Translating vaccine impact modeling to inform immunization decisions:

A WHO guidance to translate modelling to support evidence-informed decision-making within immunization programmes: What do end users need?

Global NITAG network
4 July 2024, Virtual conference
Philipp Lambach/Yoonie Sim
Julie Leask
Infectious disease modelling & decision making
Infectious disease modeling & decision making

Framework to guide the use of mathematical modelling (Oliwa et al 2024)

A long-term strategy to establish modelling capacity (Silal et al 2022)
What about immunization decision makers?

- Policy
  - Global
    - SAGE
  - Regional
    - RITAG

- Strategy
  - Global
    - IA2030

- Governance
  - Ministry of Finance
  - Economic & Fiscal Commission
  - Donors: Gavi, World Bank, ADB, Provincial Finance Officer, District Finance Officer
  - WHO UNICEF
  - Development Partners (others)
  - NGOs – CSO Communities
  - NITAG Medical Institutes Paediatrics Society
  - Ministry of Planning
  - MoH various departments

- Managers / Providers
  - Provincial Governments
  - Provincial Health Authorities
  - District Health Authorities
  - National Assembly
  - Health Secretary
  - MoH Department Directors

- National Immunization Strategy
  - Stakeholder Engagement
  - Financing
  - Decision making points
    - MoH, MoF, Planning
    - National Authorities

- National Health Plan

- Enablers – T.A.
  - Treasury
  - Ministry of Finance
  - Economic & Fiscal Commission
  - Donors: Govt, World Bank, ADB, Provincial Finance Officer, District Finance Officer
  - WHO UNICEF
  - Development Partners (others)
  - NGOs – CSO Communities
  - NITAG Medical Institutes Paediatrics Society
  - Ministry of Planning
  - MoH various departments
Problem statement

- Although modelling has played a vital role in shaping immunisation strategies, policies, and programme decisions, gaps remain

- Limited routine use of modelled evidence into immunisation decision-making, largely due to limitations in applied modelling capacity

- Effectively interpreting, translating, and applying modelled evidence requires specialized tools and expertise

- Although modelling is an essential tool to guide decision-making, due consideration must be made to the whole evidence ecosystem
Immunization and Vaccines Implementation Research Advisory Committee (IVIR-AC) & modeling
Immunization and Vaccines Implementation Research Advisory Committee (IVIR-AC) – function & main areas of work

- Principal standing advisory committee to WHO providing independent advice on vaccine implementation research to inform public health decisions
- IVIR-AC reviews evidence relevant to the WHO immunization department, and its other advisory groups (PDVAC, SAGE)
  - To provide an in-depth understanding of model best practices, nuances and caveats which is critical for decisions related to strategies, policies, and programs that rely on modelled evidence
  - To review
    - quantitative methods in vaccine-related research
    - implementation research related to estimating the performance, impact and value of vaccines and to advise the Department of Immunization, Vaccines and Biologicals on their relevance and applicability
Immunization and Vaccines Implementation Research Advisory Committee (IVIR-AC) – process and resources

- Meets twice annually (Feb/March, and Sept), dealing with a wide range of topics and antigens
- Composed of 15 international, multidisciplinary experts (vaccinologists, epidemiologists, modelers, economists)
- Meeting reports available in WER, WHO website and Vaccine journal

### Antigens covered by IVIR-AC 2013 – 2023

- Cholera 3%
- Dengue 4%
- General 43%
- Hepatitis B 6%
- HPV 2%
- Influenza 5%
- Measles 6%
- Malaria 3%
- Pertussis 5%
- Polio 1%
- Ebola 2%
- Diphtheria 1%
- Yellow fever 2%
- COVID 3%
- Typhoid 9%
- Varicella 2%
- Rotavirus 5%
- HPV 2%
- Hepatitis B 6%
- COVID 3%
- Dengue 4%

Immunization and vaccines related implementation research advisory committee (IVIR-AC) (who.int)
IVIR-AC and modeling: towards country impact

### Current scope of IVIR-AC

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<thead>
<tr>
<th>Global</th>
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<td>SAGE</td>
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<th>New evidence/context</th>
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<td>Programmatic priorities</td>
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<td>Financial resources/budget</td>
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<td>MoH, MoF, Planning</td>
<td>National Health Plan</td>
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### Growing need for independent appraisal of and advice for IVIR-AC advice in regions and countries

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**Source:** Development of WHO immunization policy and strategic guidance

4.2.7 Mathematical modelling

Modelled evidence often informs important strategic or policy questions. Hence, mathematical models are used as part of the evidence in support of SAGE recommendations. In order to assure the quality of these models, WHO’s Immunization and Vaccines related Implementation Research Advisory Committee (IVIR-AC) may be solicited (29).

**Source:** [Development of WHO immunization policy and strategic guidance](#)
WHO guidance to translate modelling to support evidence-informed decision-making within immunization programmes
IVIR-AC meeting in March 2023

“To aid the interpretation of model findings for a broader audience, IVIR-AC has established a subgroup for translation of vaccine impact modelling into immunization strategy, policy and programme decisions to advise on communication strategies and guidance for modelling groups.”

- Weekly Epidemiological Record, 31 March 2023, No 13, 2023, 98, 127–144

https://www.who.int/publications/i/item/who-wer9813-127-144
IVIR–AC sub-group: objectives

Objective

• To facilitate effective translation of vaccine preventable disease/vaccine impact modeling to inform immunization strategy, policy and program decisions.

Target audience

• The target audience includes stakeholders involved in immunization decision-making, including NITAG members, EPI programme managers, immunization technical working group members, RITAG members, and technical partners who support immunization policy decision-making

Definition of modeling:

“Mathematical models are used to develop scenarios on how vaccination might help to prevent disease in a population compared to the current situation.”

(IVIR–AC recommendations, September 2023)
Target outputs

**Decision maker needs assessment** to inform content and format of the guidance

**WHO Guidance to translate modeling to inform EIDM for immunization policies**

**Additional format identified by the needs assessment**
IVIR-AC Sub-Group and adhoc experts

**IVIR-AC Sub-Group**

- Writing group
- External experts & Qualitative research team
- WHO Regional Offices
- WHO Secretariat

**Lead writers**
- Dr Wirichada Pan-Ngum (Modeler perspective)
- Dr Jacquie Narotso Oliwa (Decision maker perspective)

**WHO ROs & Secretariat**
- AFRO
- Dr Franck Mboussou
- AMRO
- Dr Daniel Salas
- Dr Magdalena Bastias
- EMRO
- Dr Quamrul Hasan
- EURO
- Dr Siddhartha Datta
- SEARO
- Dr Sudhir Khanal
- WPRO
- Dr Heeyoun Cho
- HQ
- Dr Philipp Lambach (IVIR-AC Executive Secretary)
- Ms So Yoon Sim (WHO IVB Modeling focal point)

**Qualitative research team led by Prof Julie Leask**
- University of Sydney
- Ms Maria Christou-Ergos
- Dr Kerrie Wiley
- Dr Ikram Abdi
Decision maker needs assessment:

Qualitative study
Assessing decision maker needs and end user insights

WHO requested University of Sydney’s Social and Behavioural Insights in Immunisation research group (SABII) team to conduct a needs assessment with end-users of the proposed guidance.

Objectives:
1. Identify how and if modelling is currently used by decision-makers;
2. The needs and challenges faced by end-users in using modelled evidence;
3. Types of guidance that will be most useful for end-users.

Study will inform content and format of the guidance
Methods: qualitative research study

- In-depth interviews with 15 envisaged end-users of the guidance:
  - immunization strategy, program and policy decision-makers
  - modellers

- Across all WHO regions and country classifications groups

- Interviews lasted 20 – 60 minutes
- Transcripts produced 120 pages of text
- Analysed in Nvivo 12
- Framework analysis method
## Matrix sample 15 key-informants

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<tr>
<th>Decision category</th>
<th>Country type</th>
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<td>Low income</td>
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| 1. Direct users/potential users of modelled evidence (NITAG members) | AFRO Int 8  
AFRO Int 12 | WPRO Int 10  
SEARO Int 11 | EMRO Int 5  
SEARO Int 3  
AMRO Int 15 | WPRO Int 2 |
| 2. Stakeholders who make immunization program decisions, e.g., EPI managers, or policy | AFRO Int 13  
AFRO Int 14 | EURO Int 7 | | EURO Int 4 |
| 4. Other E.g., Regional stakeholders, modellers | | EURO Int 6 | | WPRO Int 1  
AMRO Int 9 |
Study findings
1. Existing knowledge and use

- All understood modelling to be a way to look forward and quantify health outcomes.
- Interviewees with less experience with modelling:
  - less confident in their understanding, noted the complexity, or spoke about statistical modelling.
  - passive consumers or used a very simplified version of forecasting themselves
  - Some knew nothing of international efforts to provide models
- Interviewees with more experience with modelling:
  - tended to use modelling firsthand. They were involved in modelling and used it in an advisory capacity.
- All who have used modelling did so to plan ahead, often with economic considerations in mind (i.e. cost effectiveness, vaccine procurement, health economics)

“As a word I understand perfectly but as a process... I am a little bit confused.”
EPI manager, middle-income country

But for me as EPI and person who are working on immunization, need more experience of this; how this should be used in immunisation to increase vaccine coverage. Maybe to calculate the number of vaccine needs and other tools and issues regarding immunization.

EPI Manager, middle-income country
2. Barriers to using modelling

- Knowing what it is and can and cannot do
- Seeing its relevance to context
- Accessing potentially relevant modelling

"From time to time I thought that the thing that was missing during the presentation [of modelling] was where the idea came from…the data that they put into the model, or formula that they calculated. They didn’t give us a clear source of those kind of information, and it made me wonder if it is applicable to our situation or not."

NITAG member, SEARO country

“They were really overpredicting the amount of fatality that was going to happen. In fact, the number was way off… So because of those discrepancies there was the cynical mind. So we say ‘don’t trust the modelling’… At the end of the day, more was actually guided by what the other big organisations were saying - you know, like what the CDC and WHO rather than sticking with the model. Maybe because these people [who can] better assess these models can guide us through”

Advisor, WPRO country
2. Barriers to using modelling (continued)

- In-country resourcing and capacity
- Conducting, assessing and communicating models

“So the challenges, really, are that first of all, input data can be incomplete and imprecise, so it creates a lot of variability... The second challenge is capacity. We really need a resource that masters both the software and the different types of models... Right now, we're on our own. With health economics that seem to be from another era, in fact... we expect it in every language. And we need it fast. Not receiving the English version and waiting two years for the [other language] version.”

“We have a busy schedule in these meetings then the modeller has got 20 minutes time to present a very complex model ... and for them [meeting attendees] it's a black box and they don't understand it, which is quite understandable. Within 20 minutes you will not understand the complex model so then ... you rely on that they trust you, that they trust the team who's doing the modelling, in order to use it for decision making.”

Regional Technical Advisory Group
3. The guidance

- Document, supplemented with training
  - Presented in a user-friendly manner, allowing for easy interpretation by immunisation program managers and staff who may not have extensive modelling expertise
- Ongoing interactive training
- Community of practice
- Relationship brokering (because trust and interpretation)
- Caters to different levels of literacy

This tool it should be very smart and not difficult to use, because my colleagues... who are working in immunization is very busy and very many instruments they using to receive the full vaccination data.

(NITAG chair, middle-income country)

“The document only may not be enough because sometimes it’s very difficult ...sometimes the kind of interactive conversation or maybe electronic training course ...when we face some kind of issue, we may need an interactive conversation to exchange ideas and discussion with the one who may have more experience than us. That would help a lot.”

NITAG member, SEARO region
Conclusions

**People with modelling experience**
- All in middle/high income settings
- Used modelling systematically in their decisions
- Saw communicating models as a challenge; time constraints, trust

**People with little/no modelling experience**
- Wanted to understand the value of using modelling in their context (mostly in LMICs)
- Less confident in using modelling, sometimes didn’t access models at all
- Wanted to see models that utilised locally relevant data
- Welcomed a guidance but also ongoing interactive engagement – training, community of practice, trusted knowledge brokers.

*All participants saw need for capacity strengthening. This requires resourcing.*
COM-B model of behaviour to consider the effective translation of VPD/vaccine impact modelling into immunization strategy, policy and program decisions.

Next steps for the WHO guidance informed by the end user needs
Outline of the content

“**I**” = decision maker perspective

- **Introduction**: why should I use this guidance?
- **The modeling process**: what does the modeling process look like? When and how should I be involved?
- **Results**: What should I look out for when interpreting the results?
- **Knowledge translation**: How could I implement modeled evidence to inform decisions?
- **Ways of working**: How can I work together effectively with modelers?
Target outputs

Decision maker needs assessment informed content and format of the guidance

WHO Guidance document on how to translate modeling to inform EIDM for immunization

Training and ongoing support through existing mechanisms (pending funding available)
Thank you
WHO’s value of vaccine framework

Areas of work

- Normative guidance
- Technical work areas to support decision-making
  - Modelling
  - Economics
  - Priority setting
- Value assessment frameworks
  - Full Value of Vaccines Assessment (FVVA)

Assessing the full value across the vaccine lifecycle

Value of Vaccines

Licensure and introduction

Policy development

Sustained implementation

Vaccine R&D