



Modelling initiatives to support vaccines and immunization decisions

NISH Webinar 12

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Immunization and vaccines related implementation research advisory committee (IVIR-AC)

- Principal advisory group to WHO providing independent appraisal of and advice on implementation research related to vaccines and immunization, to inform public health decisions.
- IVIR-AC will act as an advisory group (AG) to WHO, reviewing modelling evidence including for issues raised in discussions by SAGE.
- Advise on model best practices, quantitative methods in immunization, implementation research and the impact and value of vaccines

IVB's Research to Policy advisory value chain

PDVAC:

- priority infectious disease pathogens
- associated vaccine and monoclonal antibody product development approaches and related manufacturing and delivery technologies

IVIR-AC:

- vaccine related quantitative methods
- implementation research

TAG on Market Access for Vaccines:

- technical areas relating to enhancing equitable access to vaccines for all

SAGE (global policies & strategies):

- vaccines and technology
- research and development
- delivery of immunization & its linkages with other health interventions.

IA 2030

IVIR-AC Three level engagement



Global level

- Formal joint PDVAC, SAGE and IVIR-AC review mechanism
- Engagement of stakeholders, WHO departments: modelling, economic and impact analysis
- Leadership role as platform to Economic, Modelling and Impact analysis world wide



Regional level

- Regional Offices/RITAG increased engagement in IVIR-AC agenda setting and methods review
- IVIR-AC meetings as platform to discuss research and evidence with regional stakeholders
- IVIR-AC facilitates link-up with international stakeholders (VIMC, WHO Pandemic hub, etc)



Country level

- Secretariat & Country Offices engage in modelling, economic and IR analysis, capacity building
- Platform to provide advice to national stakeholders and link-up national stakeholders with decision-support available

What decisions can mathematical modelling support?

Assess the health impact of current vaccination strategy

Design future vaccination strategy through assessing the impact of increased coverage, introduction of booster doses etc

Explore value of vaccination in addition to other prevention and treatment options

Explore the value of vaccination targeted strategies to different risk groups, and measure the impact of unknown vaccine features such as duration of protection, immune loss due to new variants etc

Provide the health impact evidence to support economic costing, funding applications and advocacy

Determine Preferred Product Characteristics for Vaccine Development

How do we go about doing a modelling analysis?

- Do I need to be involved?
- Who are the key participants?
- When do I need to be involved?
- What about if I am reviewing an existing modelling exercise?

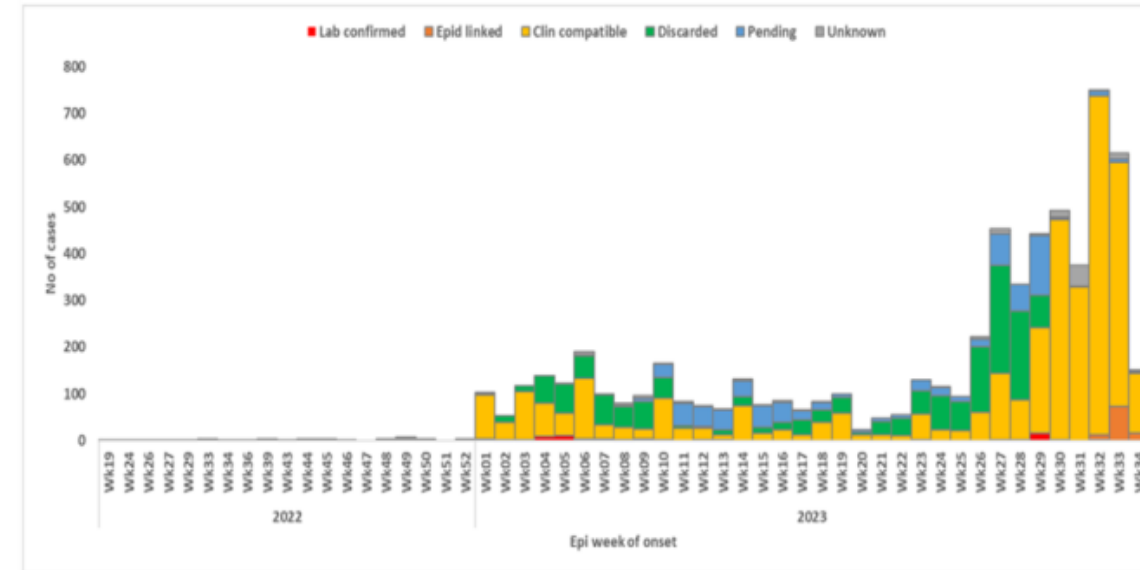


Do I need to be involved?

- YES!!

Why?

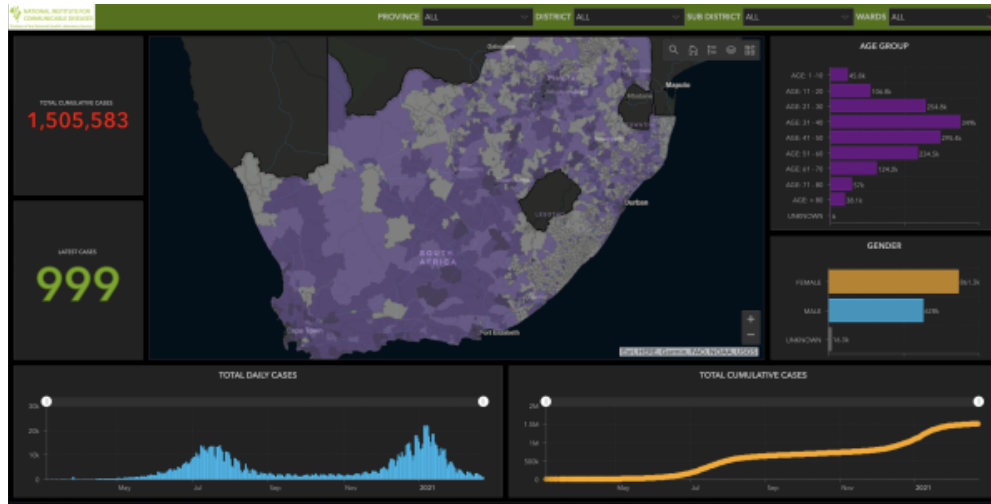
- You are faced with immunization questions to answer
- You know when these decisions will be made
- You know what data is available to help answer these questions
- You have experience in understanding implementation challenges and population socio-economic and behavioural characteristics



<https://www.who.int/emergencies/disease-outbreak-news/item/2023-DON485>

Who are the key stakeholders in a national study?

Source: Modelling and Simulation Hub, Africa (MASHA)



Source: www.nicd.ac.za

Source: <https://www.themeetingshow.com>

- Decision makers
- Modelers
- Advisory bodies
- Disease specialists
- Implementers
- General public

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model=model()
# here for my IDE to help me
() if age is None else age

self.death_age = 0
while self.death_age <= self.age: # ensure we seed with still-alive individuals
    self.death_age = int(365 * census_stats.sample_random_age_expectancy())

@property
def alive(self):
    return self.age < self.death_age

def step(self):
    self.handle_movement()
    self.handle_aging()

def handle_movement(self):
    x, y = self.pos
    x += 1 * (self.model.random.random() - 0.5)
    y += 1 * (self.model.random.random() - 0.5)
    self.model.space.move_agent(self, (x, y))

def handle_aging(self):
    self.age += 1
    if not self.alive:
        self.model.schedule.remove(self) # death

class MalariaModel(Model):
    description = open("../README.md").read().replace('\n', '\n # ')
    ..
```


When do I need to be involved?

- **Modelers**
 - Modelling question, data and literature analysis, model development, scenario analysis and interpretation
- **Decision makers**
 - **Decision problems, assess feasibility, review assumptions and data, define scenarios and support interpretation**
- **Advisory bodies**
 - **Decision problems, assess feasibility, review assumptions and data, define scenarios and support interpretation**
- **Disease specialists**
 - Synthesize information on disease and vaccine trials/studies, review assumptions and data
- **Implementers**
 - Review assumptions and data, define scenarios, and support interpretation
- **General public**
 - Decision problems, support interpretation and analysis iteratively

When do I need to be involved?

- Modelers
 - Modelling interpretation
- Decision makers
 - Decision support
- Advisory bodies
 - Decision support
- Disease specialists
 - Synthesis
- Implementers
 - Review and
- General public
 - Decision

Principle of co-creation

This process fosters shared ownership, improves accuracy, and enhances the model's relevance for decision-making.

What if I am reviewing an existing modelling exercise?

Modelling to support immunization takes many forms

- You commission a local modelling exercise
- You are reviewing a paper or guideline that includes modelling analysis and recommendations at a global scale
- You are reviewing a modelling study from another country setting
- Key questions you should ask
 - What are the vaccine characteristics (e.g. efficacy, duration of protection, dosing schedules, delivery methods) and how would these impact effectiveness in my setting?
 - What is my population demography, health-seeking pattern, transmission dynamics and pathogen epidemiology, and how might these impact vaccine interventions?
 - What healthcare infrastructure do we have in place (e.g., our service delivery capacity, vaccine supply chains, cold chain storage) and how would these impact effectiveness of vaccine programs?
 - What are the characteristics of my population (e.g., income, education) and are there disparities that might influence vaccine access, acceptance and utilization?

IVIR-AC Sub-Group for translation of vaccine impact modelling into immunization strategy, policy and program decisions

Objective

To facilitate effective translation of vaccine preventable disease / vaccine impact modelling into immunization strategy, policy and program decisions.

Desired outcomes

Global, regional, and country level decision makers to effectively use modelled evidence to inform strategy, policy, and program decisions in the immunization field.

Modelers to incorporate key elements of strategy-, policy-, and program-informative modelling into their practice and collaborate effectively with decision makers

