated at 0.37 (−0.03 to 1.03). Using the value-of-statistical-life approach, the ROI was 1.46 (0.82-2.17) in the introduction year. In the first decade, the ROI was 1.01 (0.49-1.60); in the second decade, the ROI fell to 0.83 (0.23-1.78).

Conclusions: The results of this study demonstrate the total economic benefits of PCV10 in Ecuador exceed immunization program costs after the introduction year. Estimates from this study will inform country policy makers and will contribute to efforts to mobilize resources for immunization.

Keywords: 10-valent pneumococcal conjugate vaccine, Ecuador, pneumococcal diseases, return of investment.

VALUE HEALTH REG ISSUES. 2022; 31:148–154

Introduction

Pneumococcal diseases are responsible for a significant burden of disease worldwide, especially in those younger than 5 years and adults older than 65 years.[1] One of the most cost-effective strategies to reduce pneumococcal-related morbidity and mortality globally is to introduce pneumococcal conjugate vaccines (PCVs) into routine immunization programs.[2]

Ecuador is a country located in South America that occupies an area of 283 561 km^2. In 2021, the total population is approximately 17 million people.[3] In the year 2020, there were 265 437 live births nationwide, with a life expectancy of 71.01 years and an infant mortality rate of 9.5 per 1000 live births. In 2020, the gross domestic product (GDP) per capita was $5600.[4] The Ecuadorian health system is divided into a public system that covers approximately 85% of the population and a private health system.[5] More than 90% of immunization activities are performed at the primary level.

In Ecuador, 10-valent pneumococcal conjugate vaccine (PCV10) was introduced into the national immunization scheme in 2010. Currently, the country administers 3 doses according to the 3 + 0 schedule (2, 4, and 6 months of age).[6] A study of Jimbo et al[7] demonstrated that PCV10 vaccine reduced hospitalized cases of pneumonia by 27% among children younger than 1 year and 33% in children younger than 5 years. Using data from 5-year periods before and after vaccine introduction, the estimated impact of PCV on pneumonia-related mortality was 14% in children younger than 1 year and 10% in children younger than 5 years. A 22% reduction in pneumonia mortality among adults at the age of 50 to 64 years was also observed as an indirect effect.

In addition to the direct and indirect clinical benefits of the PCV vaccine in the population, there are also economic benefits arising from the introduction of PCV vaccine into the routine vaccination program.[8,9] One method to assess the economic impact of immunization is return on investment (ROI), which compares net benefits of an intervention with costs.[10] Ozawa et al[11] evaluated

Objective

"To provide a publicly available web-based, and easy-to-use tool that enables countries to lead their immunization investment planning, supported by collaborative guidance."

Comprehensive

Convenient

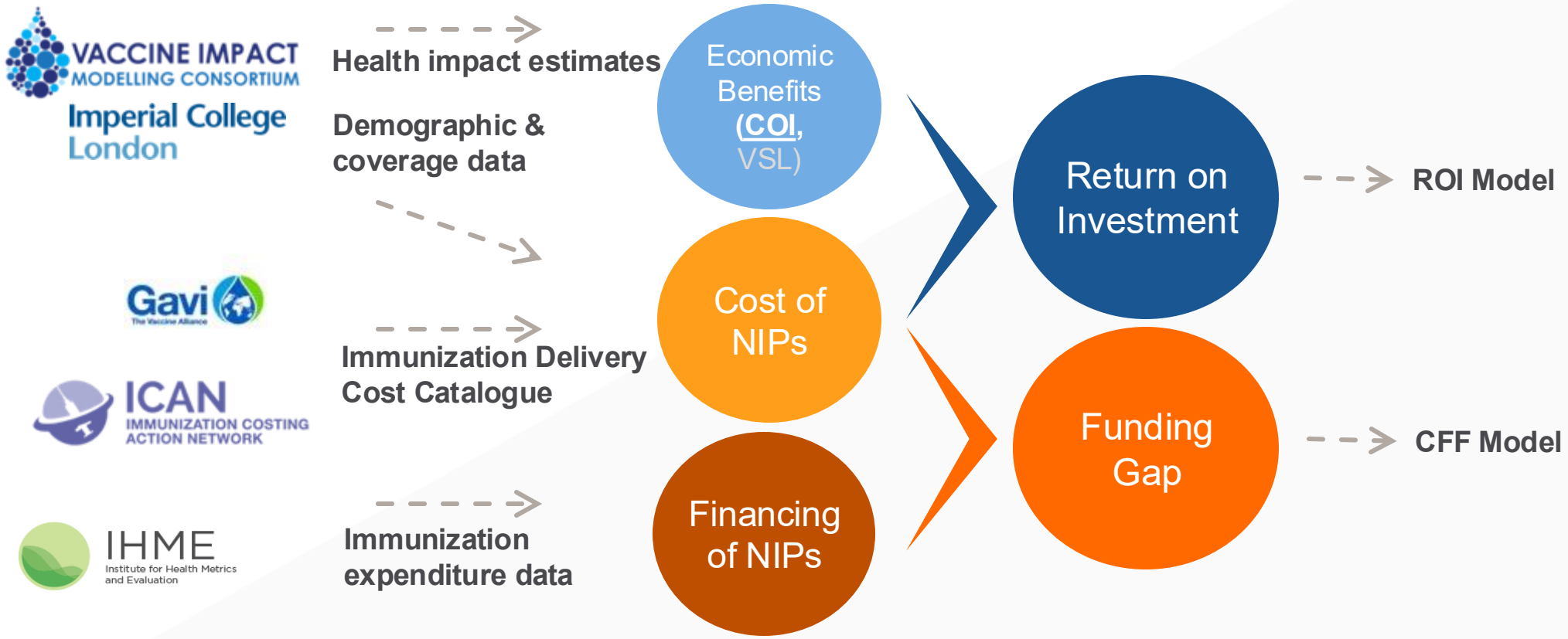
Collaborative

Country-led

Methodology

- **R-Shiny based** application
- Based on immunization program analysis models created by the Decade of Vaccine Economics (DOVE)/ Vaccine Economics Research for Sustainability and Equity (VERSE) team at the International Vaccine Access Center, the Johns Hopkins Bloomberg School of Public Health.
  - **Economic benefit – Cost-of-Illness (COI) approach**
  - Vaccine-specific immunization program costing and the funding gap are calculated based on the current level of financing - **Costing, Financing and Funding Gap (CFF) model.**
- Model key components of immunization program analysis, including
  - Economic benefits, Costing, ROI, Financing and Funding Gaps
- At **both national and subnational** level.

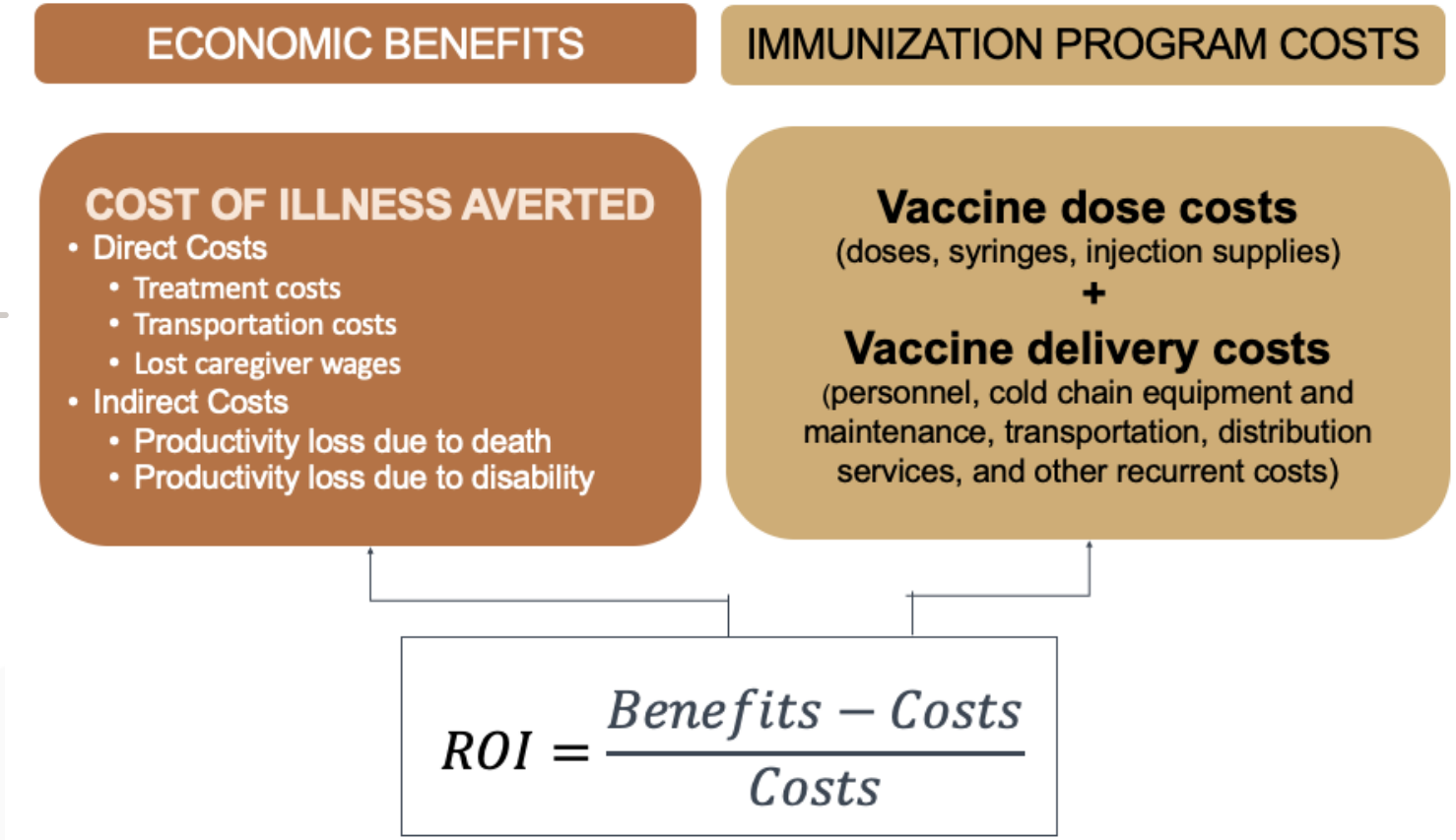
Methodology – DOVE/ VERSE Model Review



Funded by Gates Foundation

Return on Investment (ROI) Model

- Inpatient Bed Days
- Care Seeking Rate
- Daily minimum wage
- ETC.



Immunization Program Costing

$$Vaccine\ costs_{ijk} = \sum_{k=2021}^{2030} \sum_{j=1}^{117} \sum_{i=1}^{18} (number\ of\ doses_{ijk} \times price\ per\ dose_{ijk})$$

+

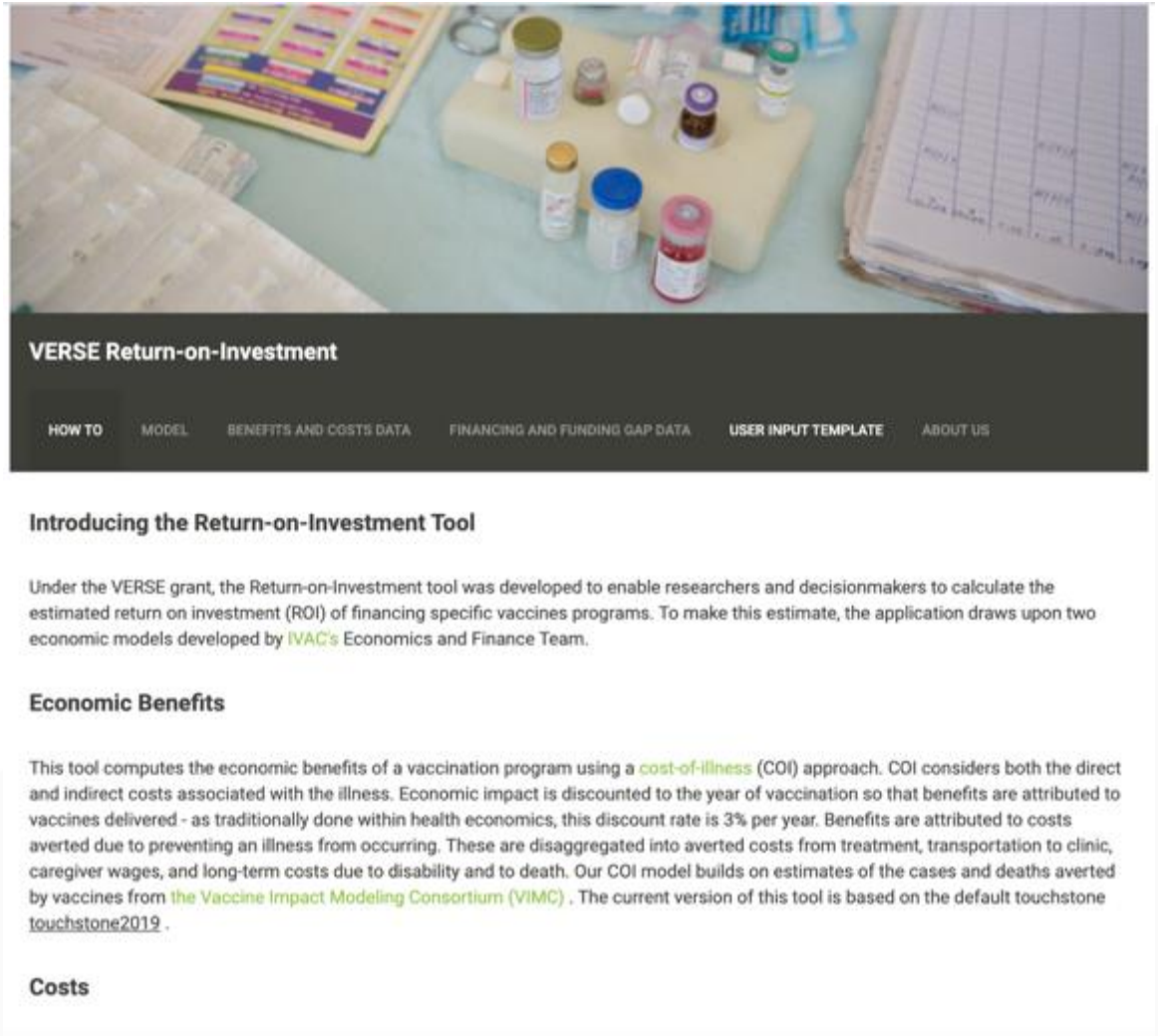
$$Immunization\ delivery\ costs_{ijk} = \sum_{k=2021}^{2030} \sum_{j=1}^{117} \sum_{i=1}^{18} (number\ of\ doses_{ijk} \times delivery\ cost\ per\ dose_{ij})$$

$$Number\ of\ doses_{ijk} = Target\ population_{ijk} \times Coverage\ rate_{ijk} \times Number\ of\ recommended\ doses_{ij} \times \left(1/(1 - Wastage\ rate_{ij})\right) \times \left(Buffer_{ijk}\right)$$

Where i = vaccine, j = country and k = year

* the buffer stock rate for routine immunization is calculated incrementally

ROI Shiny Application – LIVE DEMO



What's next?

- Integrating additional metrics:
  - **Cost per dose**
  - **Cost per death averted**
  - **Cost per DALY averted**
- Enhancing customization to better reflect country-specific data:
  - Adjustable **coverage targets**
  - Editable **financing inputs**
  - Scenario analysis for **policy and investment planning**

THANK YOU!

VACCINE IMPACT MODELLING CONSORTIUM

Gavi The Vaccine Alliance

GF

DOVE DECADE OF VACCINE ECONOMICS

INTERNATIONAL VACCINE ACCESS CENTER

VERSE VACCINE ECONOMICS RESEARCH FOR SUSTAINABILITY AND EQUITY

JOHNS HOPKINS BLOOMBERG SCHOOL of PUBLIC HEALTH

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Vaccine Impact Modelling Consortium (VIMC) **Health Economic Modelling**

Allison Portnoy & Kaja Abbas

20 July 2025

Vaccine Impact Modelling Consortium

https://www.vaccineimpact.org vimc@imperial.ac.uk

- VIMC is an international community of modellers providing high-quality estimates of the public health impact of vaccination, to inform and improve decision making.

VIMC background

- The Vaccine Impact Modelling Consortium (VIMC) comprises 22 modelling groups on 11 diseases, with its secretariat based at Imperial College London
  - Funded by the Bill & Melinda Gates Foundation, Gavi, the Vaccine Alliance, and the Wellcome Trust
- Core aims by 2027:
  - To provide reliable and accessible estimates of vaccine impact across the Gavi portfolio
  - To address critical modelling related vaccine policy questions raised by stakeholders who will be dynamically engaged in our work
  - To translate the Consortium's modelling to real world policy that improves health outcomes
  - To foster a diverse international community of vaccine impact modelers, inclusive of modelers in low- and middle-income countries (LMICs)
  - To provide training in infectious disease modelling and its application to vaccine preventable diseases for both modelers and policymakers

VIMC project working groups

VIMC project working groups aim to answer discrete,

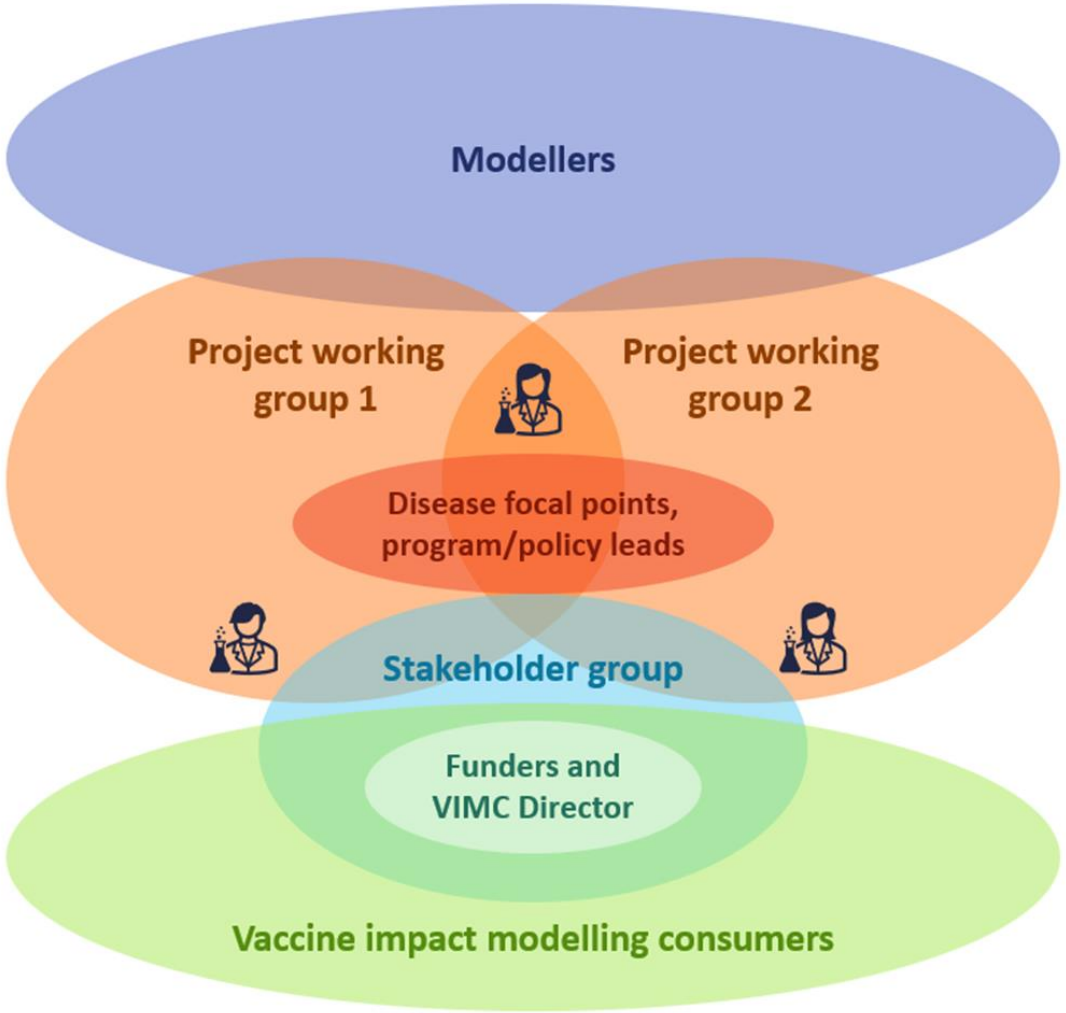
policy-relevant questions

in collaboration with a

diverse range of engaged stakeholders

then translate and disseminate results to create

real-world health benefits.



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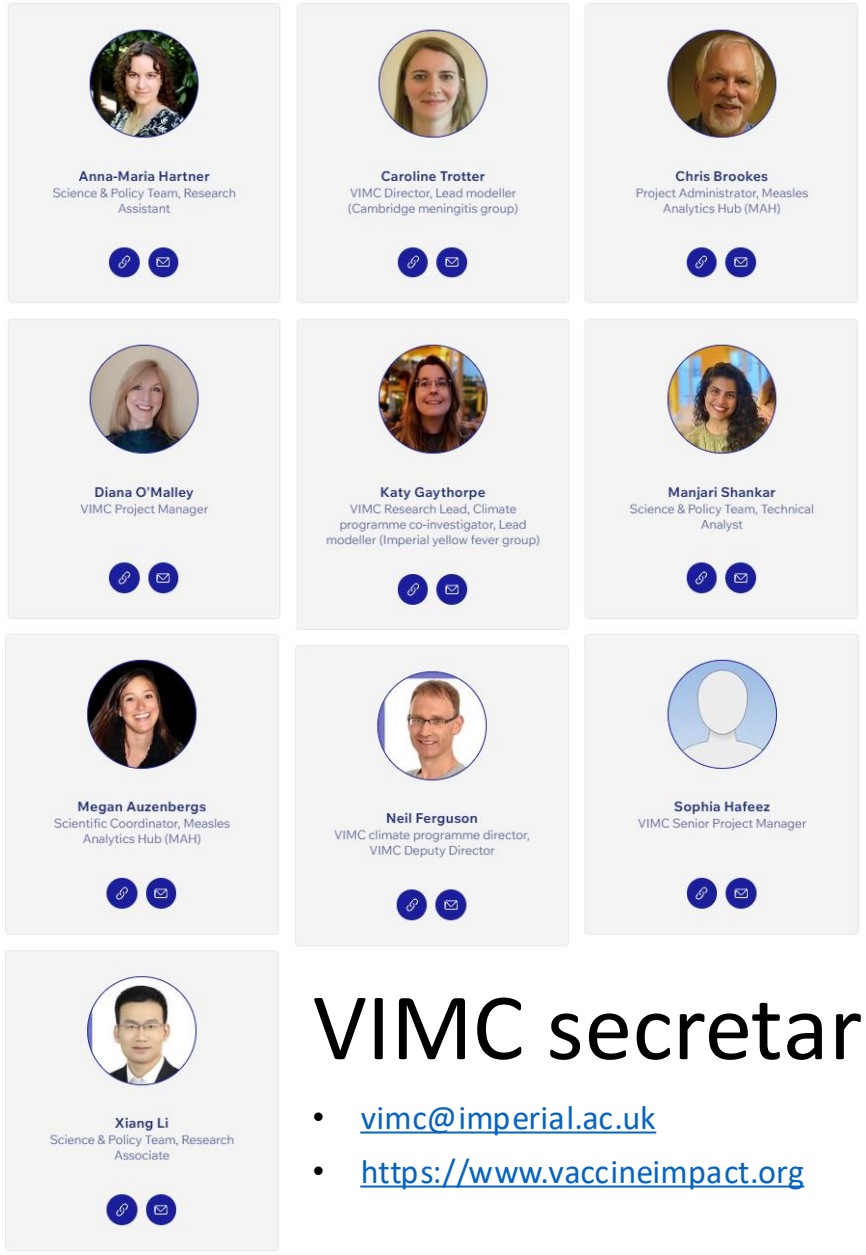
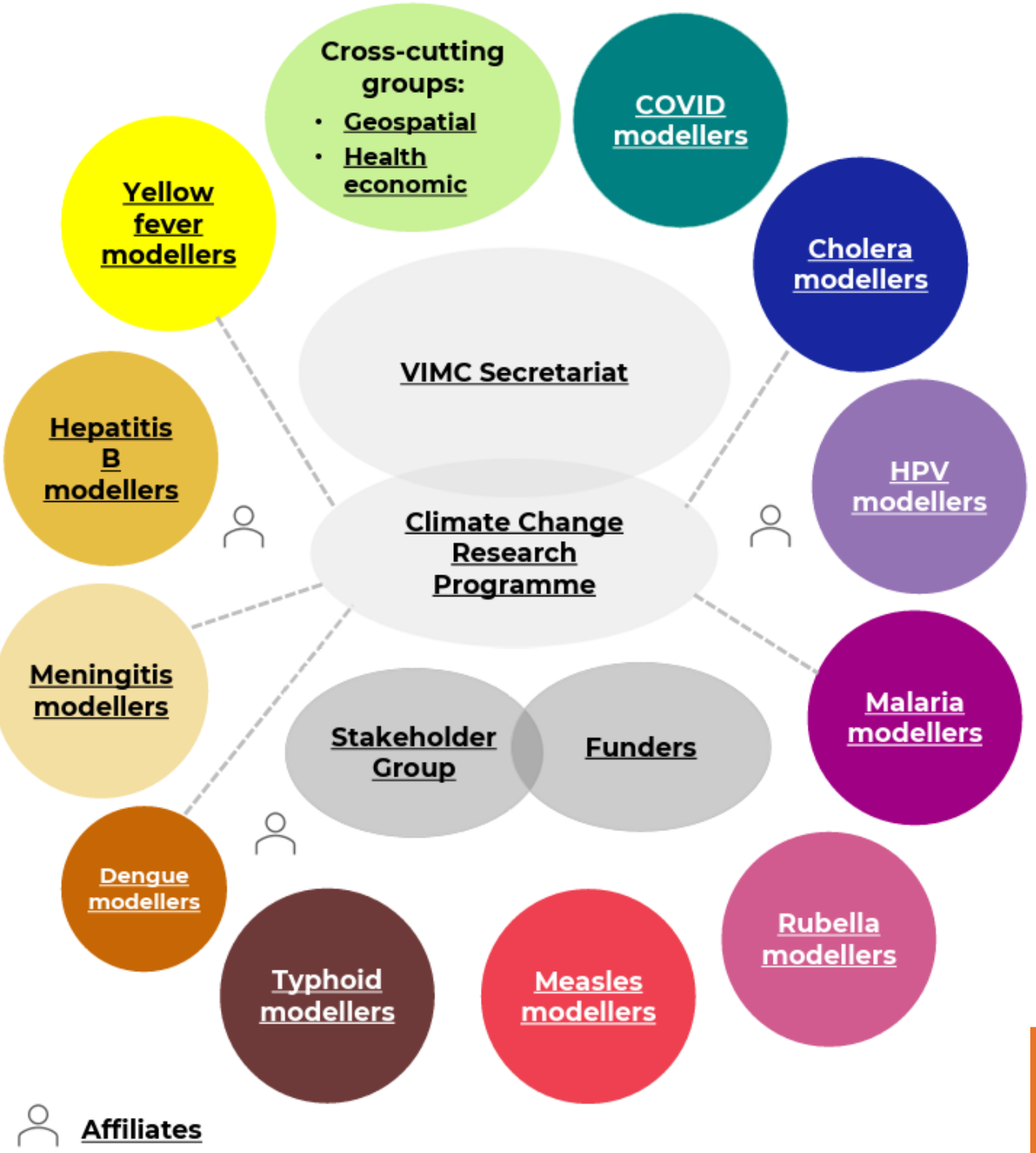
VIMC network and opportunities

- We have an affiliate scheme where early career researchers can join our network, join a buddy system with other early career researchers, join our webinars and apply to join our VIMC-wide meetings
- We have fellowship opportunities where researchers can visit VIMC modelling groups for an extended period (1–2 months) and have reciprocal visits
- We have a short course (next in 2026) where we teach infectious disease modelling with a focus on vaccination for a week
- We release RfPs for other modelling questions and groups



VIMC secretariat

- vimc@imperial.ac.uk
- https://www.vaccineimpact.org



VIMC New Workstreams

- VIMC has established four new workstreams as of June 2025
  - Expanding Outbreak Vaccine Response Impact Framework
  - Vaccine Prioritization and Country-Level Estimates
  - **Supporting Health Economic Modelling**
  - Impact of Catch-Up Vaccination

VIMC health economic modelling – efforts so far

- **Sep 2023**
  - health economics breakout session held during VIMC annual meeting (Hampshire, UK)
- **Nov 2024**
  - health economics working group formed
- **Jan 2025**
  - initial survey administered to VIMC members
- **Apr 2025**
  - support for health economic modelling concept note finalized
  - one modeler per VIMC antigen identified to lead disease-specific efforts ('antigen lead')
- **Jun 2025**
  - presentation for consortium feedback during VIMC annual meeting (Accra, Ghana)

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Proposed approach for supporting health economic modelling in VIMC

- What minimally sufficient information and functionality in VIMC models is needed to conduct health economic analyses
  - Consideration: provide a foundation of relevant outcomes for Gavi, Gates, other stakeholders
- **Phase 1:** costing estimates
  - consortium-standardized: led by Health Economics Project Working Group
  - disease-specific: led by antigen leads and modelling teams
- **Phase 2:** further development with limited additional effort
  - cost-effectiveness analysis (incremental cost-effectiveness ratios)
  - cost-benefit analysis (return on investment)
  - budget impact analysis

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Cost-effectiveness analysis (CEA)

- Metric: can be estimated as **cost per death averted** or **cost per DALY averted** using
  - VIMC health impact estimates (already generated – cases, deaths, and DALYs averted by vaccination)
  - Cost estimates (to be added)
- Perspective: health system or societal
- Payer: given full health system costs estimated, later information and decisions regarding proportion covered by individual payers (e.g., government, patient, Gavi) could be assumed and applied for analyses
- Time horizon: as relevant to specific disease, but can be assessed through 2100 by all VIMC models
- Impact: assessment could be calendar year, year of vaccination, or birth cohort
- Discounting: functionality to discount both costs and health gains
  - ➢ As long as this functionality is included, later decisions regarding a standardized assumption could be assumed and applied for analyses
    - (e.g., 3% for costs and 0% for health gains per WHO economic evaluation guidelines)

Approaches for cost-benefit analysis (CBA)

- Only additional assumption beyond CEA is a monetization of health gains
- **Net Monetary Benefit (NMB)** = *health benefit * CE threshold – (net cost of vaccination)*
  - Costs from societal perspective
  - Health benefit in terms of DALYs averted

net cost of vaccination =
vaccination costs – treatment costs averted by vaccination

- **Net Health Benefit (NHB)** = *health benefits – (net cost of vaccination / country-specific estimate of health opportunity cost to avert a single DALY)*
  - Costs from societal perspective
  - Health benefit in terms of DALYs averted
- **Return on Investment (ROI)** = NMB / cost of vaccination
  - Full cost of vaccination program
  - Outcome in terms of net monetary benefit per $1 invested in vaccination
- Later decisions regarding CE threshold definition (e.g., multiples of GDP per capita, country-level opportunity cost thresholds) could be standardized and applied for analyses

Budget impact analysis (BIA)

- With costing estimates, we could further estimate the budget impact of vaccination
  - ➢ primarily to inform the short-term impact on country budget needs, e.g., for future Gavi transition

Phase I costing work

- To include full costs in each perspective (health system and societal)
- To include disease-specific efforts that leverage expertise of VIMC modelling teams
- Health system perspective
  - vaccine costs
  - health service costs
- Societal perspective
  - health system perspective costs
  - patient/caregiver non-medical costs
  - patient indirect costs
  - productivity costs
  - indirect health service costs

Vaccine costs

- *vaccine price, supply costs, recurrent delivery costs (labor, social mobilization, monitoring & evaluation for vaccine safety, surveillance), introduction costs (social mobilization, training, program planning, monitoring & evaluation for vaccine safety, surveillance), wastage rate*
  - ➢ May be necessary to differentiate between social mobilization, monitoring & evaluation, and surveillance costs that are one-time introduction costs (to expand the vaccine program with a new vaccine) versus those that are recurrent
- Would likely involve a set of standardized assumptions across VIMC models
  - ➢ **AP is currently developing an update to PharmacoEconomics 2020 paper**

Health service costs

- *Specific to health services provided in the diagnosis and treatment of each disease*
  - could differ by health facility level and/or severity level
  - including costs borne by all payers, e.g., Gavi, country government, patient
- Healthcare access: base-case assumption of 100% healthcare access (all individuals requiring treatment receive treatment)
  - Additionally, aim for individual modelling teams to propose a realistic scenario assuming prevalent levels of healthcare access
- Individual VIMC teams would review literature using a standardized protocol (in development) to determine cost and care-seeking assumptions
  - Technical assistance for extrapolation of limited data to all VIMC countries can be provided by Health Economics Working Group

Patient/caregiver non-medical costs

- *Transportation to/from medical visit(s), cost of food/accommodation purchased while traveling to a health facility*
- Could be **disease-specific** or **standardized** across VIMC models

Patient/caregiver indirect costs

- *Income reported lost during treatment*
- Could be **disease-specific**
- **Alternatively**, could be measured as opportunity cost for seeking or being in care that is a valuation of time lost for patient and household members throughout disease episode with standardized assumptions across VIMC models

Productivity costs

- *Productivity loss due to premature death or long-term disability*
- Would likely involve a set of standardized assumptions across VIMC models, assuming per-capita GDP as proxy of productivity

Indirect health service costs

- For some pathogens, there may be a relevant indirect cost consequence of another disease/pathogen to consider
  - e.g., ART costs in the case of TB (not a current VIMC pathogen)

Extensions to non-VIMC pathogens

- All standardized costing efforts would apply to impact analyses of non-VIMC pathogens, as needed, but new efforts (beyond proposed scope) would be required for any disease-specific cost estimation
- This would also require future discussion to determine appropriate methods and sources/data, but could support analyses such as Immunization Agenda 2030

Question for the audience

- Should we consider additional outcomes or analytic frameworks for this initial scope of work?
- Any other feedback?

Thank you

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Efficiency, prioritization, and vaccine portfolio optimization: tools & way forward

Bali, July 20, 2025

Wifi login details:
Network: IHEACongress
Password: Bali2025!

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