Welcome to the 2026 MAH Annual Meeting

Jakarta, Indonesia

11 June – Day 2

MEASLES ANALYTICS HUB

SIAs and novel delivery modalities

Session Chair: Matt Ferrari

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Balcha Masresha

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Measles /MR SIAs and selective vaccination in AFR countries

Balcha Masresha

WHO AFRO

June 2026

Strategies for measles control/ elimination

Provision of 2 **routine doses** of measles vaccine

Close immunity gaps through **supplemental immunisation activities**

Conducting high quality **surveillance with lab confirmation**

Outbreak response vaccination

Case management

Measles mortality estimates, globally and in AFR. 2024

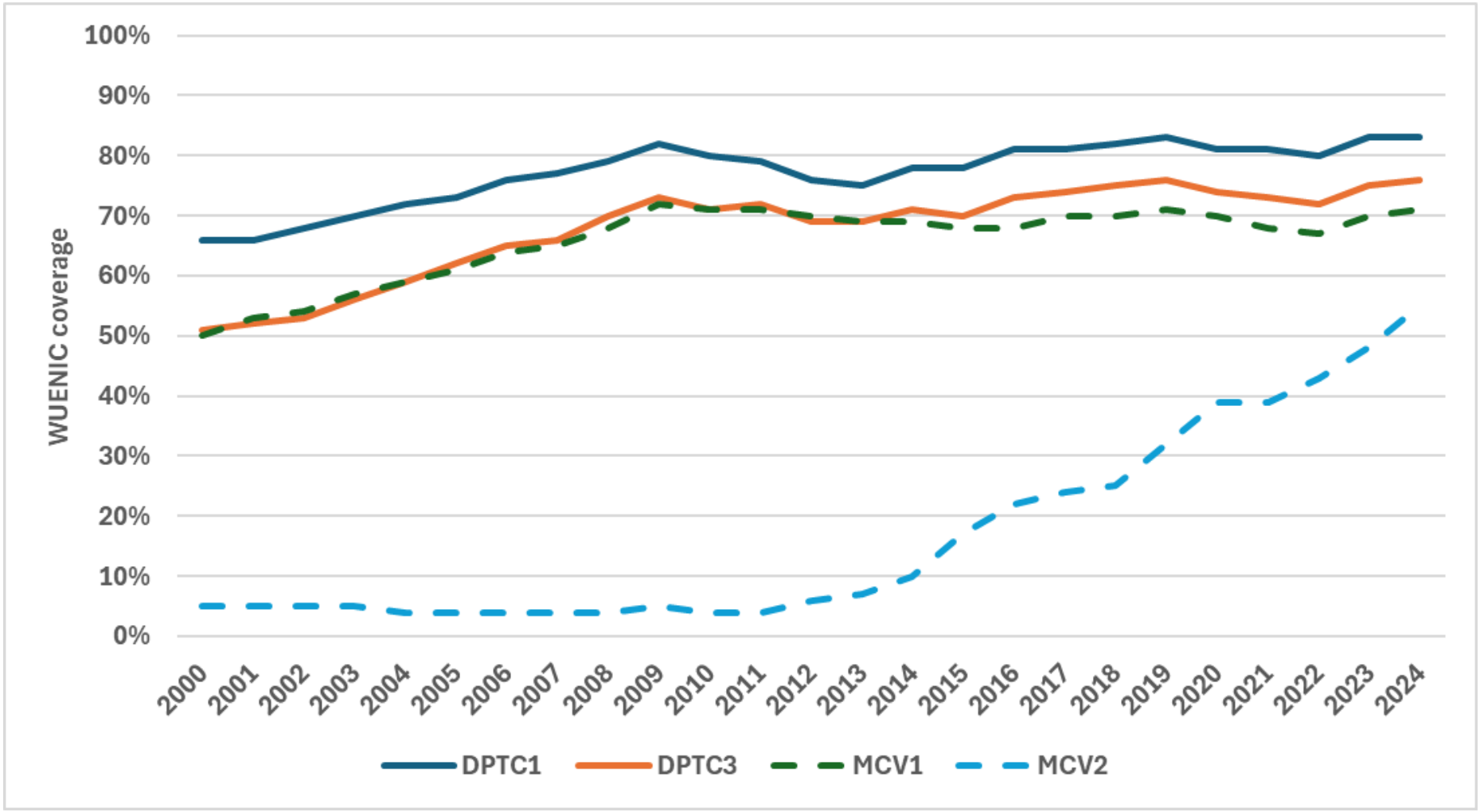
Regions	Year	Estimated measles cases		Estimated measles deaths		Estimated reduction in measles deaths (2000 - 2024)	Cumulative number of measles deaths averted
		Number	(95% Confidence interval)	Number	(95% Confidence interval)		
Global	2000	38,010,567	(24,872,611 - 55,787,540)	777,703	(439,492- 1,210,067)		
	2024	10,988,213	(3,362,389- 21,141,394)	94,564	(32,591-198,975)	85%	58,699,301
African Region	2000	**12,423,693**	(5,510,141– 19,735,650)	**391,690**	(164,419 –632,893)		
	2024	**2,660,025**	(752,547- 7,834,482)	**33,639**	(9,209 - 99,328)	**91%**	**21,940,542**

Sebastien A et al. Progress towards measles elimination – worldwide, 2000–2024. *Weekly Epidemiol Rec.* 2025; 48 (100): 591- 604.

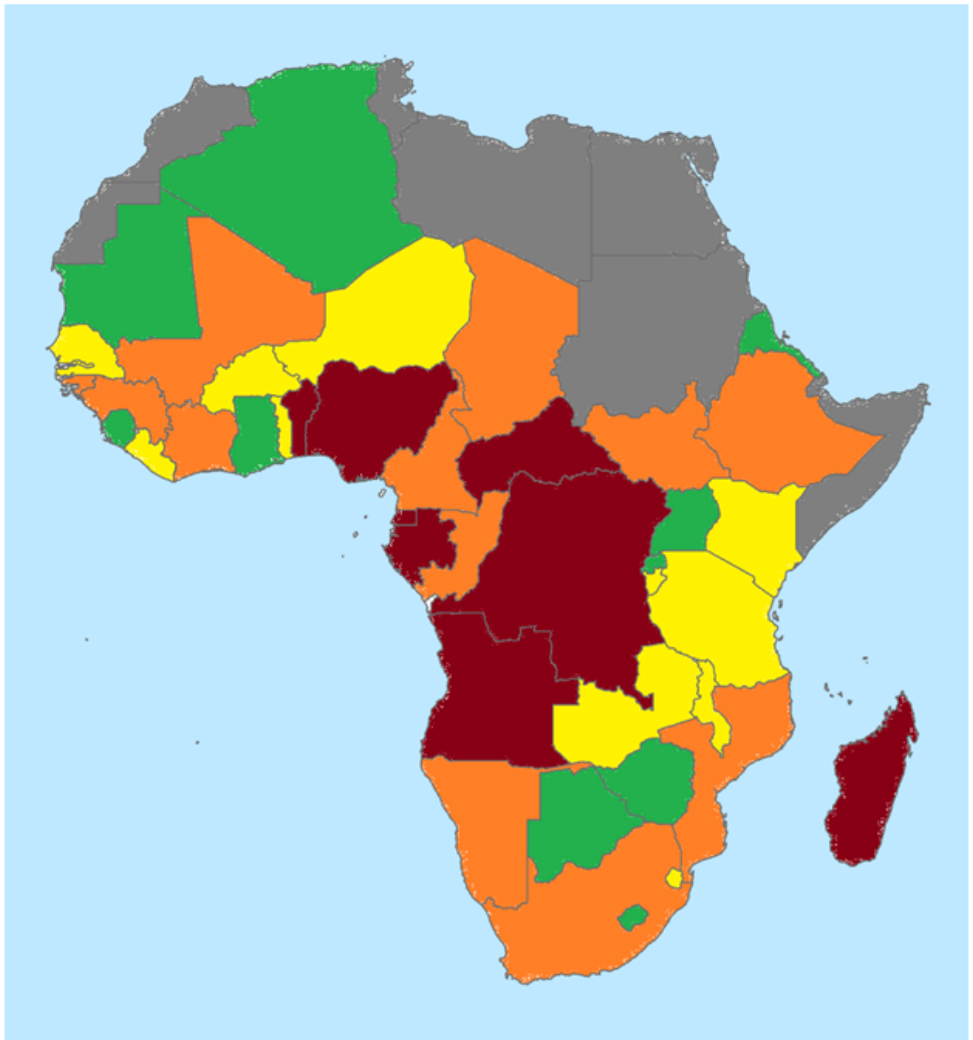
Measles situation at country level

- **Less frequent and smaller size outbreaks** as compared to 20 years back, in most countries
- High political sensitivity to measles outbreaks
- **No more dedicated "Measles wards"** in hospitals across AFR
- Not many young clinicians get to see measles cases/ complications
- 3 countries verified for having eliminated measles, 3 more on the way

DTPC and MCV immunisation coverage. African Region. WUENIC. 2000 - 2024



MCV1 coverage – WUENIC 2024



> 90% MCV1 (WUENIC 2024)

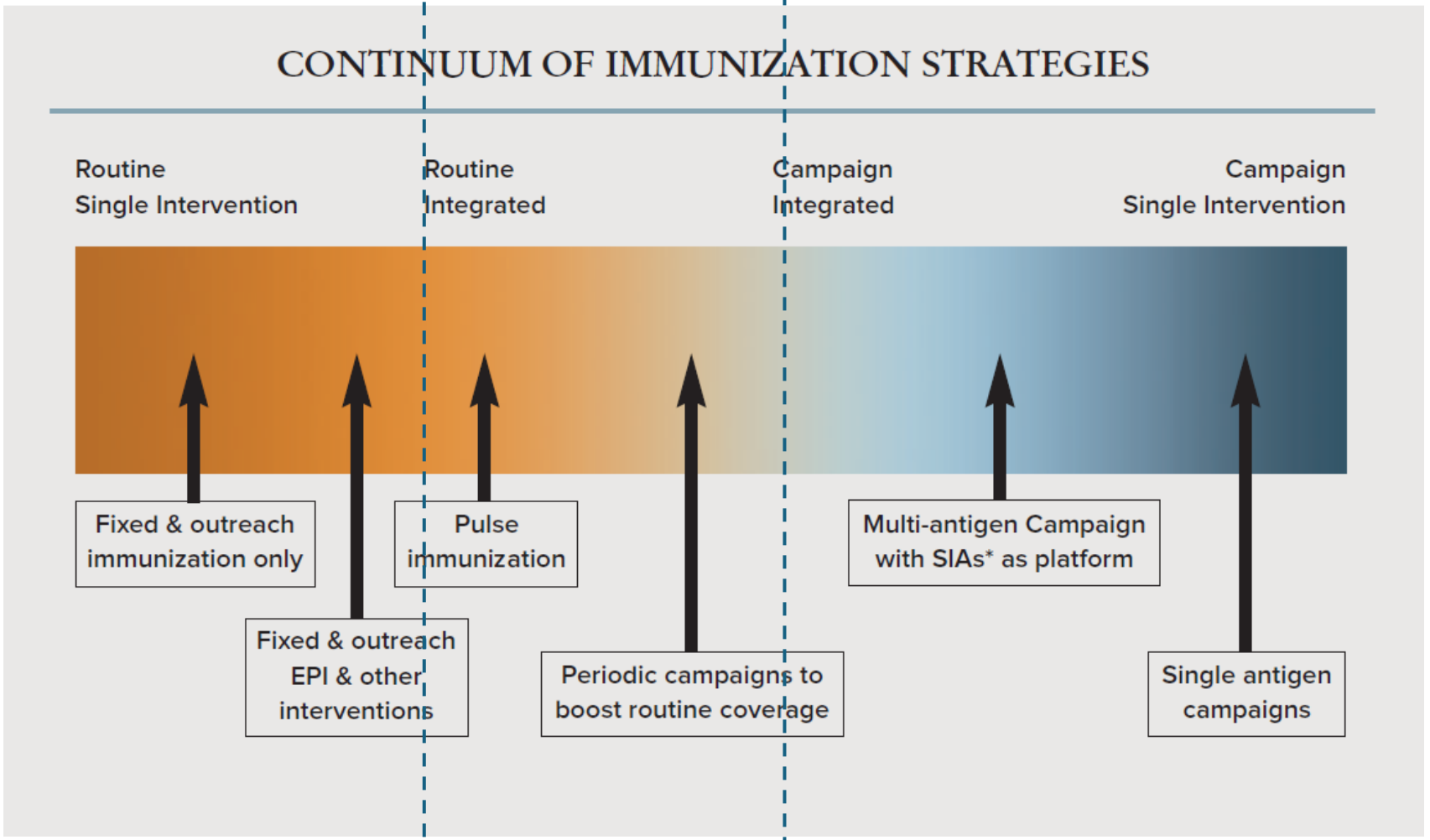
80 - 89% MCV1

60 - 79% MCV1

< 60% MCV1

EMRO

NB: 42% of the population lives in countries with <60% MCV1 coverage



Routine Immunization

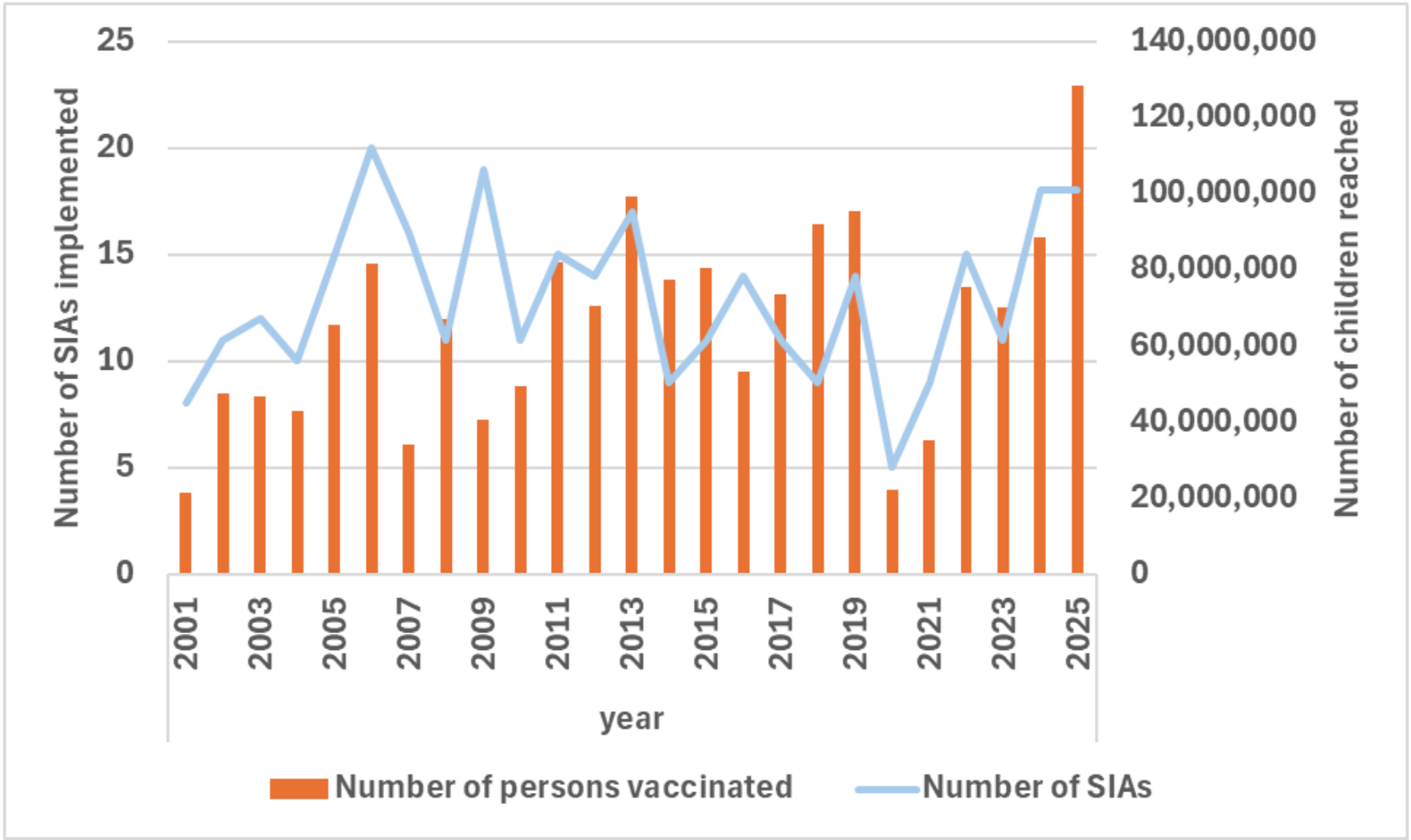
"Periodic Intensification of Routine Immunization"

Supplemental Immunization Activities

SIAs = preventive mass vaccination campaigns

- In countries with suboptimal routine immunization coverage
- Nationwide / wide contiguous areas
- Huge **mobilization** of resources, political will, community
- **Expected to reach** previously unreached children
- **Non-selective:** all in target area/ age group irrespective of past vaccination history/ illness

Number of M/MR SIAs and children reached by year in AFR. 2001 - 2025



Average frequency of M/MR SIAs by country.

SIAs q 2 years

SIAs q 3 years

SIAs q 4+ years

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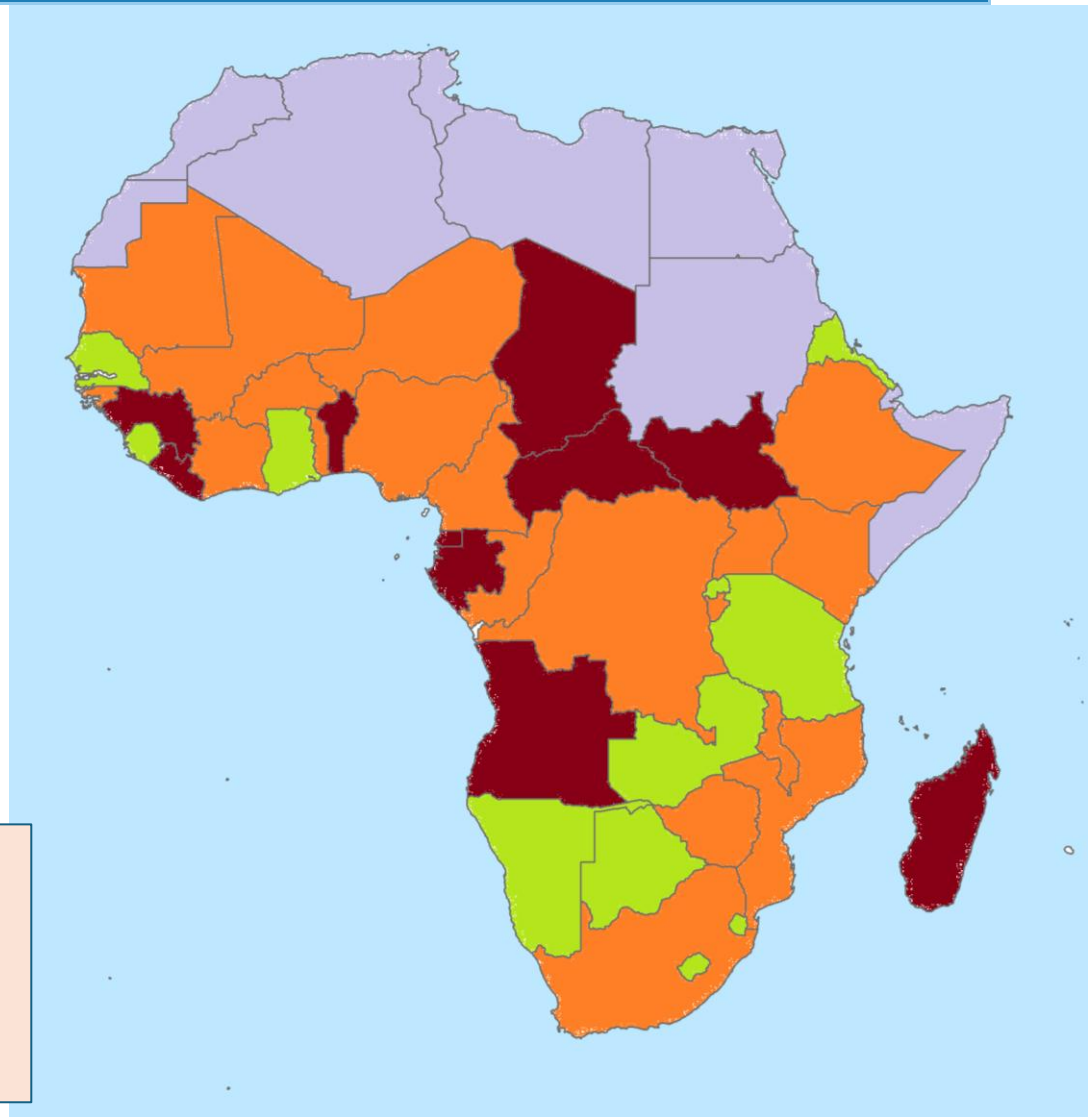
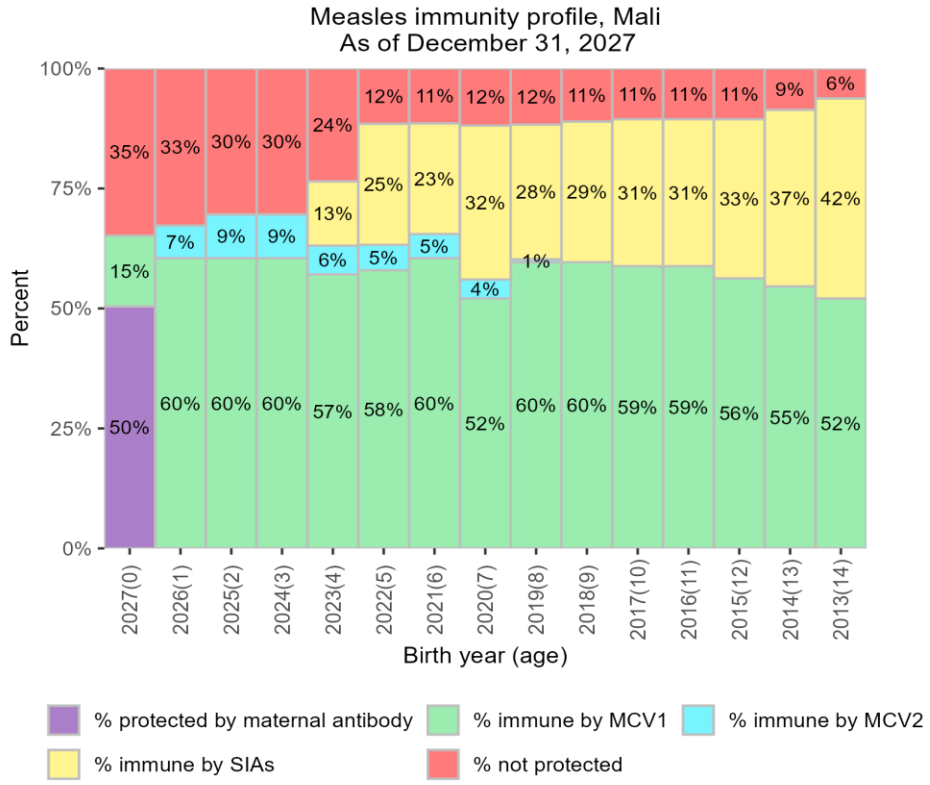


Age target: often fixed at 9 – 59 months age!!

- **Majority of measles cases**
- **Resource limitations!**

MSP tool for advocacy and decisions on timelines of SIAs planning



- National level estimation of susceptibles by birth cohort
- WUENIC estimates -? DHS
- SIAs coverage – admin coverage/ PCCS as available
- Not accounting for natural infection
- Not accounting for “PIRI” doses
- No such estimation at subnational level

SIAs in AFR in 2025

- 126.1 million reached in 2025

- Major challenges in recent SIAs:
  - Delayed / inadequate preparations
  - Last minute decisions on “integration”
  - Repeated postponements
  - Low coverage in urban areas
  - Suboptimal SIAs followed by outbreaks – eg CAR, Chad, Togo in 2025

World Health Organization
African Region

SAGE guidance: Oct 2018 meeting

2018, 93, 661–680 **No 49**

World Health Organization

Organisation mondiale de la Santé

Weekly epidemiological record
Relevé épidémiologique hebdomadaire

7 DECEMBER 2018, 93th YEAR / 7 DÉCEMBRE 2018, 93e ANNÉE
No 49, 2018, 93, 661–680
http://www.who.int/wer

Contents

Sommaire

Meeting of the Strategic Advisory Group of Experts on Immunization, October 2018 – Conclusions and recommendations

The Strategic Advisory Group of Experts (SAGE) on Immunization[1] met on 23–25 October 2018. This report summarizes the discussions, conclusions and recommendations of the Group.[2]

Report from the WHO Department of Immunization, Vaccines and

Réunion du Groupe stratégique consultatif d'experts sur la vaccination, octobre 2018 – conclusions et recommandations

Le Groupe stratégique consultatif d'experts (SAGE) sur la vaccination[1] s'est réuni du 23 au 25 octobre 2018. Le présent rapport résume les délibérations du SAGE, ainsi que les conclusions et recommandations auxquelles il est parvenu.[2]

Rapport du Département Vaccination, vaccins et produits biologiques

World Health Organization

African Region

SAGE guidance: Oct 2018 meeting

SAGE stressed that vaccination ***campaigns are resource intensive and are not sustainable as a strategy****. Countries should therefore prioritize routine strengthening, so that they become less reliant on campaigns. The primary goal of campaigns should be to reach unvaccinated (also known as "zero dose") and under-vaccinated children. ……..*

….Countries with medium disease incidence and periodic outbreaks, inadequate immunity in some populations and moderate programme capacity (e.g. MCV1 coverage of 85–90% and MCV2 coverage of 80–90%) can conduct ***targeted campaigns*** *according to the epidemiological profile of the subnational areas concerned* ***if high-quality data are available for accurate subnational analysis****.*

World Health Organization
African Region

Subnational / selective SIAs in AFR

- Subnational SIAs
  - Almost always non-selective:
    - Essentially “phased campaigns” in countries with HR and logistical challenges (e.g., DRC, Nigeria, Ethiopia, Guinea, etc)

- **Limited experience with Targeted / Selective approaches:**
  - **Kenya 2021** – (MCV1 88%) - non-selective geographic targeting, due to limited funding
  - **Senegal 2021** – (MCV1 87%) - selective vaccination
    - low reach, followed by big outbreaks in 2022 - 2023,
    - wide age range nationwide SIAs in 2024
  - **Eritrea 2024** – (MCV1 93%) - non-selective in targeted districts
  - **Rwanda 2024** – (MCV1 – 96%) - non-selective in targeted districts

World Health Organization
African Region

REPUBLIC OF BOTSWANA
Ministry of Health

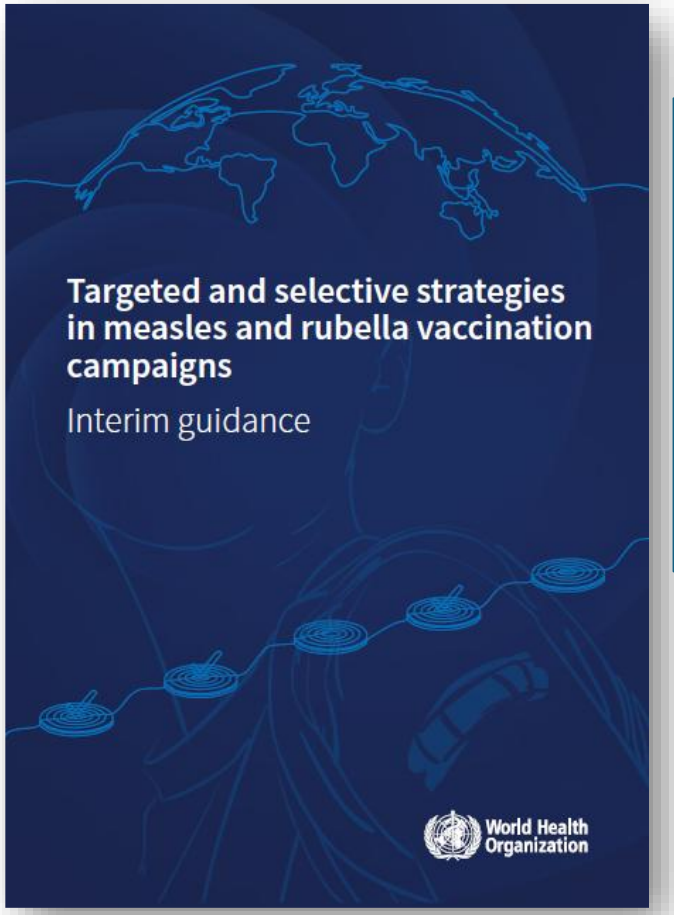
A re ehedisheng

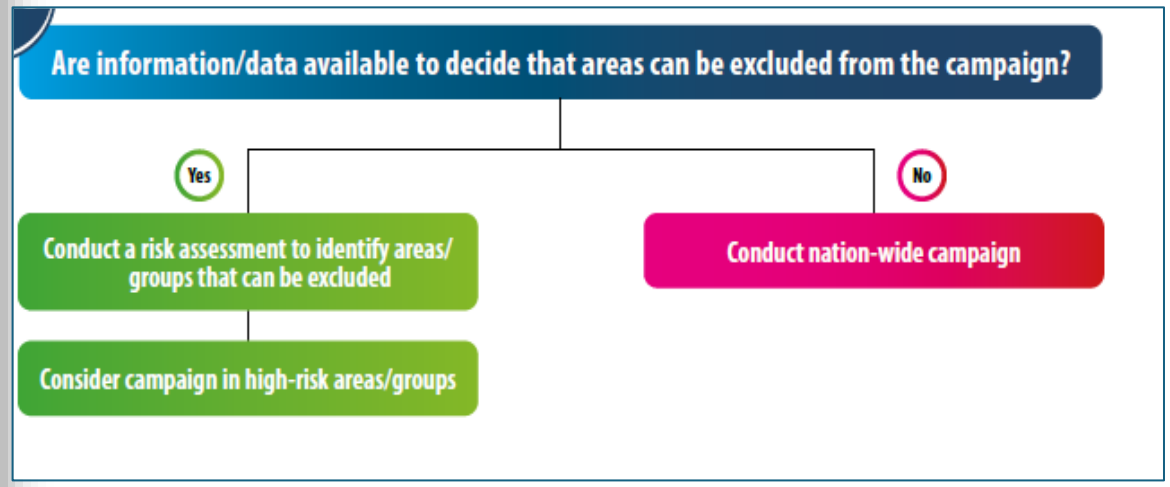
Parents & caregivers

are encouraged to take their children under the age of five (5) to the nearest health facility, during their usual child welfare monthly visits to access the High Impact Interventions (HIIs) such as:

- Child immunization.
- Receiving ORS and Zinc Sulphate for diarrhoea.
- Receiving Vitamin A supplementation.
- Receiving education on the introduction of soft foods from six months of age.
- Receiving education on exclusive breastfeeding for the first six months of life.
- Receiving education on feeding children with clean hands washed with soap and clean water.
- Receiving education on sleeping under insecticide-treated nets (Malaria Endemic Areas).
- Receiving education on Early health care seeking behaviour.
- Receiving education on the importance of singing to, talking to, playing with, and loving your child from an early age.

Targeted/ Selective SIAs





- High-quality, granular coverage and surveillance data needed!

Alternative non-SIAs approaches to close immunity gaps

- "Selective or targeted" **RI strengthening activities**:
  - PIRIs, CHDs, BCU, etc
  - Sometimes used as platforms for nationwide non-selective campaigns

- PIRI-like activities (info from 18 countries)
  - Including "Africa Vaccination Week"
  - 1 – 3 times a year, often subnational
  - Multi-antigen, MCH interventions often < 2 yrs/ < 5 yrs
  - In areas of VPD outbreaks, high # of zero dose children
  - dependent on resource availability

Operational challenges in “PIRI” planning/ implementation to close measles immunity gaps

- PIRI **planning is not necessarily based on measles** immunity/ epidemiology
- At subnational level, **unreliable administrative coverage data to exclude districts -** heavily affected by inaccuracies in denominators
- PIRI activities are **dependent on resource** availability (vaccines and $) - not predictable
- PIRI activities are **not always selective** when implemented
- There is no clear guidance on how to include PIRI doses in **coverage calculations/ immunity profiling**
- **Inaccurate denominators**
- PIRI Vs **measles among older age groups**

- Examples of countries postponing SIAs due to “recent large PIRI/ BCU doses” and experiencing large measles outbreaks (Benin, Liberia, Uganda, Madagascar, etc)

Making these alternative "PIRI" approaches work for measles elimination

- Better national **ownership and leadership** of the measles-rubella agenda (amidst multiple priorities)
- Donor funding
- **Strong evidence and robust models** for advocacy
- High-quality **disease surveillance** to help targeting interventions
- **Better tools** for risk assessment and public health decision-making
- Documentation of **lessons and quantified outputs from "PIRI" activities**

Thank you

Md Ariful Islam

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Transition from SIA to new delivery modalities

SEARO Perspective

Dr. Ariful Islam
Bangladesh

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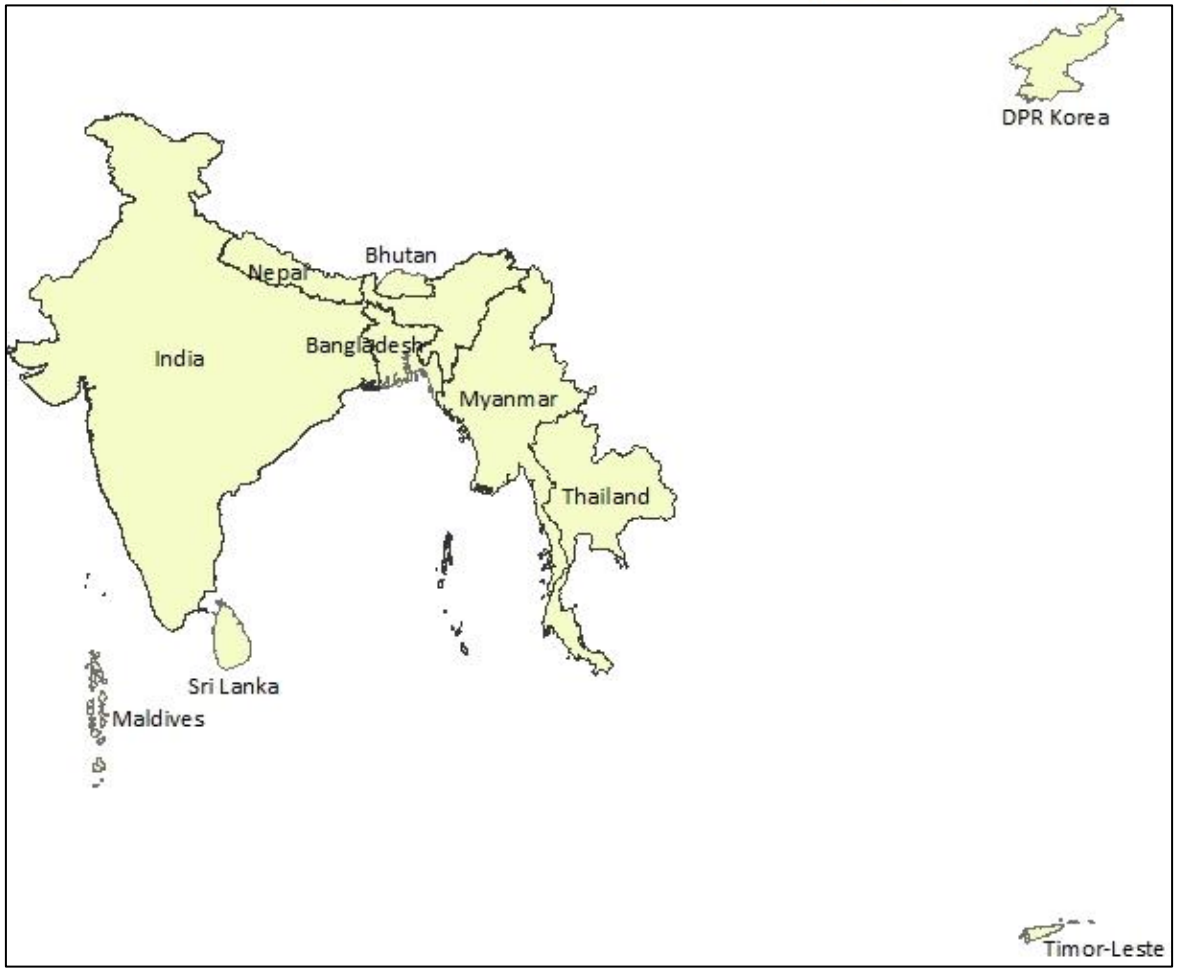
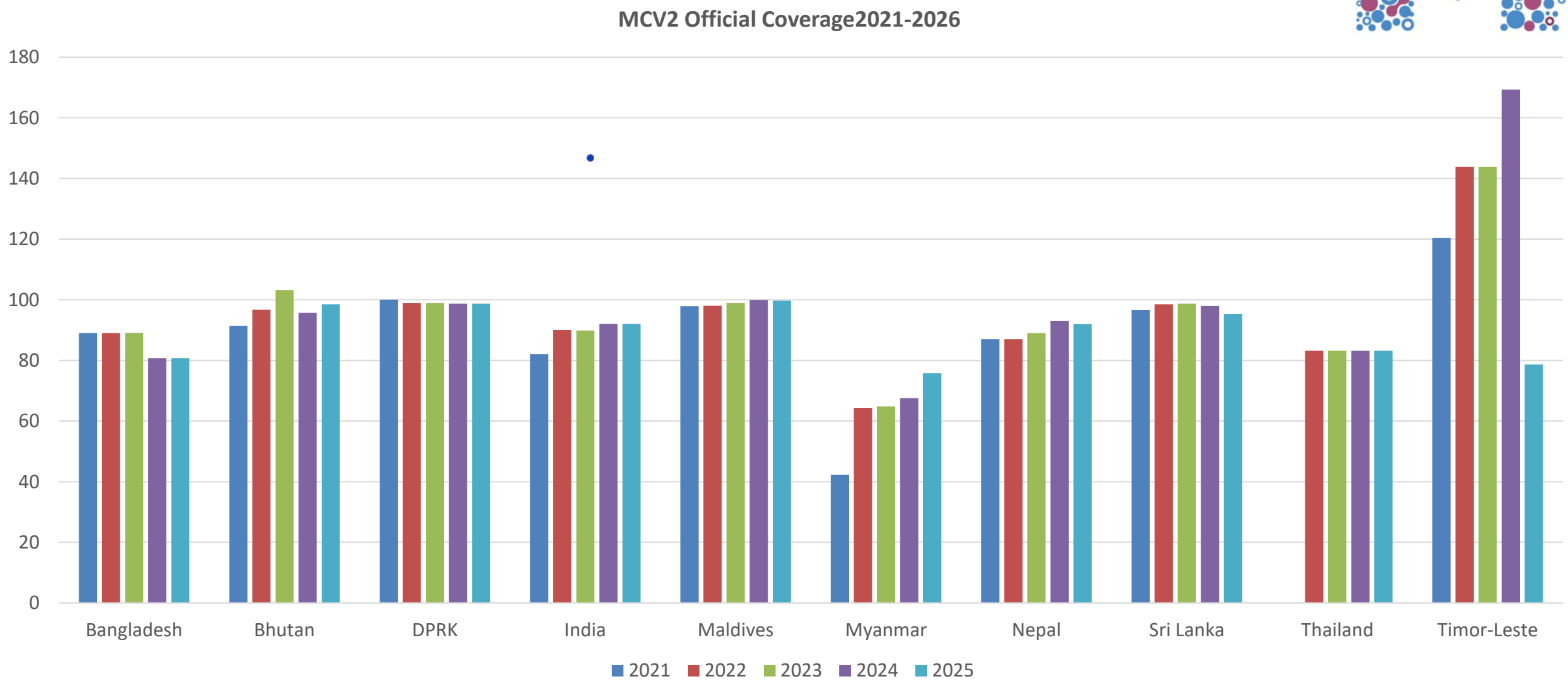
Overview

- SEARO has 10 countries
- All countries have introduced 2 doses of MCV
- All countries conduct case-based surveillance

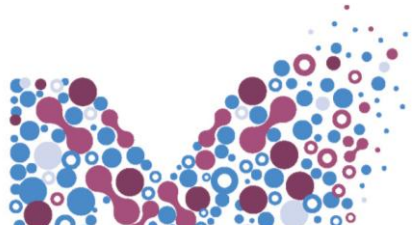


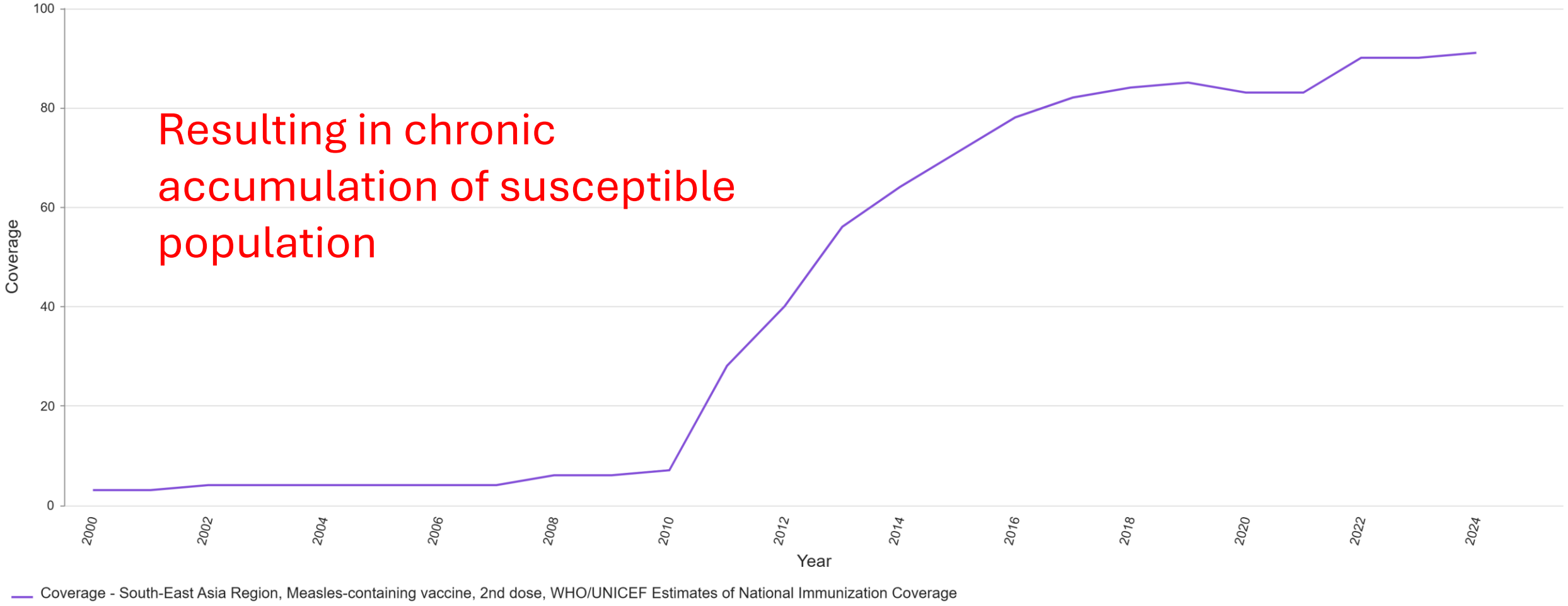
Suboptimal REPI performance in most of the countries



Data source: https://immunizationdata.who.int

Suboptimal RI performance (Cont.)



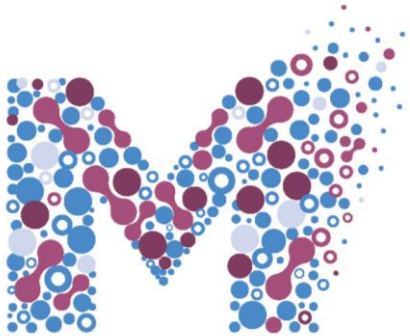


SIA to close immunity gap

- Most of the countries are conducting MCV campaign every 4-5 years
- Coverage is not optimal and missing the same category of children
- Catch-ups covering only the gap up to 5 years of age
  - Adult or other risk group are being missed

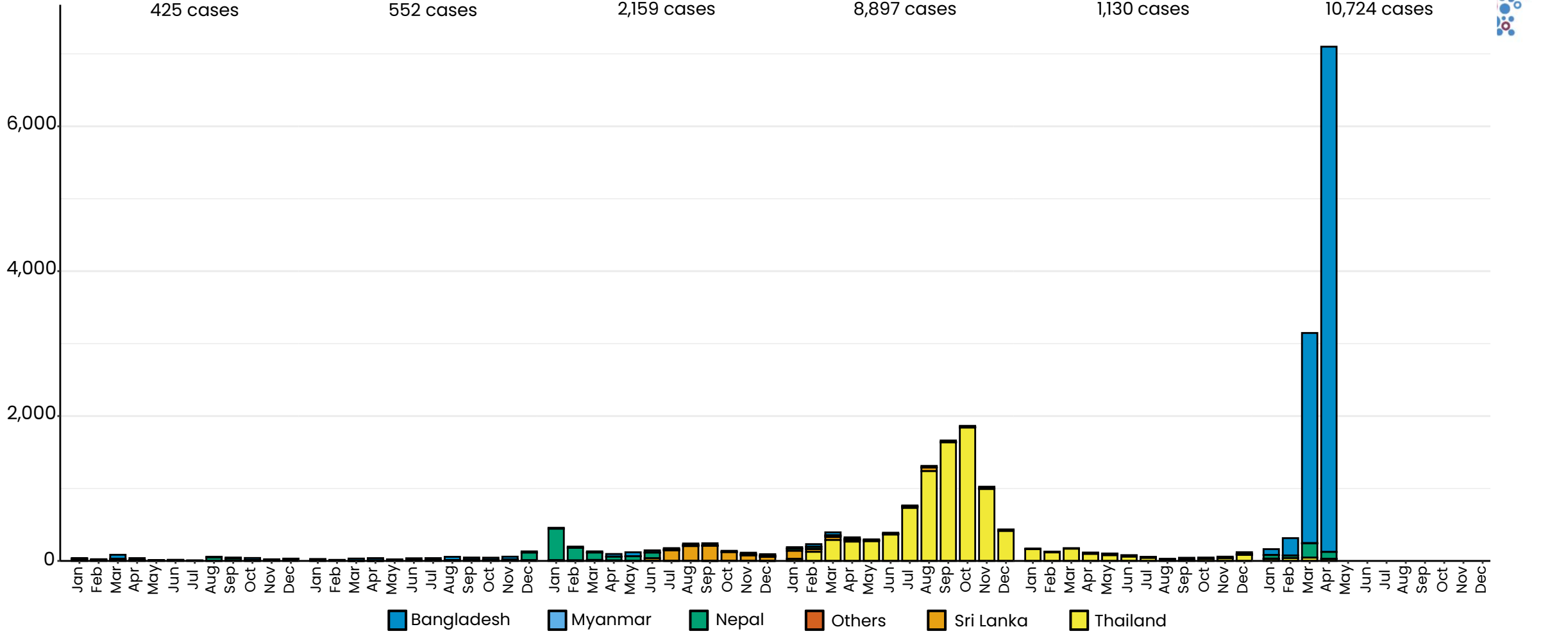
Country	Year conducted National/Rollover-National MCV campaign	Year conducted Subnational MCV campaign
Bangladesh	2005-'06, 2010, 2014, 2020-'21, 2026	2001, 2016, 2017, 2020, 2026
Bhutan	2006, 2017	2000, 2016, 2018, 2025
DPR Korea	2007, 2019	
India	2010-'11, 2017-'19,	2000, 2001, 2012, 2013, 2015, 2022, 2023
Maldives	2005-'06, 2007, 2017, 2020, 2023	
Myanmar	2002-'04, 2012, 2015	2019, 2023, 2024
Nepal	2004-'05, 2008, 2020, 2024	2012, 2015, 2016, 2023
Sri Lanka	2003, 2004, 2013	2024
Thailand	2015, 2020, 2023, 2024	2018, 2021
Timor-Leste	2003, 2006, 2009, 2011, 2015, 2018, 2023	

Immunity gap result in outbreak



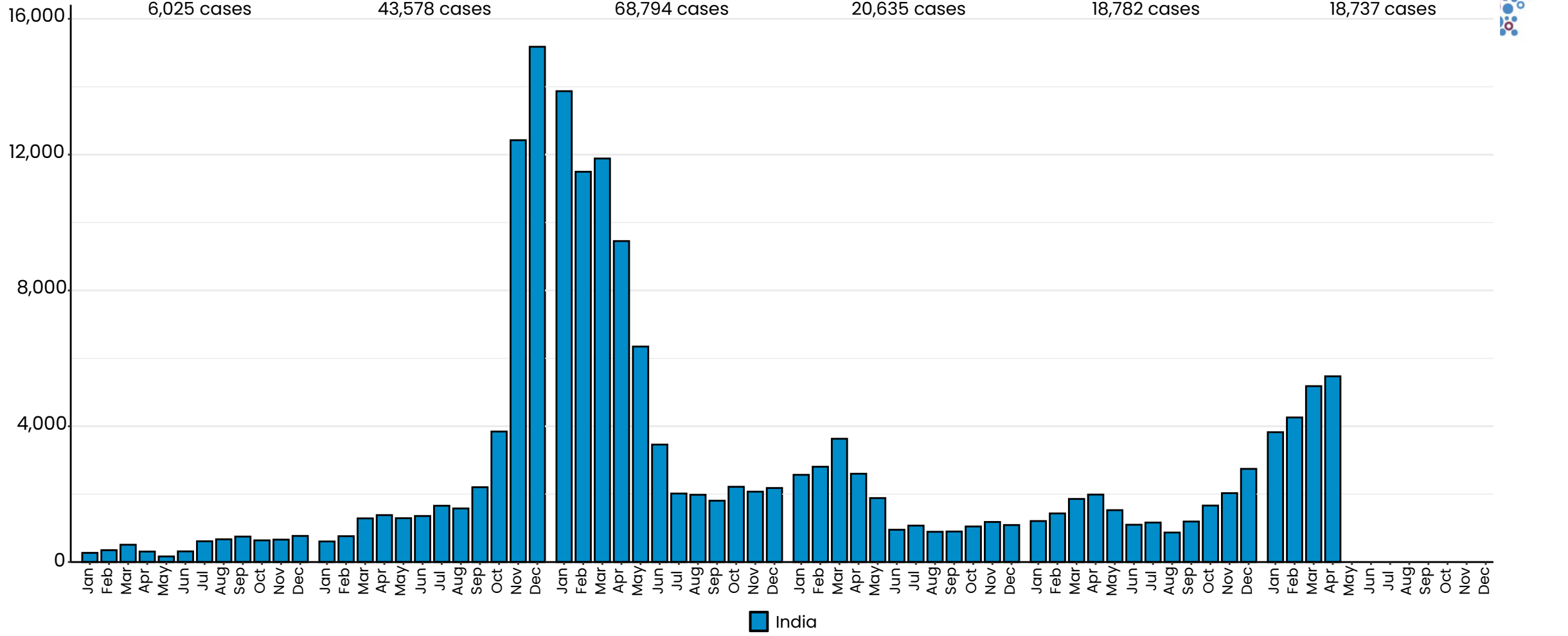
- Because of immunity gap, multiple large outbreaks reported in SEAR
  - Sri Lanka – lost elimination status
  - Maldives - regular importation
  - India & Bangladesh - reported multiple large outbreaks
- Outbreaks observed in adult population- evidence of chronic immunity gap
- Policy gap (not vaccinating after 5 years of age)

Measles case distribution (SEAR (excl. India)), 2021-2026



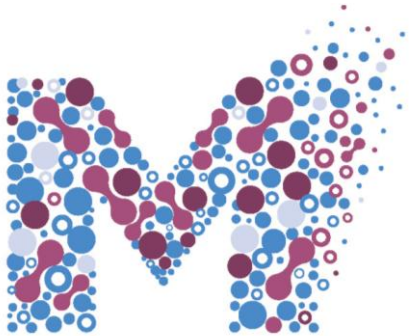
Based on data received 2026-05 - Data Source: IVB Database

Measles case distribution (SEAR, India), 2021-2026



Based on data received 2026-05 - Data Source: IVB Database

What next?



- Targeted closure of immunity gap.
- How to close the immunity gap in a targeted way?
  - Identify susceptible areas
  - Conduct targeted high-quality SIA*
- How to identify this susceptible population?
  - Immunity profile (Susceptible calculation in SEARO)
    - if the susceptible population is more than one birth cohort, we do campaign (rule of thumb)

*SIA includes PIRI/Catch-up/Sweeping/Crash Immunization/National campaigns/ Subnational campaigns for various age group

What we do not know/Gap

- Is this rule of thumb correct?
  - We need to verify this rule of thumb by various modelling exercises.
  - We need very simple modelling exercise with multiple scenario generation which is
    - Easy for program managers to interpret and for taking decision on
      - Identifying target age group for vaccination
      - Geographical area/scope of SIA
      - Selective vs. non-selective
      - How much of routine immunization improvement is required
      - When the next SIA will be required

Thank You

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Yvette Kiptoo

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Simon Mutembo

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11 Jun 2026

Measuring the Impact of Measles Supplemental Immunization Activities (SIAs): Nesting Serosurveys within Measles SIA

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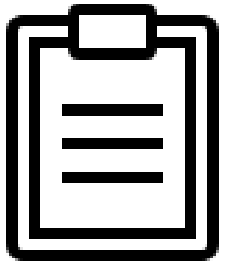
JOHNS HOPKINS BLOOMBERG SCHOOL of PUBLIC HEALTH | International Vaccine Access Center

Why rethink SIA evaluation?



Post campaign coverage survey

How many children **received vaccine**?
Often proxy for population protection

Who is **susceptible**?
Who remained **missed?**
Did **immunity gaps reduce?**

Additional information gained through **alternative evaluation approaches** can provide valuable model inputs on **susceptibility, heterogeneity, and campaign efficiency**

Nesting a serosurvey in an SIA
Zambia November 2020

Setting

Nested in SIA conducted during Child Health Week (6 days)

Fixed and outreach vaccination sites in two districts (urban and rural; 30 total sites)

What was done

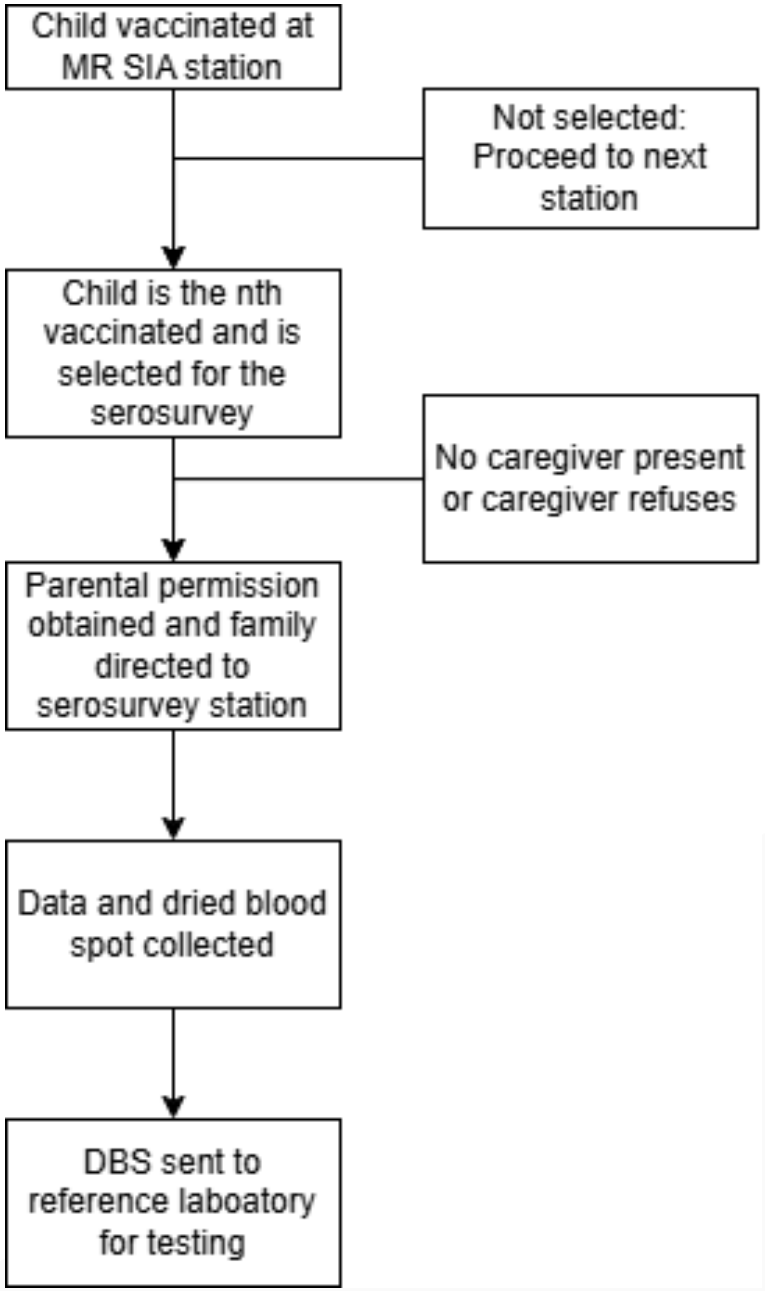
Children **systematically sampled** at the time of MR vaccination then enrolled

Demographic and **vaccination history** data collected

Dried blood spot collected and tested for **anti-measles and anti-rubella antibodies**

Concept: Transform the campaign into a **measurement platform** to generate **model-relevant data on immunity profiles, susceptibility, and campaign efficiency**

Sources: Carcelen et al., PLOS Global Public Health 2024; Prosperi et al., PLOS Global Public Health 2025.



Research activities (enrolment, questionnaire administration, and DBS collection) were conducted **alongside campaign delivery**

Nested serosurvey implementation was feasible and did not compromise SIA delivery

What did we find?

~2,400 children enrolled

High caregiver acceptability

No evidence DBS collection disrupted campaign delivery

Refusals were mainly misconceptions about blood collection

Why did it work?

Ministry of Health engagement

Team coordination with vaccinators

Local field teams

Intensive community mobilization

Adaptive implementation

Source: Carcelen et al., PLOS Global Public Health 2024

Embedding evaluation required flexible implementation and continuous adaptation

Microplans were imperfect

Attendance differed substantially across sites and varied day-to-day

Attendance was often lower or higher than expected

Sampling had to stay adaptive to balance across sites and throughout SIA

Real-time coordination was key

Daily monitoring of incoming data against enrollment targets

Daily meetings to discuss changes to campaign activities, challenges with enrollment, adjustments to plan

Source: Carcelen et al., PLOS Global Public Health 2024

Serology revealed meaningful susceptibility despite high coverage

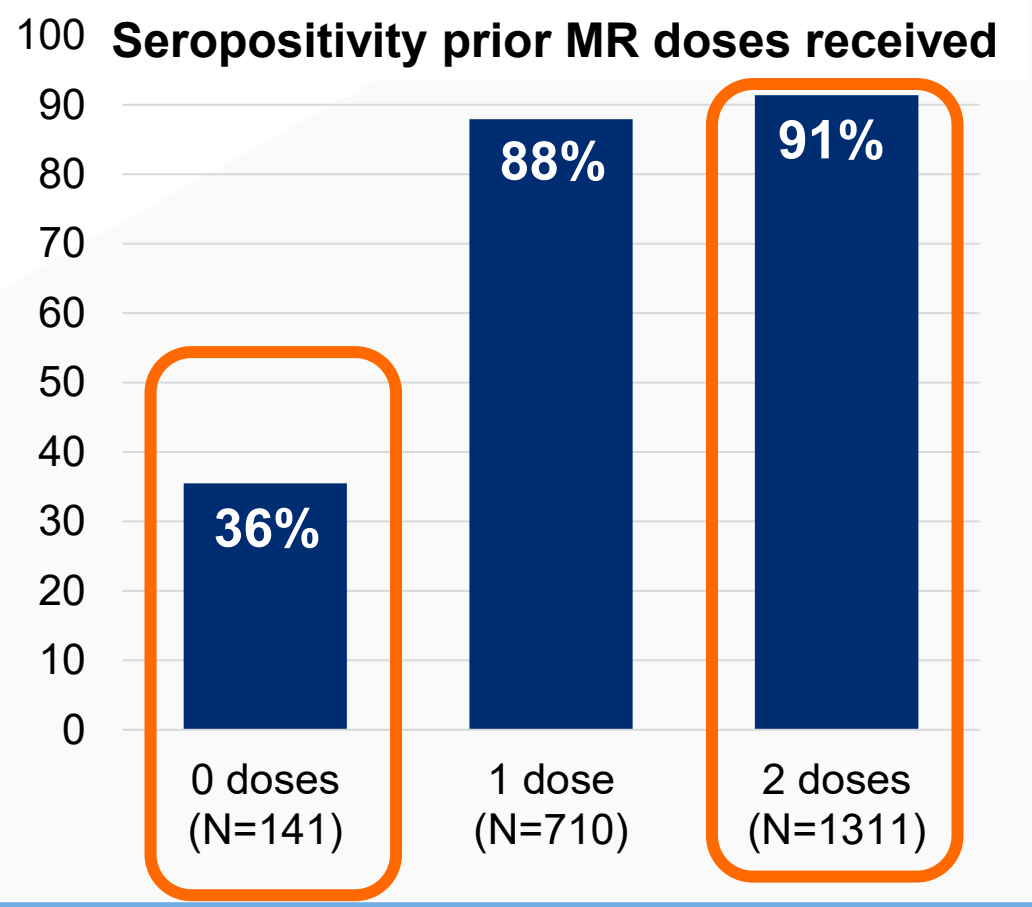
Conventional coverage measures

94% received **at least one MR dose** before SIA

Serology told a different story

86% were **measles seropositive** before SIA

14% **susceptible** despite high coverage



Distinction between coverage and susceptibility key for inference and modeling

Source: Prosperi et al., PLOS Global Public Health 2025. Seropositivity by dose restricted to children with routine immunization cards.

Campaign benefit was greater for dose completion than zero-dose recovery

How many campaign doses went to children who truly needed protection and were unlikely to receive a dose through the routine system?

5% of children gained a **first dose** from the SIA they likely would not have received otherwise

23% of children gained a **second dose** from the SIA they likely would not have received otherwise

Value of campaign depends on RI coverage

Vaccine Activity Efficiency (VAE) Metric:

1 out of every 3.5 campaign doses resulted in meaningful additional protection.

Source: Prosperi et al., PLOS Global Public Health 2025.

Conclusion and Modeling Implications

Coverage ≠ protection

High coverage masked residual susceptibility

Serology identified children who remained susceptible despite prior vaccination

Models require estimates of immunity—not simply doses delivered

Nested Serosurveys Are Feasible

Implemented without disrupting SIA delivery

High participation and operational acceptability

Can generate real-world data on susceptibility and heterogeneity

Future SIAs Need Better Evaluation

Future SIAs may become smaller and more targeted

National average coverage estimates may become less informative

Need for innovative methods for measuring impact

What ultimately matters is not simply how many doses were delivered, but whether susceptibility in the population was reduced

JOHNS HOPKINS
BLOOMBERG SCHOOL
of PUBLIC HEALTH

International Vaccine Access Center

Edson Utazi

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Using geospatial tools to inform subnational non-SIA strategies

(Survey, admin and surveillance data)

C. Edson Utazi

University of Southampton

VaxPop WorldPop University of Southampton MEASLES ANALYTICS HUB

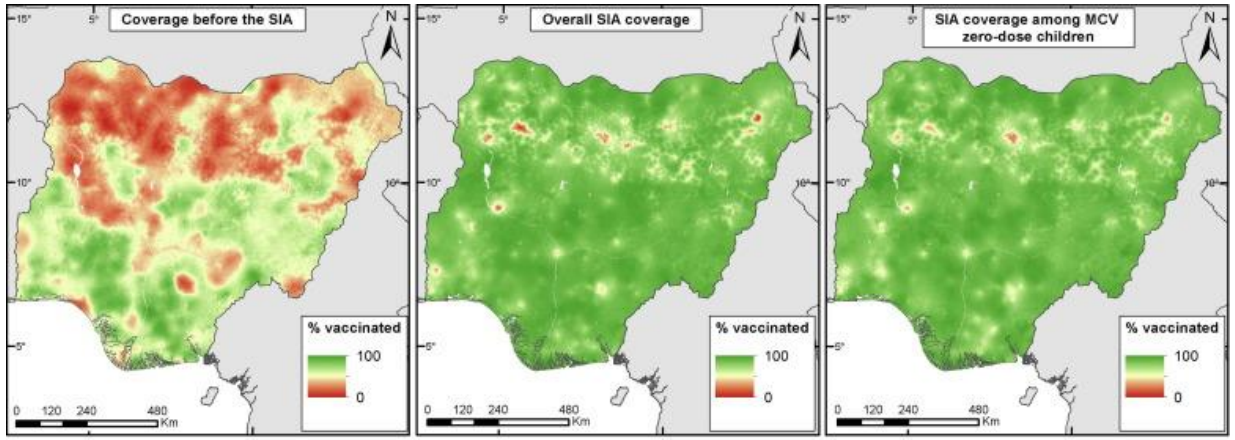
Introduction

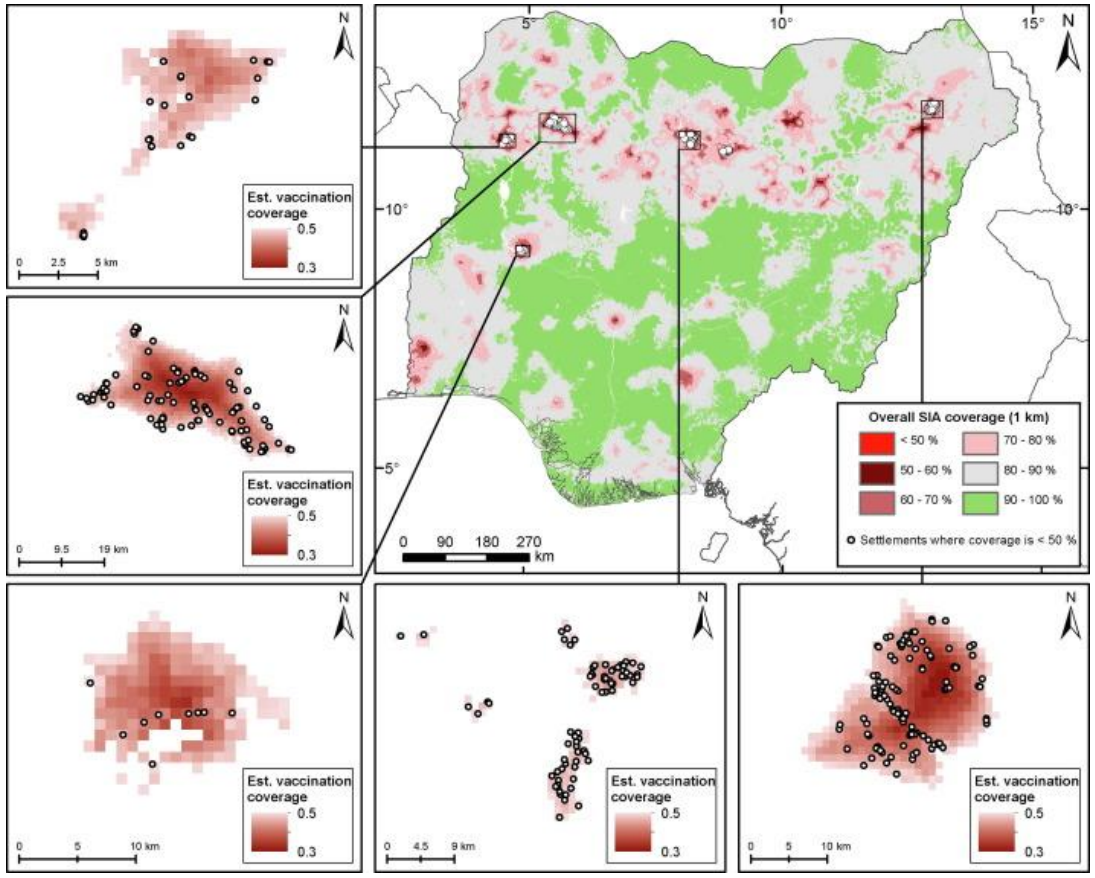
- Goal: Generate evidence to support subnational monitoring of vaccination coverage between SIAs, informing targeted RI strategies and facilitating the transition towards sustainable non-SIA activities.

- Relevant programmatic questions
  - Which subnational areas experience declines in MCV coverage between SIAs and what are the sizes of MCV zero-dose children in these areas?
  - What is the future risk of accumulating susceptibles and outbreak in these areas?
  - Which subnational areas are sufficiently protected to transition from SIA strategies to strengthened RI activities?
  - What health system, demographic or geographic factors are associated with RI underperformance?

Introduction

- Previous efforts included mapping coverage indicators using PCCS data and identifying lower coverage areas





Challenges:

- Tendency to inflate coverage during PCCSs
- Not suitable for inter-SIA coverage monitoring or estimating post-SIA RI effect

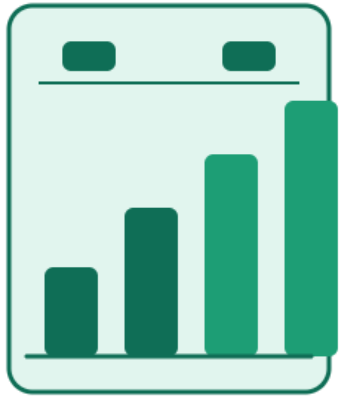
Utazi et al (2020) *Vaccine*

Introduction

- Moving away from SIAs and PCCSs, how can we support MCV subnational RI strategies using individual and combined evidence from these data sources?

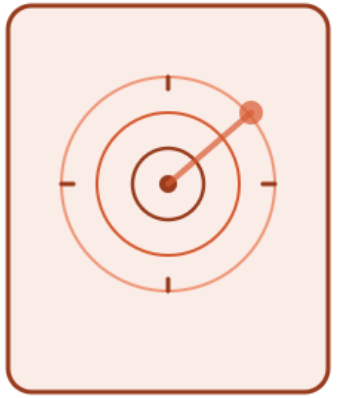
Surveys

Household surveys



Routine data

Administrative records

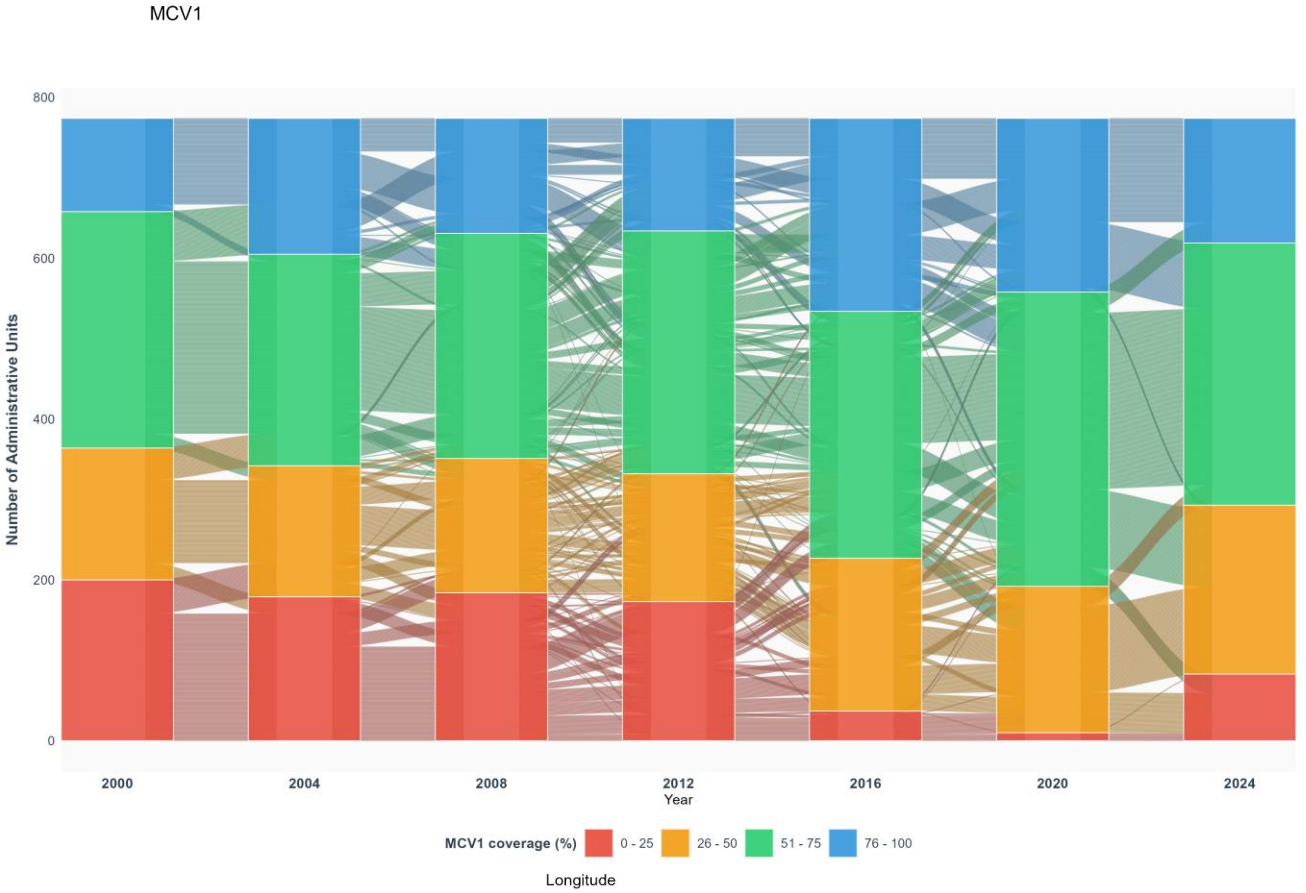


Surveillance

No coverage data?

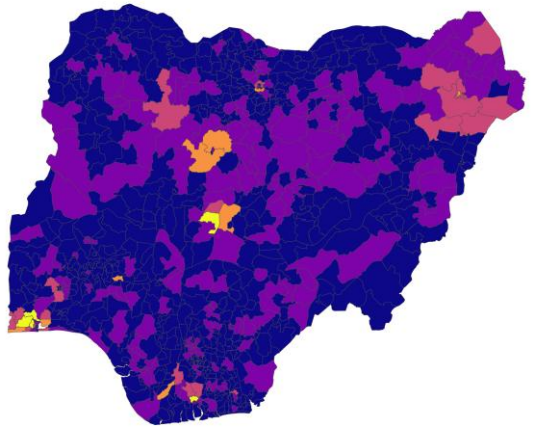
Surveys

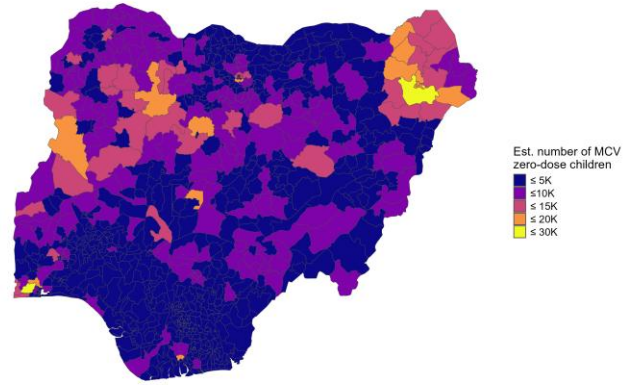
- DHS, MICS, NICS, etc
- Apply geospatial modelling to produce **annual** estimates at 1x1 km and the district level from multiple surveys
- Integrate with gridded population data to produce zero-dose estimates
- Estimates can also be aggregated within **health facility catchment areas** or the **ward** level

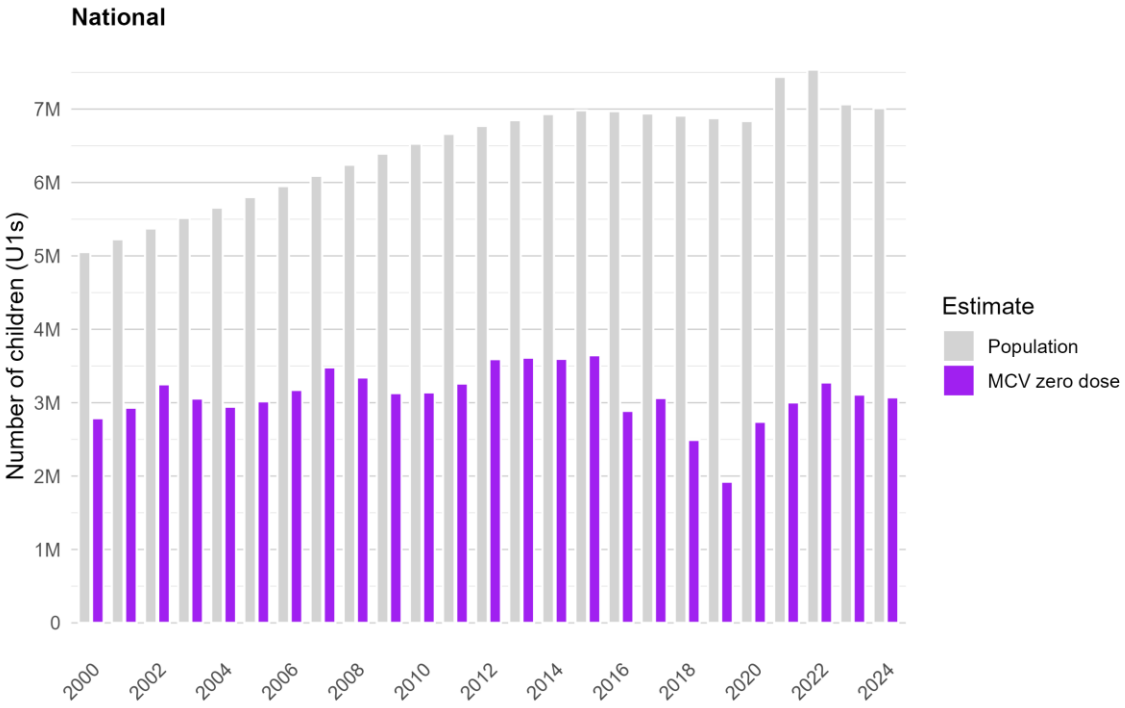


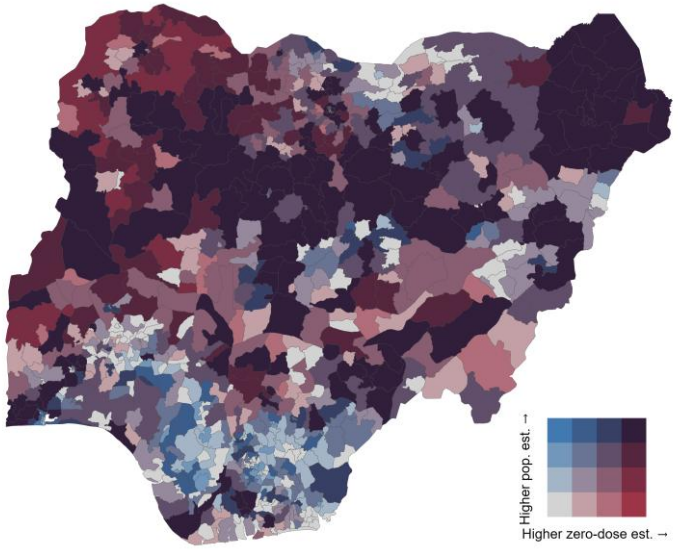
Surveys

2024: U1 pop. vs MCV zero-dose estimates







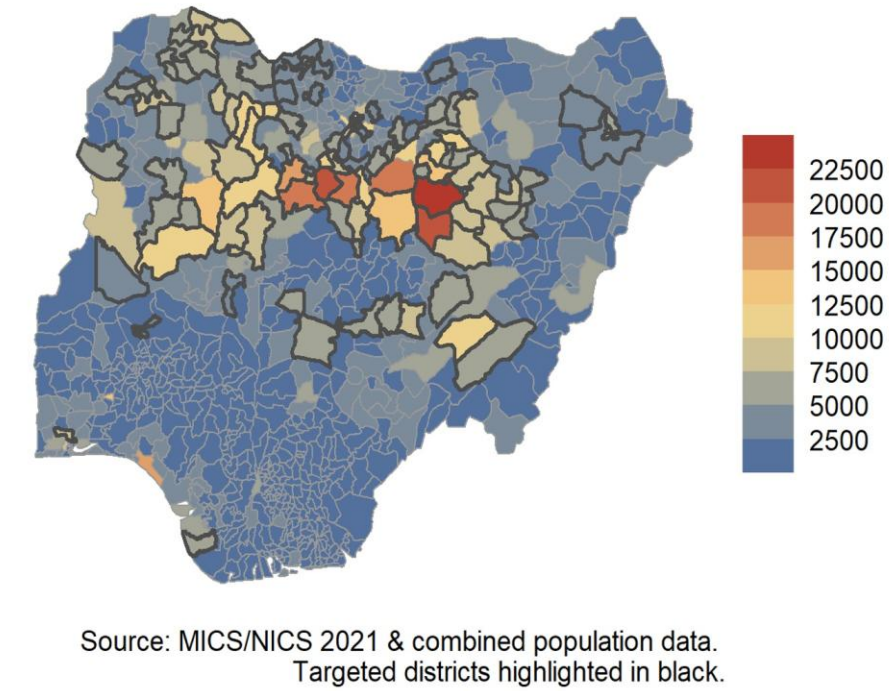


- WorldPop has produced population projections up to 2030 (by age and sex). We can use these to forecast numbers of zero-dose children, if the current trends in coverage were to persist.

Surveys

- Use case: spatial prioritization exercise for RI interventions in Nigeria
- Zero-dose estimates were integrated with other programme data

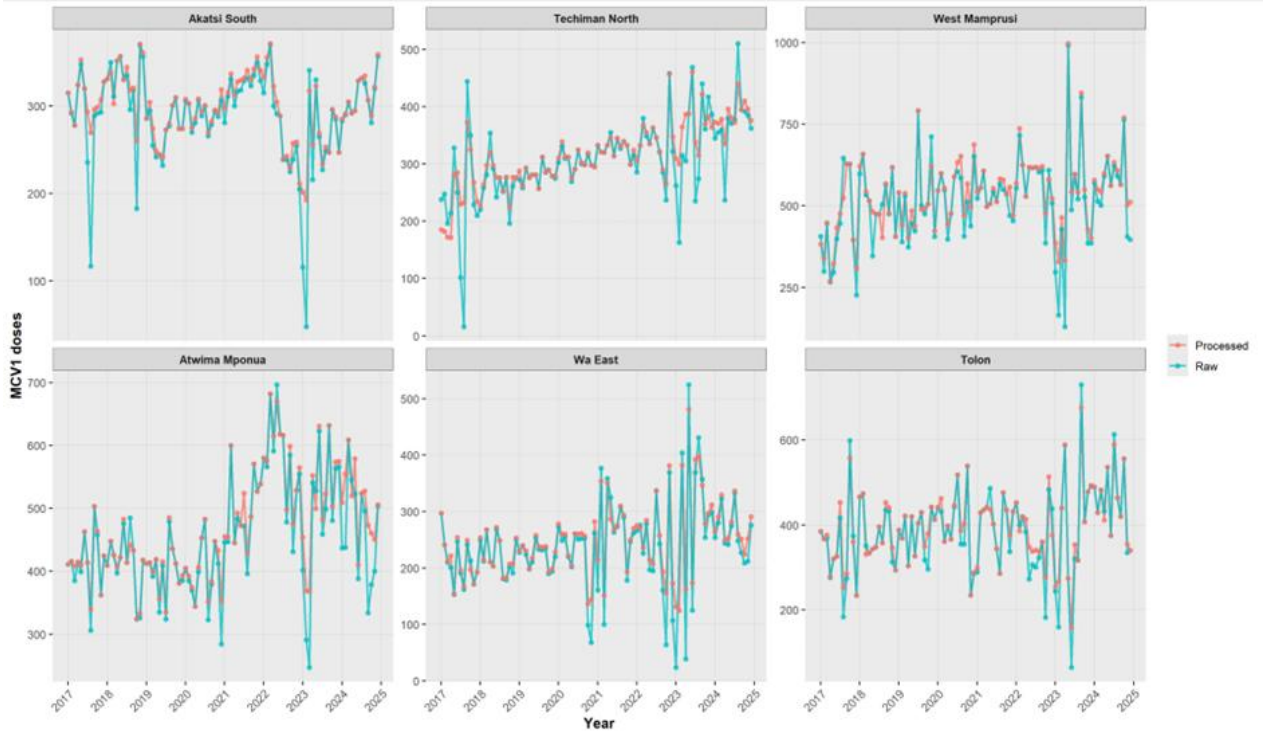
SN	Parameters	Data Source	Indicator	Indicator Definition
1	Un and under-immunized for Penta and un-immunized for MCV1	University of Southampton Penta 1 zero dose modelling for NDHS 2018	Number of children unvaccinated for Penta1	Total Number of children who did not receive Penta1
2	cVDPV2	2020 National AFP Surveillance Database	Case of cVDPV2 reported	Report of at least one case of cVDPV2 per LGA
3	Security	Health Facilities Settlement Catchment Areas Database as at Feb. 2021.	% of Security Compromised settlements per LGA	Proportion of settlements per LGA that are classified as security compromised
4	Confirmed Measles Cases	Surveillance Database 2020	Number of Confirmed Measles cases	Total count of confirmed Measles cases per LGA



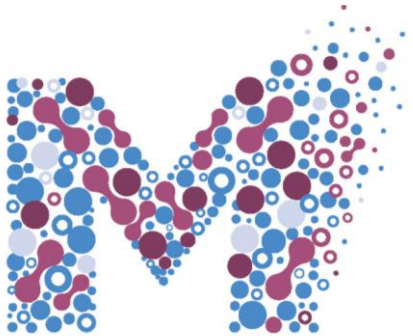
Pathway analysis conducted by Gavi showed expected reductions in zero-dose prevalence by targeting these areas.

Routine admin data (RAD)

- **Monthly** facility level data comprising dose counts/service volumes (for BCG, DTP1, DTP3 and MCV1) from DHIS2
- Pre-processing steps: outlier detection and imputation, consistency checks, etc
- Denominator estimation using processed BCG and DTP1 (survey-adjusted)
- Consideration of alternative denominator sources (e.g., WorldPop)
- Aggregation to obtain monthly and annual district level RI coverage estimates
- **Geospatial modelling** can be used to address remaining data quality issues (e.g., estimates > 100%)



Routine admin data (RAD)



- RAD can yield insights into rates of accumulation of MCV zero-dose children at granular spatial (health facility & district) and temporal (monthly) scales

- Different denominators can be assessed and compared for zero-dose estimation

Surveillance data

- Predict MCV1 coverage using surveillance-based indicators –
  - mean age of infection
  - proportion of vaccinated suspected cases
  - Proportion IgM negative
- Approach used DHS data as outcome variable

ELSEVIER

Vaccine
Volume 60, 11 July 2025, 127277

Prediction of subnational-level vaccination coverage estimates using routine surveillance data and survey data

Deepit Bhatia [a], Natasha Crowcroft [b], Sébastien Antoni [b], M. Carolina Danovaro-Holliday [b], Anindya Sekhar Bose [b], Anna Minta [b], Balcha Masresha [c], Matthew J. Ferrari [a]

[a] Pennsylvania State University, United States
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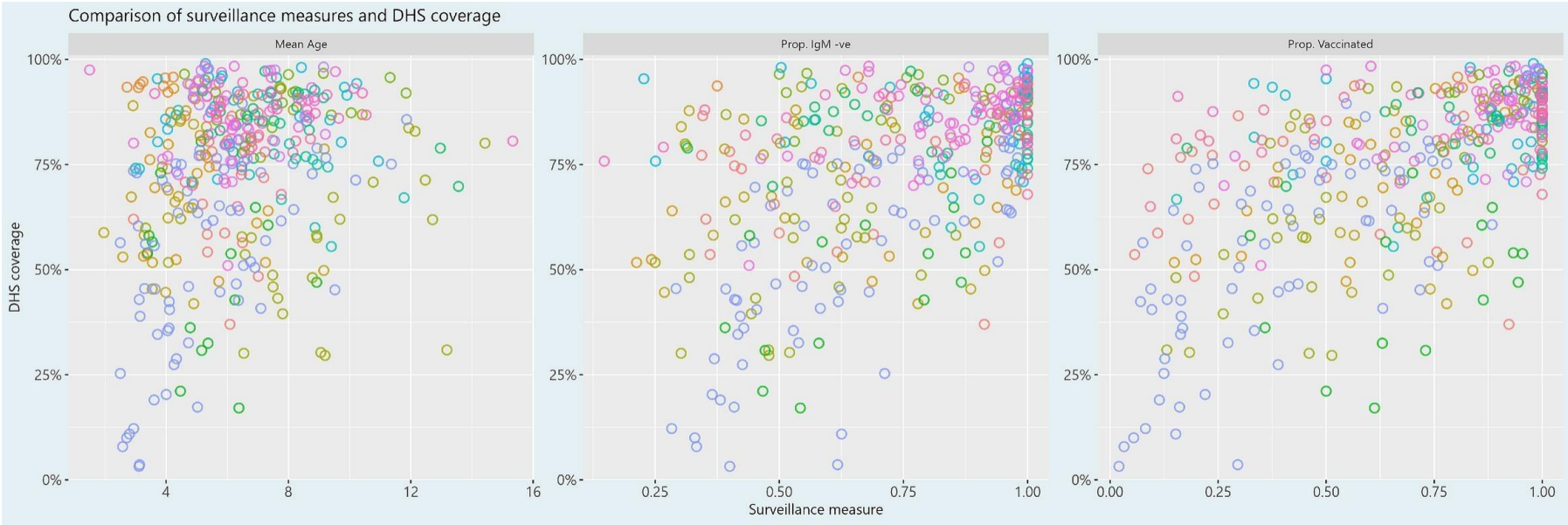
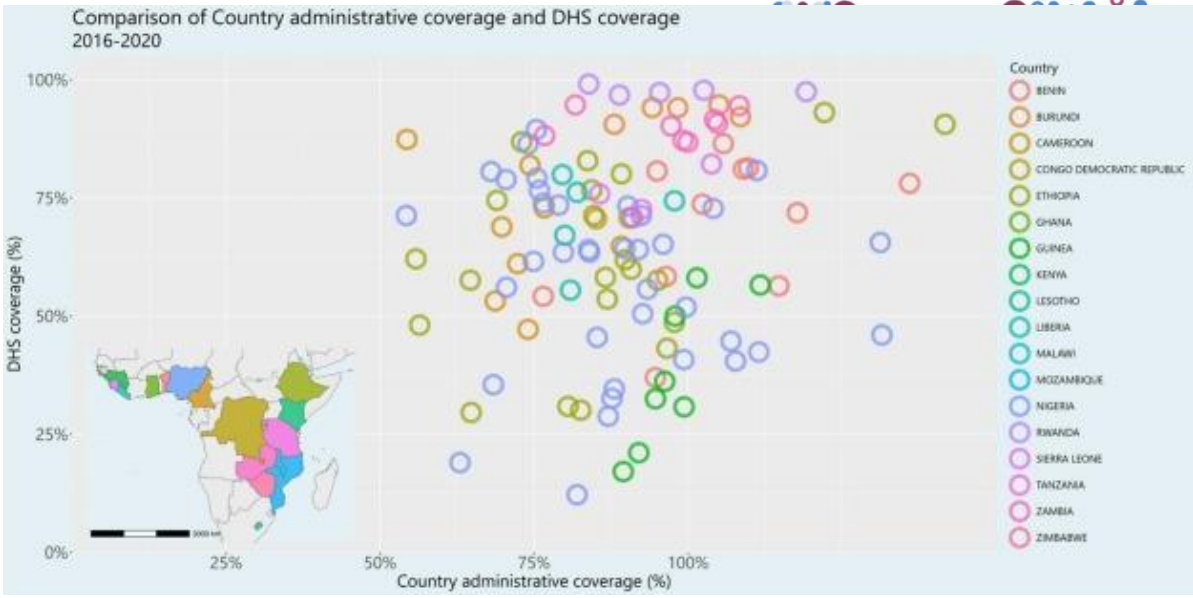
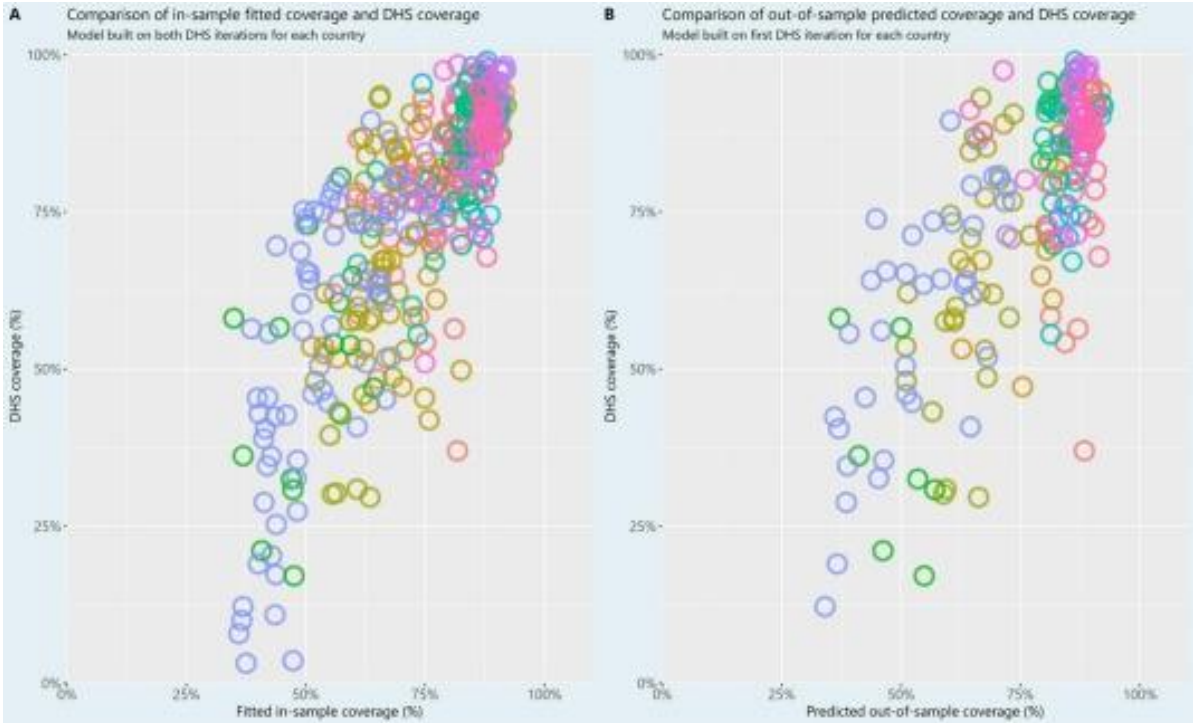


Surveillance data

- A regression model enabled the prediction of coverage using surveillance-based indicators
- Currently implemented at the national and first administrative levels
- Potential to extend methodology and analysis to the district level (would require modelled district level coverage estimates) for annual coverage estimation





Zero-dose vulnerability index

- Useful for spatial prioritization in the absence of reliable coverage estimates
- Can combine information on multiple factors related to vaccination coverage
- Data on these variables can be taken from censuses, admin records, surveys or other sources
- Index can be combined with population data to produce estimates of vulnerable children

Spatial Statistics
Date: October 2023
Article: 100772
Volume: Volume 57

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A zero-dose vulnerability index for equity assessment and spatial prioritization in low- and middle-income countries

C.E. Utazi [a b] ✉, H.M.T. Chan [b], I. Olowe [a], A. Wigley [a], N. Tejedor-Garavito [a], A. Cunningham [a], M. Bondarenko [a], J. Lorin [c], D. Boyda [c], D. Hogan [c], A.J. Tatem [a]

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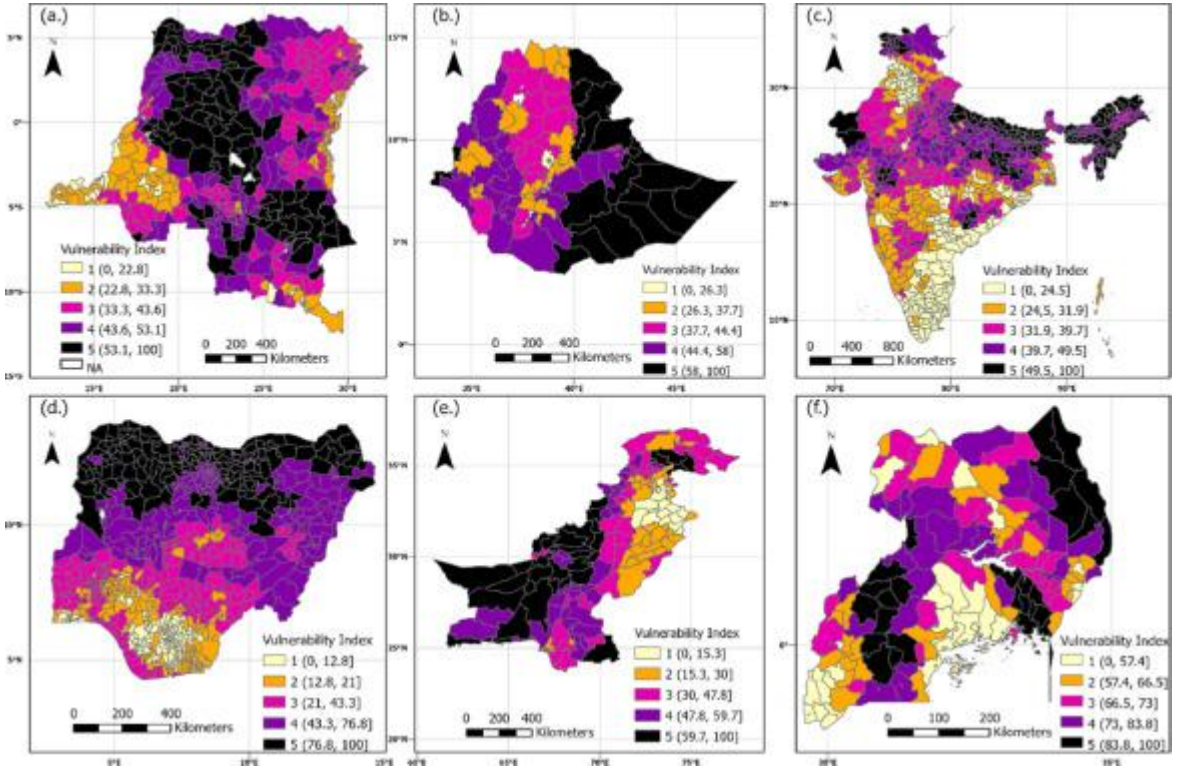
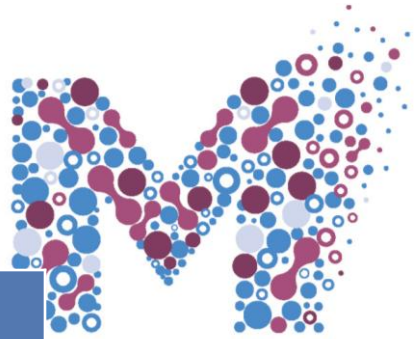
Received 7 April 2023, Revised 15 August 2023, Accepted 15 August 2023, Available online 21 August 2023, Version of Record 5 September 2023.

What do these dates mean?



Comparisons between the data sources

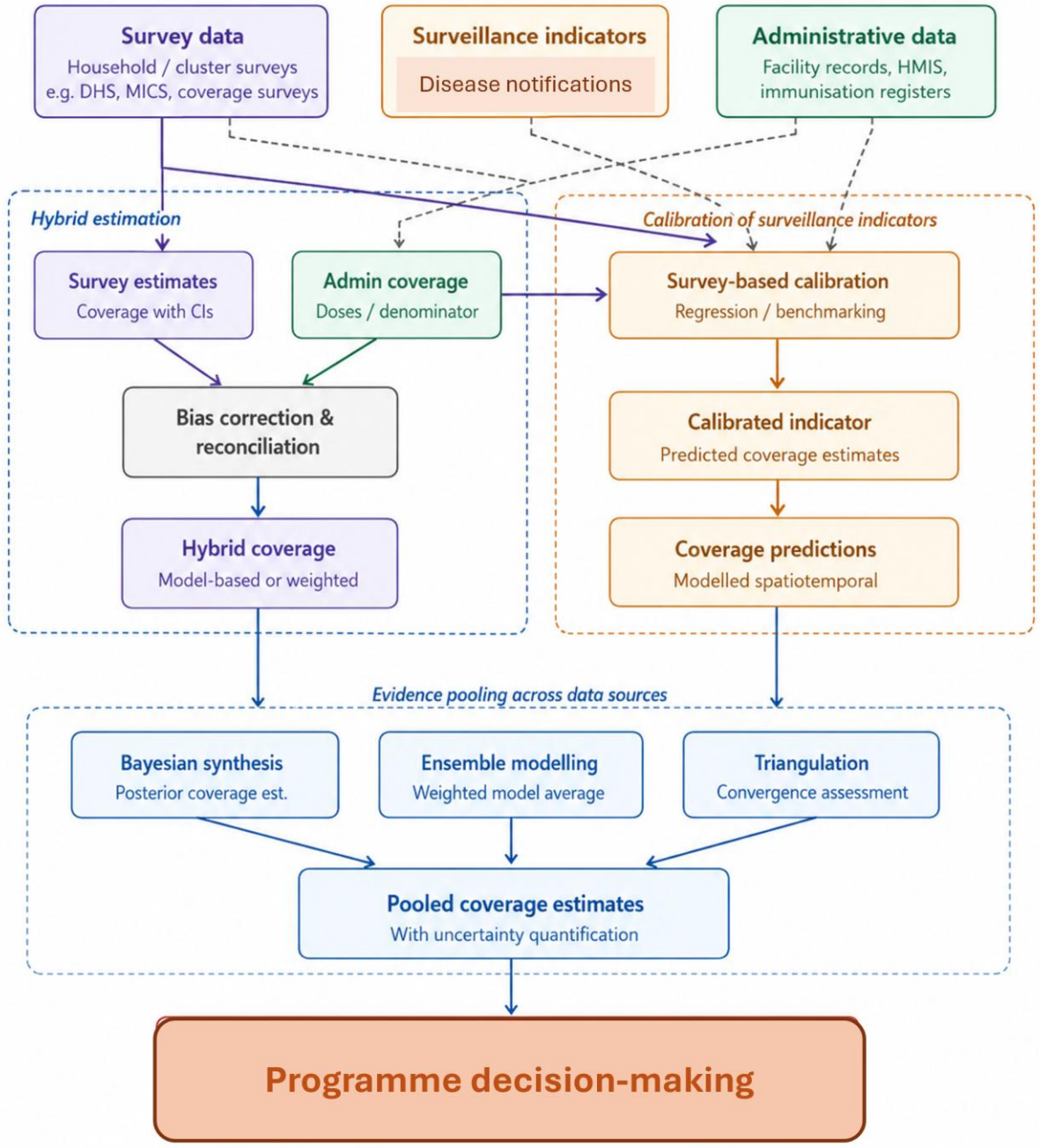


Data source	Spatial and temporal resolution	Data quality issues
Surveys	Grid and Admin; Annual	Representativeness, timing & frequency, recall bias, no distinction between RI and SIA doses, etc
Admin	Admin; Monthly & Annual	Numerator & denominator issues (private sector underreporting, outdated censuses, etc
Surveillance	Admin; Annual	Reporting completeness, reporting delays, missing characteristics, outbreak-driven reporting bias, low lab confirmation rates, low incidence challenges (fewer data), changes in sensitivity, etc
Others (health indicators)	Depends on data source(s)	Depends on data source(s)

Bringing it all together…

- Integrate evidence across all data sources?
- Consider additional programme data?
- Develop a tool to support microplanning and subnational RI strategies at the programme level
- Tool should enable fast annual updates
- How about uncertainties? Can these be operationalized?

Integrated methodology can be tested using some example countries.



Special Issue

AI and Geospatial Modeling for Vaccination Strategies in LMICs

Message from the Guest Editors

This Special Issue focuses on the growing role of geospatial analysis, artificial intelligence, and mathematical modelling in informing childhood vaccination strategies in low- and middle-income countries. It aims to showcase innovative methodological and applied research that leverages geospatial data, machine learning, epidemiological modelling, and advanced statistical approaches to answer relevant programmatic questions and address persistent challenges in immunization systems. Topics of interest include high-resolution mapping of vaccination coverage and zero-dose children, modelling of outbreak risk and population immunity, optimization of vaccination campaigns, integration of routine administrative and survey data, forecasting approaches, and the use of novel data streams to support immunization planning and monitoring. By bringing together contributions from multiple disciplines, the Special Issue seeks to highlight how data-driven approaches can support more equitable, targeted, and effective vaccination strategies, and ultimately contribute to disease control and elimination efforts in resource-constrained settings.

Guest Editors

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Deadline for manuscript submissions

Vaccines

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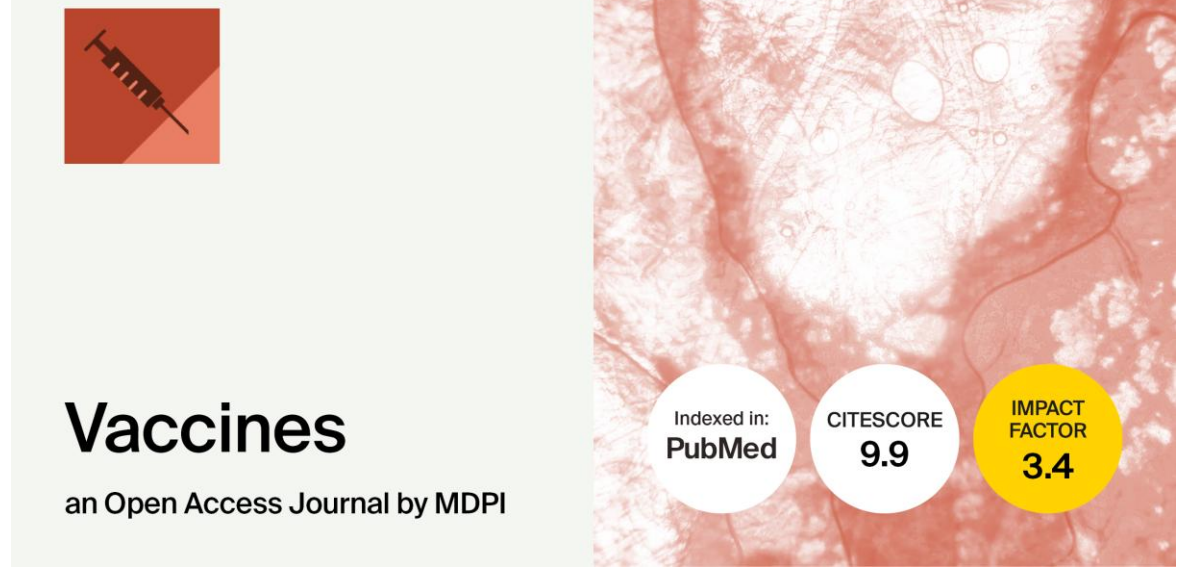

WorldPop

VaxPop

www.worldpop.org

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Julia Lowe & Fiona Walsh

MEASLES
ANALYTICS HUB

Catalyzing a New Paradigm in Campaign Evaluation

May 2026

Gates Foundation

Agenda

1

Phase 1 Work
Assessing PCCS value and alternatives

What we found & what it means for the way forward

2

Phase 2 Approach
Supporting transition to a flexible MEL paradigm

Our proposed goals and implementation plan

3

Discussion

Preliminary draft of the research framework, pilot countries and how we can work together.

Phase 1: What We Found

Phase 1 in Brief: What We Did

A mixed methods review of how PCCS are used across measles SIAs — and what alternatives could better serve countries' needs

50+

Stakeholder Interviews

Global technical & operational partners, country EPI staff, donors, researchers

90

Articles Reviewed

Rapid literature review of PCCS and alternative evaluation methods (2018–2025)

4

Country Case Studies

Cambodia, Mozambique, Ethiopia, Pakistan — PCCS planning, use, and impact

~10

Alternative MEL Tools

Initial catalogue and scoring (to be further validated) on rigor, relevance for decisions, sustainability, and feasibility

Phase 1: What We Found About PCCS

1

Implementation has improved — but fundamental gaps remain

23% → 55% of SIAs with PCCS (2020–25)

- Timeliness, logistics & capacity constraints prevent adherence to global standards in many settings

2

Even when PCCS is completed, findings rarely reach decision-makers in time to matter

Median lag: **6-9 months post-campaign**

- Only 27% of 2024-25 PCCS started within WHO-recommended 1-month post-campaign
- As a retrospective tool, PCCS often arrives after corrective action windows have closed

3

PCCS is perceived as a donor accountability tool, not country-owned

All 4 case study countries reported this

- Externally driven with limited MoH engagement — reduces willingness to prioritize findings
- As co-financing expectations shift, MEL tools need to be more flexible & government-aligned

Phase 1: Recommendations

1. Directly support emerging & alternative MEL TA partners / approaches in upcoming campaigns

- In partnerships with MoH, develop evidence and decision maps to understand how evidence is used in context, further refining fit-for-purpose guidance and identifying gaps in capacity and investment.
- Responding to perceptions that the PCCS ecosystem has crowded out new (and perhaps more agile, innovative, and cost effective) MEL partners; direct support of diverse approaches based on context, preferred methodology, and trusted partnerships could help evolve and strengthen the field to reflect MoH goals.
- Where possible, do head-to-head learning that will give the most robust picture of campaign MEL.

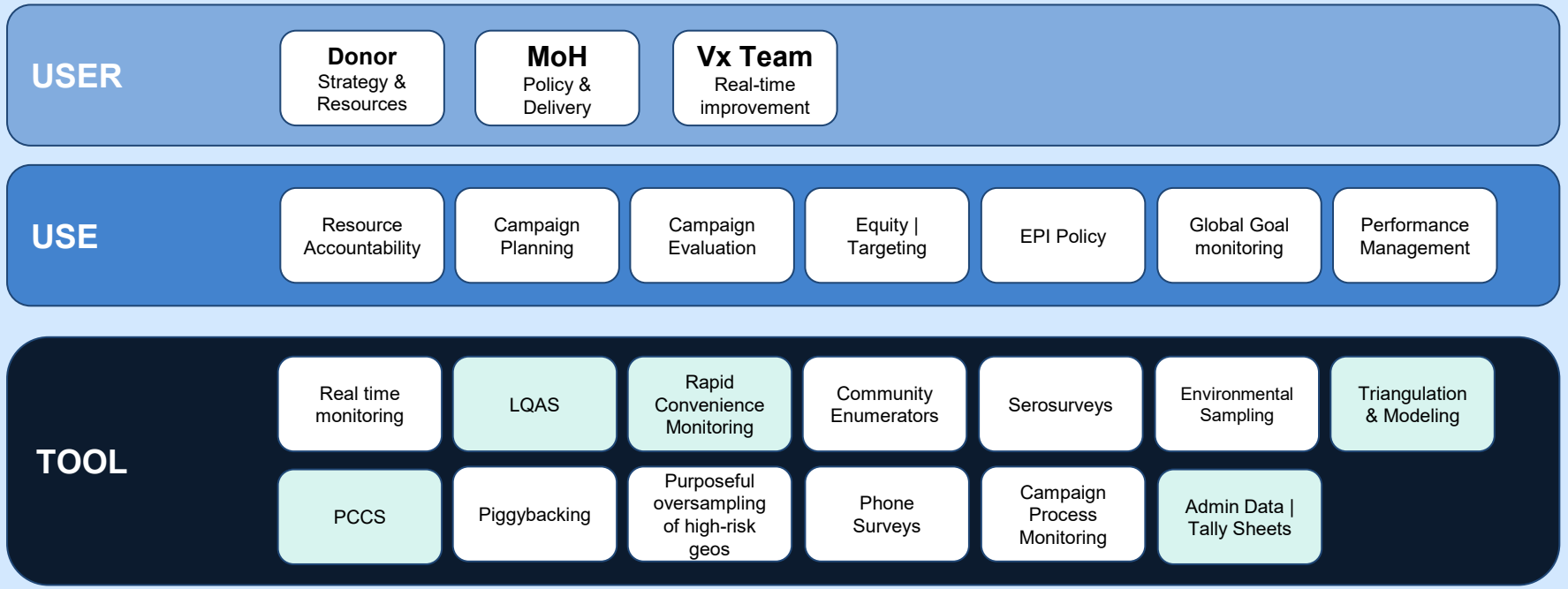
2. Support policy & practice change to codify more MEL flexibility for measles campaigns

- Gavi 6.0 has adopted a more flexible approach with campaign MEL funding; we will support them on strengthening the PPC with (conditional) guidance and assessing how decision support systems and tools can be integrated within existing workflows.
- Convene stakeholders for shared learning to ensure emerging evidence is integrated in policy and technical engagement.
- Develop distinct resourcing paths for monitoring vs. evaluative tools
- Develop and include per-person costing guidelines, as extreme variability and inflation of costs is a continued bottleneck.

3. Align with alternative survey & post-DHS data ecosystem workstreams

- A new paradigm for Vx financing presents new opportunities for MEL to serve multiple purposes.
- Ensure evidence and learnings on emerging methods are integrated in decision-support tools and evaluated for use.
- Data sharing and reuse is an extreme challenge (even intra-government) that may intensify in a post-DHS world. Consider explicit guidance or policy on expectations of data sharing and reuse.

Phase 1: Tools and Use Cases Evaluated



Context

- Capacity
- Resources
- Data systems & environment
- Demand & methods preference
- RI | Campaign integration context

Phase 1: Scoring Rubric Developed to Guide Assessment

Rigor	How representative are the results? (Broader representativeness = higher score)
	How accurate and valid are the estimates? (More reliable, less bias = higher score)
	Can results be compared over time? (Trendable, repeatable = higher score)
Sustainability	Does it fit into existing systems and processes? (Stronger integration = higher score)
	Is it owned and sustainable locally? (More MoH leadership and buy-in = higher score)
	Can it be institutionalized or automated? (Easier routinization = higher score)
	How affordable is it? (Lower cost per respondent = higher score)
Feasibility | Logistics	How easy is it to implement with available skills? (Less specialized training = higher score)
	How quickly are results available? (Faster turnaround = higher score)
	How low is the burden on respondents? (Less invasive, less time = higher score)
	How feasible is it to reach target populations? (Easier access = higher score)
	How well can it link with other efforts? (Stronger complementarity = higher score)
Relevance for Decision-Making	How broadly can it be applied across antigens and sub-populations? (Wider applicability = higher score)
	Is it timely enough to inform decisions? (More actionable in real-time = higher score)
	How rich is the data it produces? (More variables, deeper insights = higher score)
	How easy are results to interpret? (Simpler, more decision-ready = higher score)
	What level of detail does it provide? (Finer granularity = higher score)

Phase 1: Heat Map (Snapshot)

						SCORING RUBRIC																
						Rigor			Sustainability				Feasibility/ Logistics					Relevance for Decision-Making				
Evaluation Method	**For What Kind of Contexts and Questions Is It Relevant?**	**What Questions Does It *Not* Answer Well?**	**When Is It Relevant?**	**How Should Results Be Interpreted and Used?**	**What Practical Requirements Are Needed to Implement It?**	**How representative are the results?** (Broader representativeness = higher score)	**How accurate and valid are the estimates?** (More reliable, less bias = higher score)	**Can results be compared over time?** (Trendable, repeatable = higher score)	**Does it fit into existing systems and processes?** (Stronger integration = higher score)	**Is it owned and sustainable locally?** (More MoH leadership and buy-in = higher score)	**Can it be institutionalized or automated?** (Easier routinization = higher score)	**How affordable is it?** (Lower cost per respondent = higher score)	**How easy is it to implement with available skills?** (Less specialized training = higher score)	**How quickly are results available?** (Faster turnaround = higher score)	**How low is the burden on respondents?** (Less invasive, less time = higher score)	**How feasible is it to reach target populations?** (Easier access = higher score)	**How well can it link with other efforts?** (Stronger complementarity = higher score)	**How broadly can it be applied across antigens and sub-populations?** (Wider applicability = higher score)	**Is it timely enough to inform decisions?** (More actionable in real-time = higher score)	**How rich is the data it produces?** (More variables, deeper insights = higher score)	**How easy are results to interpret?** (Simpler, more decision-ready = higher score)	**What level of detail does it provide?** (Finer granularity = higher score)
Post-Campaign Coverage Survey (PCCS) (also known as Coverage Evaluation Survey, Post-Campaign Evaluation) Traditional household cluster survey providing population-representative coverage estimates; considered the gold standard for rigor; costly, slow, and requires substantial technical expertise.	One single (or possibly regional) population-representative coverage figure. When an "objective" or "gold standard" estimate of campaign coverage is needed for accountability or validation of administrative data. Often commissioned to provide donors and global partners with credible evidence of campaign performance. Can sometimes inform equity analysis if disaggregated by sex, rural/urban, or socio-economic factors.	Granular information about coverage in subnational/local areas (clusters not powered for district/ward estimates). Root-cause analysis of poor performance or operational bottlenecks. Real-time coverage assessment to allow for immediate corrective action within the campaign. Populations most likely to be left out of sampling (e.g., nomadic, remote, marginalized groups) are also those most likely to have been missed by vaccinators.	After a campaign is completed (WHO recommends within 3 months). As input to RI strengthening or future campaign planning. When external stakeholders (e.g., Gavi) require a validated coverage figure for funding or accountability purposes.	Considered credible and rigorous when conducted to WHO standards, but often slow. Findings frequently highlight discrepancies between administrative and survey-based coverage, which may be politically sensitive. Evidence of limited uptake: only ~18% of PCCS in the literature reported that results were used for decision-making. Greatest impact when results are embedded in decision-support processes (e.g., Nigeria 2017/18 dashboard that informed postponement decisions). If delayed, risks becoming a retrospective audit with little programmatic value.	Requires substantial planning, budget, training, and technical expertise to execute. High cost compared with other monitoring tools. Fieldwork can be logistically demanding, especially in insecure or remote settings. Guidance and standard methods available from WHO (cluster survey design, VCQI software). Often externally commissioned, which can limit MoH ownership and capacity development.	3 High	3 High	2 Medium	1 Low	1 Low	1 Low	1 Low	2 Medium	1 Low	2 Medium	2 Medium	2 Medium	3 High	1 Low	3 High	2 Medium	2 Medium
Rapid Convenience Monitoring (RCM) (also known as: Spot Checks, Convenience Sampling) Small-scale, non-representative spot checks conducted during or immediately after campaigns; low cost, rapid results, and high MoH ownership; not rigorous or representative.	To understand pockets of low coverage in real-time during or immediately after a campaign. Helps identify children or areas missed by vaccinators. Best for operational teams who need quick, actionable information.	Does not provide population-representative coverage estimates. Cannot answer questions about overall campaign effectiveness at national/subnational levels. Limited for long-term accountability or trend analysis.	During implementation of a campaign, or immediately after. When the priority is rapid corrective action rather than rigorous evaluation. Useful for mop-up planning and identifying missed settlements.	Provides immediate, actionable feedback but should not be interpreted as representative coverage. High credibility with frontline managers, but donors may not accept as sufficient for accountability. Most useful when linked to supervision systems (e.g., dashboards, readiness monitoring).	Low cost and easy to implement. Requires only basic training for enumerators. Can be repeated frequently during or between campaign rounds. Often conducted by MoH staff or local supervisors, ensuring high ownership. May systematically miss remote or high-risk groups if only convenience locations are sampled. Guidance forthcoming from WHO alongside cluster survey manual.	1 Low	1 Low	2 Medium	3 High	3 High	2 Medium	3 High	2 Medium	3 High	3 High	2 Medium	2 Medium	2 Medium	3 High	1 Low	3 High	3 High

Phase 2: Proposed Implementation Plan

Phase 2 Overview: Supporting Ecosystem Change

Track 1
Global Policy & Guidance

- Workshop(s) with Gavi to pressure-test assumptions and integrate research into 6.0 policy & funding guidance (starting today!)
- Regular engagement with MRP and other global platforms for MEL strategy
- TA to support policy and practice change across partners
- Final shared learning convening to review experiences and results

Track 2
Country Implementation

- Stakeholder mapping and analysis of data context and capacity
- Engage national decision-makers in existing regional forums (e.g., EPI manager meetings)
- Direct TA to 4+ countries: landscape, assess data context, identify MEL tools
- Support MoH and technical partners through decision-support tools
- Qualitative evaluation documenting learning at each stage of campaign cycle

Track 3
MEL Innovation

- Align with broader survey innovation workstreams.
- Develop systems to ensure tools and methods guidance are continually updated.
- Costing and procurement guidance for best-fit MEL tools
- Identify opportunities to organize and support technical partners as policy, needs, and resources shift.

↔ Shared Learning Loop: Regular cross-track touchpoints to share implementation experience, surface problems early and refine decision-support tools in real time.

How the Shared Learning Loop Works

Insights from country implementation feed into global policy, and global policy changes shape what we test in countries — continuously.

Global Policy & Guidance

Gavi eases PCCS requirement; initial alternatives menu published

→

Country Implementation

Select 4+ countries pilot alternative MEL campaigns; learning documented at each stage (2026)

→

Refined Guidance & Tools

Decision-support tool validated; operational guidance published (early 2027)

← *Findings from country implementation feed back into global guidance*

What we document

- Campaign planning decisions & tool selection rationale
- Implementation experience, barriers encountered
- Data quality and timeliness observations
- Partner ecosystem dynamics

How we share it

- Regular briefings (quarterly)
- Case study write-ups after each campaign
- Interim findings brief to Gavi and GF by December 2026
- Full synthesis report post-campaign (early 2027)

Partner collaboration

- Include our planning and engagement in new application and ongoing planning processes.
- Share ground-level observations in real time
- Participate in cross-track learning sessions

Discussion: Research Framework, Pilot Countries, & MEL Partners

Building on Phase 1

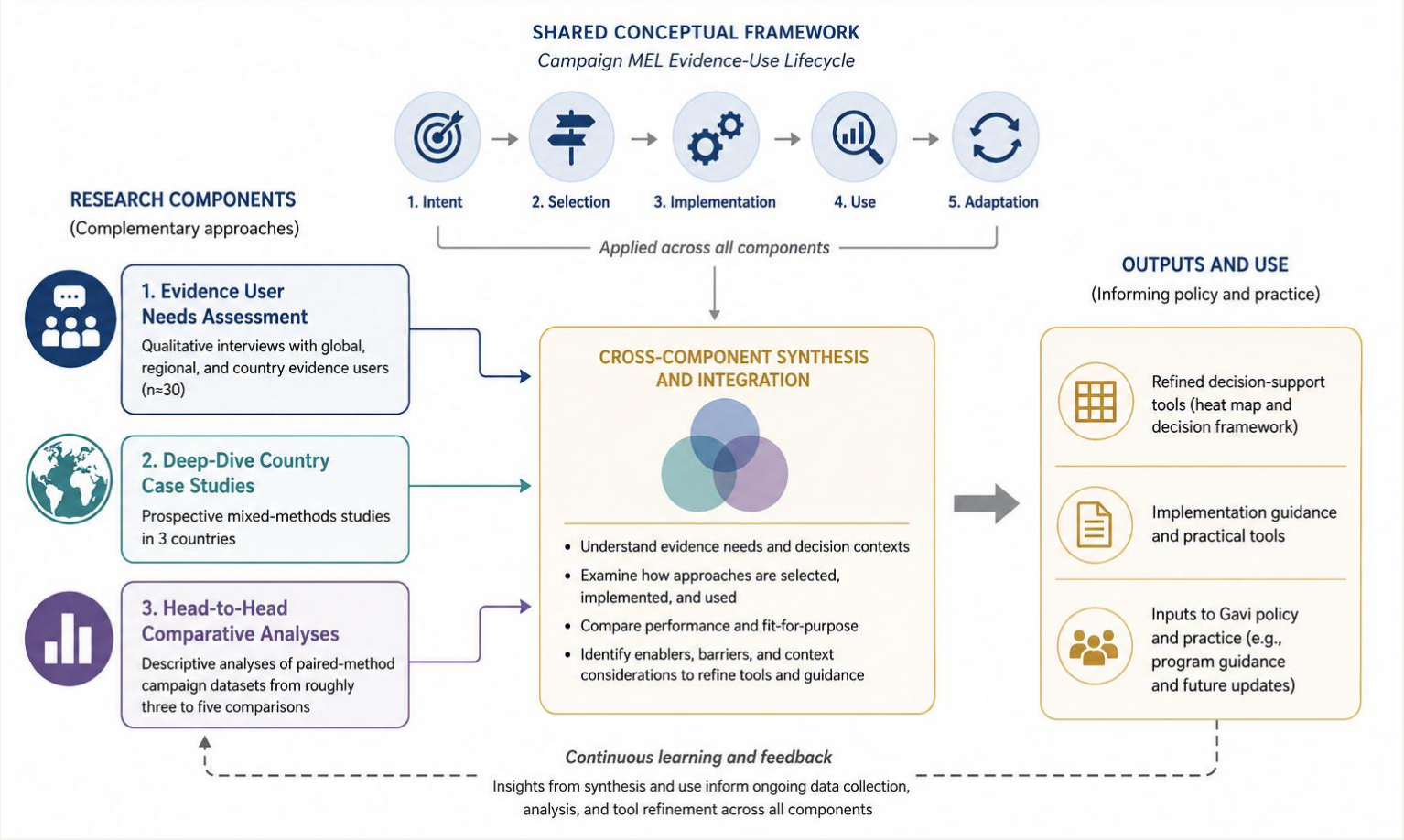
- Major pain points with PCCS were planning, procurement/payment, additional demand on limited capacity, and data use. We want to be intentional this year on working with partners to build efficient and functional processes and integrate into existing workflows to address these challenges.

- We know every implementation experience is unique – epidemiologically, political buy-in, capacity – and our goal is to maximize learning from these engagements in support of identifying potential fit-for-purpose solutions. We realize this will take flexible support and engagement from our team across contexts, and this is what we are planning for.

- We know this will be a year of change for Gavi and the broader ecosystem, and that things are moving quickly and this will require an agile collaboration and iterative products. We're here are as a resource and want to be proactive about how to build engagement and support now. We look forward to hearing what would work best for you and your team.

Discussion: Phase 2 Conceptual Framework

Study component	Design	Primary purpose
Evidence user needs assessment	Cross-sectional qualitative study	Understand decision-maker evidence and guidance needs
Deep-dive country case studies	Prospective mixed-methods comparative case studies	Examine MEL implementation and evidence use across campaign cycles
Head-to-head comparative analyses	Descriptive comparative analyses of paired-method datasets	Generate empirical comparisons between MEL approaches



Discussion: Phase 2 Research Framework

OVERARCHING RESEARCH QUESTION

As Gavi moves toward flexible MEL policy, how can countries identify and implement fit-for-purpose campaign evaluation tools — and what do early implementation experiences reveal about the conditions, support, and guidance needed to make this work in diverse contexts?

Study Design & Methodology

- Qualitative comparative case study design
- Cost analysis of alternative methods
- 3+ pilot countries spanning diverse contexts (stable/fragile, high/low-performing)
- Three data collection timepoints aligned with campaign cycle: pre-campaign planning, implementation, and post-campaign review
- Thematic analysis with cross-case comparison to surface generalizable findings and refine decision-support tools
- Landscape of specific use cases with understanding of impact of methodological changes (e.g., immunity profiles)

Data Collection Approach

- Semi-structured key informant interviews: MoH EPI staff, implementing partners, Gavi country focal points (per country, per timepoint)
- Document review: campaign MEL plans, tool outputs, partner meeting notes, data quality reports
- Structured observation at planning and post-campaign review meetings where feasible
- Brief structured process checklist at each timepoint to track tool selection rationale, adoption status, and data use

Draft Interview Questions

- What were you trying to achieve with campaign MEL for this campaign — and who defined that?
- How did you assess which tool(s) were the right fit, and what criteria or constraints most shaped that choice?
- Who was involved in implementing the MEL approach, and what did that partnership look like in practice?
- What did the data get used for — and by whom?
- What would need to be different — in terms of guidance, capacity, funding, or partnerships — for this to work more reliably in future campaigns?

Discussion: Identifying Implementation | Support Countries

No sites confirmed yet. Bangladesh in active conversation on tally sheet pilot. We need to identify potential pilot site countries.

2026 MR Campaign Window*

- April: Philippines
- May: Angola, Botswana
- June: Bangladesh, Malawi
- July: Namibia
- September: Cameroon, Yemen
- October: Burundi, Guinea, Madagascar
- November: Haiti, Myanmar, Tajikistan, Uganda

What Good Looks Like

Early integration into country conversations
Partners share relevant opportunities as they arise so we can provide timely support and learn alongside implementation.

Leveraging existing country relationships
Identify in-country partners who can facilitate introductions to MoH EPI teams and other key stakeholders in the ecosystem.

Diverse contexts strengthen the evidence base
A mix of country archetypes (e.g., high vs. low-performing, stable vs. fragile) in our pilot sites will strengthen the application of our findings

Shared learning as we go
Partners who can share what they're observing on the ground will make the whole learning loop more valuable for everyone.

**M&RP Tracker as of March 2, 2026*

Coffee break

How modelling can support the transition from SIAs to alternative delivery approaches

(interactive discussion)

MEASLES
ANALYTICS HUB

Lunch break

Surveillance: Outbreak Detection and RDTs

Session Chair: Amy Winter

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Triggers and Responses:

Decision-Makers: What triggers and associated responses do you rely upon?

Modellers: throughout this conversation, I want you be to thinking about how we can (or cannot) model the discussion triggers and responses

MEASLES & RUBELLA PARTNERSHIP

MEASLES OUTBREAK STRATEGIC FRAMEWORK 2026–2030

In some countries, they also define trigger thresholds that prompt investigation or response. For example, in elimination settings, even a single laboratory-confirmed case may trigger an alert, whereas in high-burden settings a cluster of cases above a certain threshold (for instance, 5 suspect cases in a week in a district) may trigger a response.

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Triggers and Responses:

Modellers, your turn:

- How are we doing in our models to evaluate surveillance responses?
- What are we missing? What can we do different?
- What additional data do we need?

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Catherine Eisenhauer & Birgit Nikolay

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Leah Kamulaza & Hope Sabao

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Mathematical Modelling of Measles: Optimising Outbreak Response and Real-Time Use of RDT Data

Leah Kamulaza & Hope Sabao

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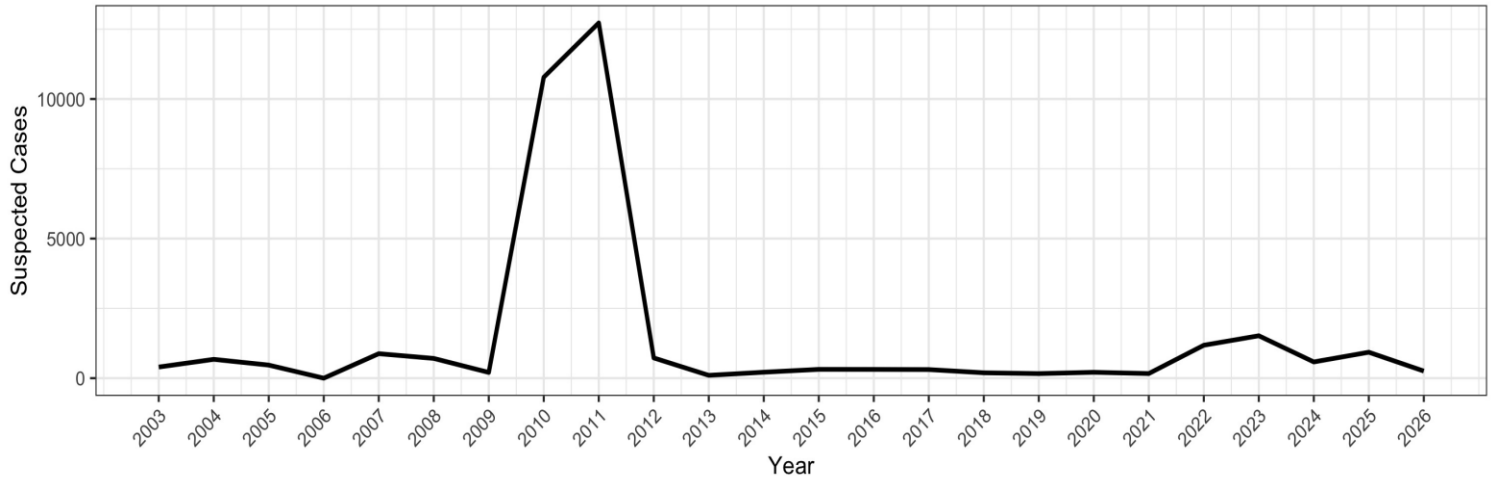
Background

Current Measles Situation



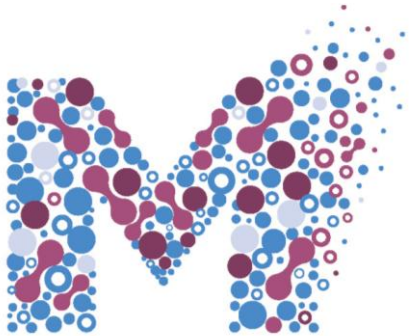
Main gap

- Since measles spreads rapidly, delays in laboratory confirmation can slow public health response, including isolation, contact tracing, and targeted vaccination.

Opportunity for RDT Through Modelling

- Introducing measles RDTs at provincial, district, or facility level could shorten the time from suspected case detection to confirmation, improve surveillance accuracy, reduce pressure on central laboratories, and support faster decision-making by frontline health workers.

Study Objective and Key Approaches



Assess the **epidemiologic impact of introducing RDTs for measles case confirmation in Zambia** compared to current ELISA-based workflows and identify optimal response strategies

- Develop and calibrate a Zambia-specific measles MSIRV transmission model
- Conduct scenario modelling to
  - Quantify how RDT reduced time to measles case confirmation can enhance measles outbreak response effectiveness
  - Evaluate how outbreak response strategies, including reactive campaigns and reactive targeted testing, can maximize outbreak containment
- Use “Measles IgM Rapid Diagnostic Test (RDT) Pilot Deployment and Evaluation Study in Zambia” to parameterize our models

Current Progress

- Adopted and calibrating UGA's MSIRV model for measles transmission in Zambia to 2016 and 2024 serological data

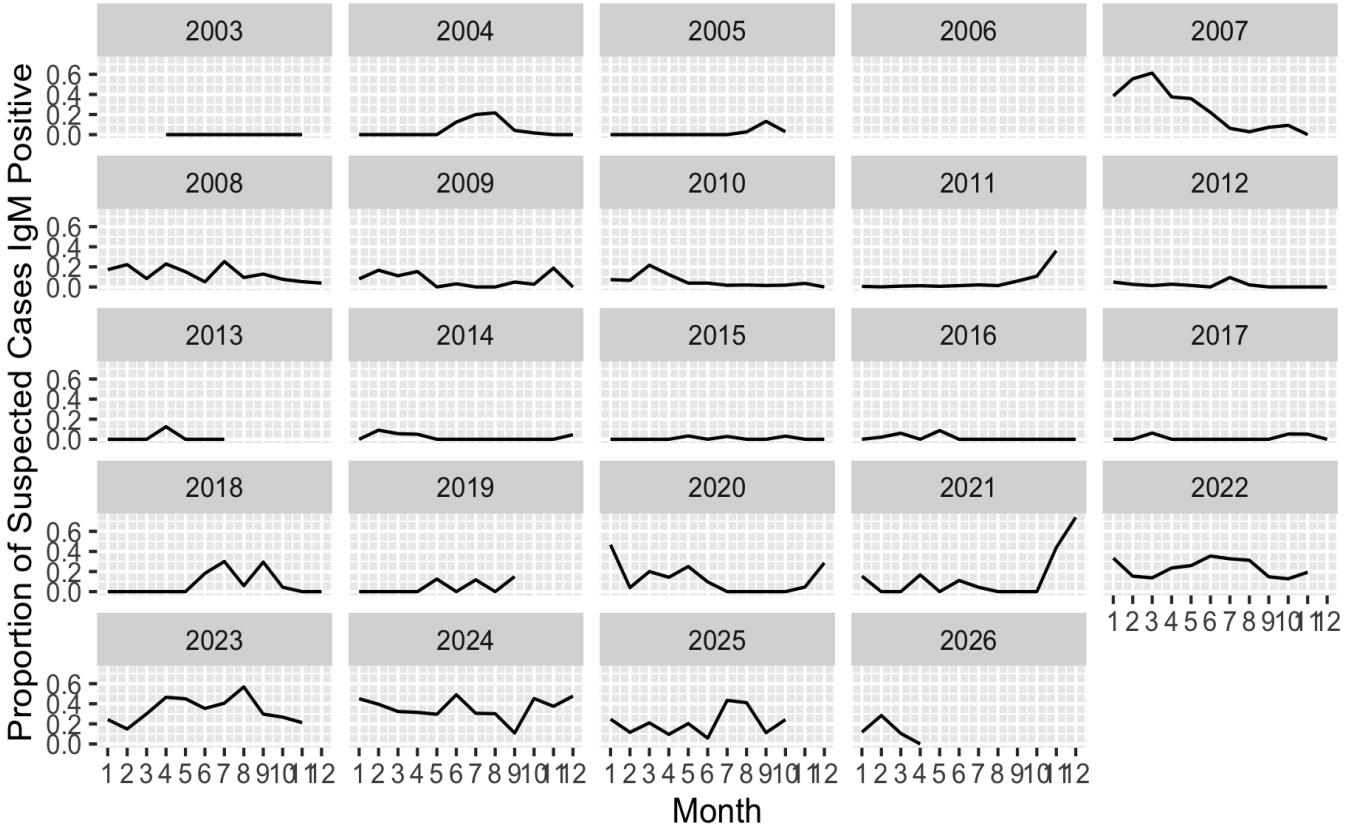
Current Progress

- Adopted and calibrating UGA's MSIRV model for measles transmission in Zambia to 2016 and 2024 serological data
- Updated the model to allow outbreak responses (16 new arguments)

Scenario Dimensions	Related Arguments in R Function
Surveillance	or.confirmation.delay
	or.monthly.reporting.rate
Trigger Definitions	or.threshold.type
	or.threshold.value
	or.trigger.window
	or.trigger.age.lower, or.trigger.age.upper
Response – Campaign Only	or.response.delay
	or.vacc.age.lower, or.vacc.age.upper
	or.vacc.coverage
Response – Campaign + Testing	or.test.age.lower, or.test.age.higher
	or.number.tests.percent.increase.per.timestep
Other	or.min.interval
	or.start.timestep

Current Progress

- Adopted and calibrating UGA's MSIRV model for measles transmission in Zambia to 2016 and 2024 serological data
- Updated the model to allow outbreak responses (16 new arguments)
- In the process of incorporating observational process on simulated infections.



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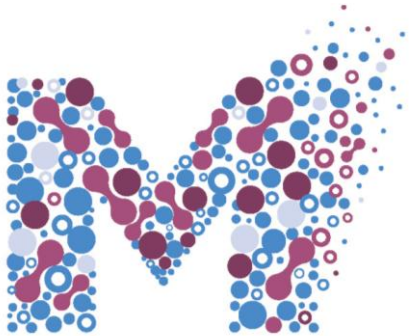
Current Progress



- Adopted and calibrating UGA's MSIRV model for measles transmission in Zambia to 2016 and 2024 serological data
- Updated the model to allow outbreak response campaigns.
- In the process of incorporating observational process on simulated infections.
- Defined scenarios: 36 in total differing by confirmation delays (3 scenarios) and outbreak responses (12 scenarios

Confirmation Delays

Outbreak Response

	Confirmation Delay = 4 weeks	Confirmation Delay = 2 weeks	Confirmation Delay = 0
Campaign Age Targets: 9mo-4yo; Additional testing 0	Scenario 1	13	25
Campaign Age Targets: 9mo-9yo; Additional testing 0	2	14	26
Campaign Age Targets: 9mo-14yo; Additional testing 0	3	15	27
Campaign Age Targets: 9mo-4yo; Additional testing 5yo-9yo; 5% more	4	16	28
Campaign Age Targets: 9mo-4yo; Additional testing 5yo-14yo; 5% more	5	17	29
Campaign Age Targets: 9mo-10yo; Additional testing 11yo-15yo; 5% more	6	18	30
Campaign Age Targets: 9mo-4yo; Additional testing 5yo-9yo; 10% more	7	19	31
Campaign Age Targets: 9mo-4yo; Additional testing 10yo-14yo; 10% more	8	20	32
Campaign Age Targets: 9mo-10yo; Additional testing 11yo-15yo; 10% more	9	21	33
Campaign Age Targets: 9mo-4yo; Additional testing 5yo-9yo; 15% more	10	22	34
Campaign Age Targets: 9mo-4yo; Additional testing 5yo-14yo; 15% more	11	23	35
Campaign Age Targets: 9mo-9yo; Additional testing 10yo-14yo; 15% more	12	24	36

ELISA Scenarios

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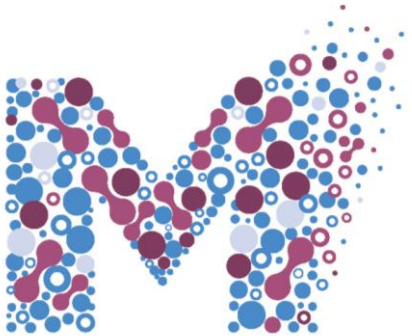
Outbreak Triggers

- The point at which simulated measles infections exceeds a threshold.
  - Age group summing infections over
  - Scaling down infections based on reporting rate
  - Comparing to predefined threshold

Outbreak Responses

- Once an outbreak trigger is reached, the model activates response scenarios.
  - Campaign only: Defined by coverage, target age groups
  - Campaign & testing: Defined by coverage, target age groups & target age groups for additional testing

In Progress/Pending



- Simulate the introduction of measles RDTs as a reduction in diagnostic turnaround time and as an opportunity to do reactive testing
- Conduct sensitivity analysis to identify parameters with the greatest influence on outbreak size and intervention impact.
- Use model outputs to inform outbreak response activities.

Special Thanks:

- MAH
- Mentors
- MOH
- PARTNERS

Isaiah Agorinya & Abdulzeid Anafo

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Modelling measles IgM RDT Deployment in Ghana & Senegal

A spatial agent-based approach with LASER

PRELIMINARY UNCALIBRATED 2026

WORK IN PROGRESS (WIP)

MAH Annual Meeting, Jakarta

Isaiah Agorinya & Abdulzeid Anafo

University of Health and Allied Sciences and University of Mines, Ghana

11 June 2026

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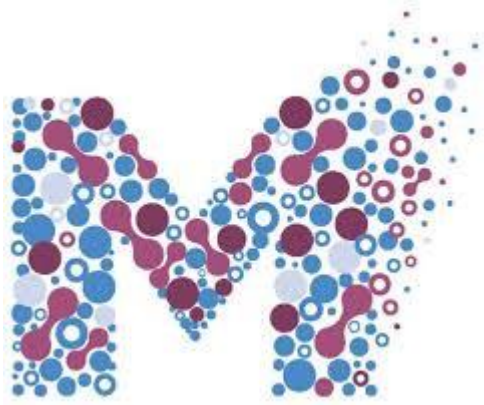
Background – Surveillance Gaps

- Recurrent measles transmission in Ghana and Senegal
  - Outbreaks amplified by delays in confirmation and reporting
  - Centralized IgM EIA testing with multi-step referral pathways
  - Delays accumulate:
    - 1. onset
    - 2. presentation
    - 3. Collection
    - 4. Transport
    - 5. Laboratory
    - 6. Reporting
  - Reduced effective sensitivity and weakened early outbreak signals

Operational Constraints & Equity Gaps, and Policy uncertainty in Igm RDT deployment

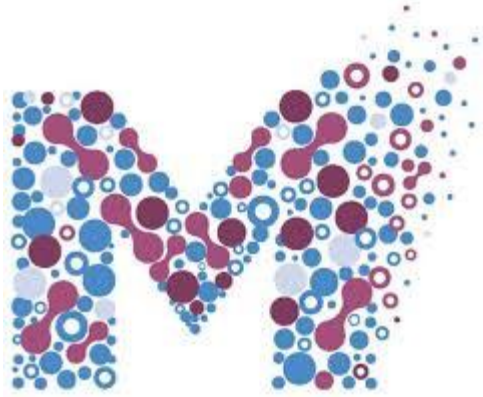
- Longest delays in rural and peri-urban districts
  - Sparse facility networks and fragile transport logistics
  - Cold-chain and specimen shipment vulnerabilities
  - Delayed confirmation blunts rapid response triggers
  - Geographic inequities in surveillance performance

- Facility-level IgM RDTs can shorten time-to-confirmation
  - Key uncertainties: optimal placement by tier and district
  - Confirmatory strategy needed to safeguard PPV during low prevalence
  - Risk of excessive roll-out → false positives & workload strain
  - Risk of limited roll-out → minimal impact on outbreak dynamics



Overall Research Aim

- Assess impact of facility-level IgM RDTs on surveillance performance and outbreak dynamics
  1. Quantify changes in sensitivity, specificity/PPV, and timeliness vs current algorithms
  2. Evaluate epidemiologic effects under realistic operational constraints
  3. Identify optimal facility-tier prioritisation to maximise impact and equity



THE QUESTION

Where and how should measles IgM rapid tests (RDTs) be deployed to improve surveillance — without losing accuracy?

1

AIM 1

Detection & timeliness

Change in case detection and time-to-confirmation by RDT coverage (25/50/75%) × placement (hospital / health centre / outreach); and PPV vs confirmatory testing.

2

AIM 2

Outbreak impact

Effect on outbreak size, duration and effective reproduction number (R_e) under realistic response.

3

AIM 3

Prioritisation & equity

District prioritisation rules balancing burden, access and equity.

→ Needs a **spatial transmission model** + a **surveillance layer** on top.

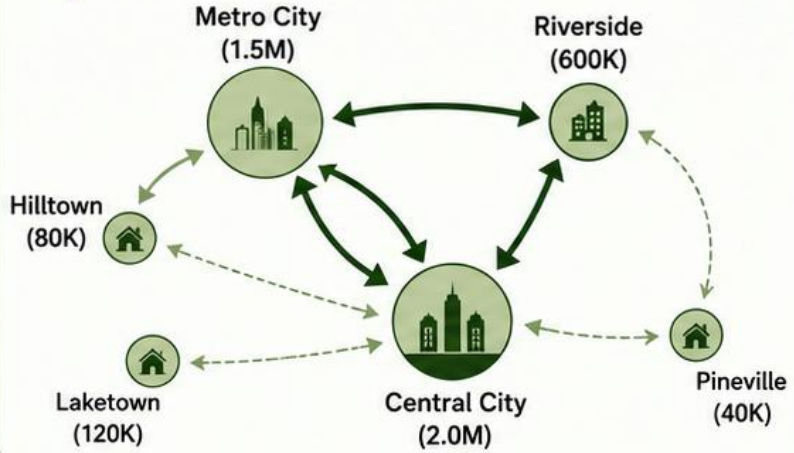
LASER-measles

Spatial epidemiological modeling toolkit for measles transmission

What it does

1. Simulates how measles spreads across connected communities
2. Evaluates vaccination strategies and immunization campaigns
3. Supports outbreak response and resource planning
4. Built on the LASER framework

Spatial spread: gravity model



$$Flow_{ij} \propto \frac{P_i^{\alpha} \times P_j^{\beta}}{d_{ij}^{\gamma}}$$

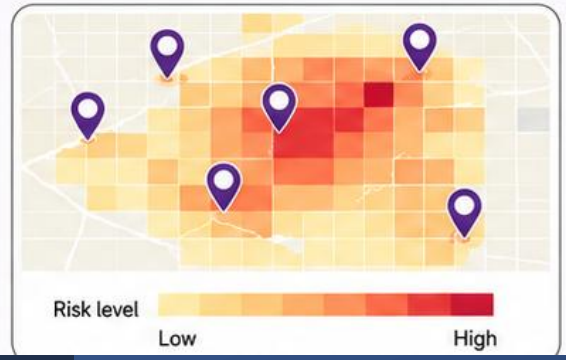
Spread is stronger between larger, closer populations.

Key inputs

- Population and geography
- Distance or mobility between places
- Vaccination coverage
- Demographic and surveillance data

Typical outputs

- Outbreak projections
- High-risk locations
- Susceptible population pockets
- Scenario comparison for interventions

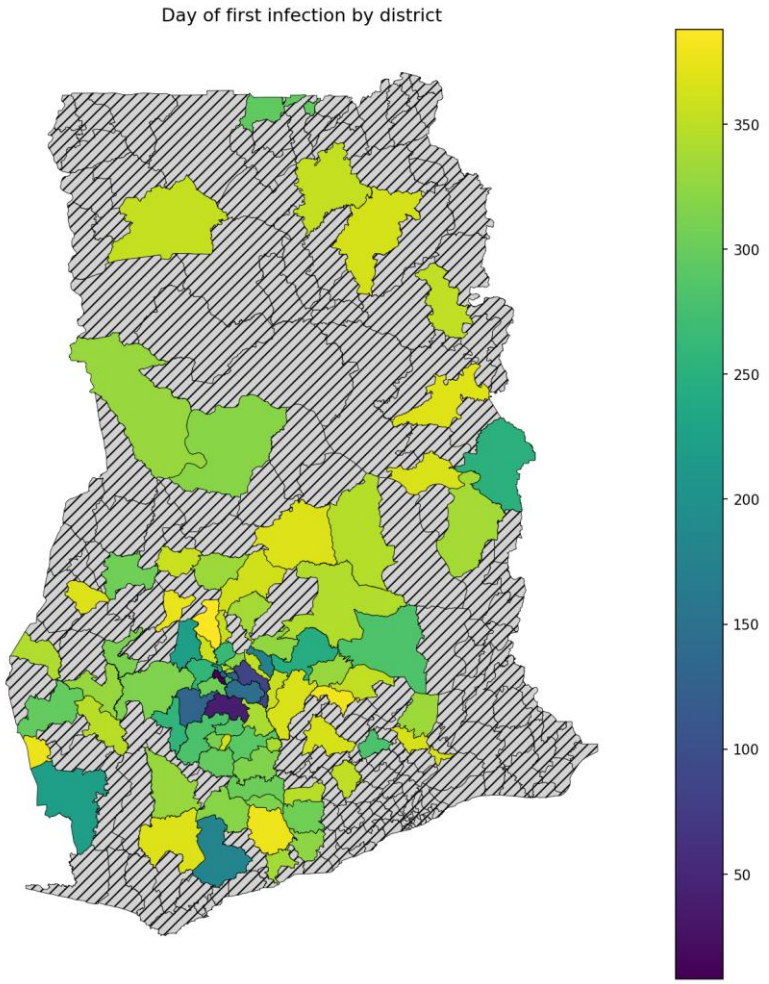


THE MODEL — LASER-GHANA MEASLES ABM

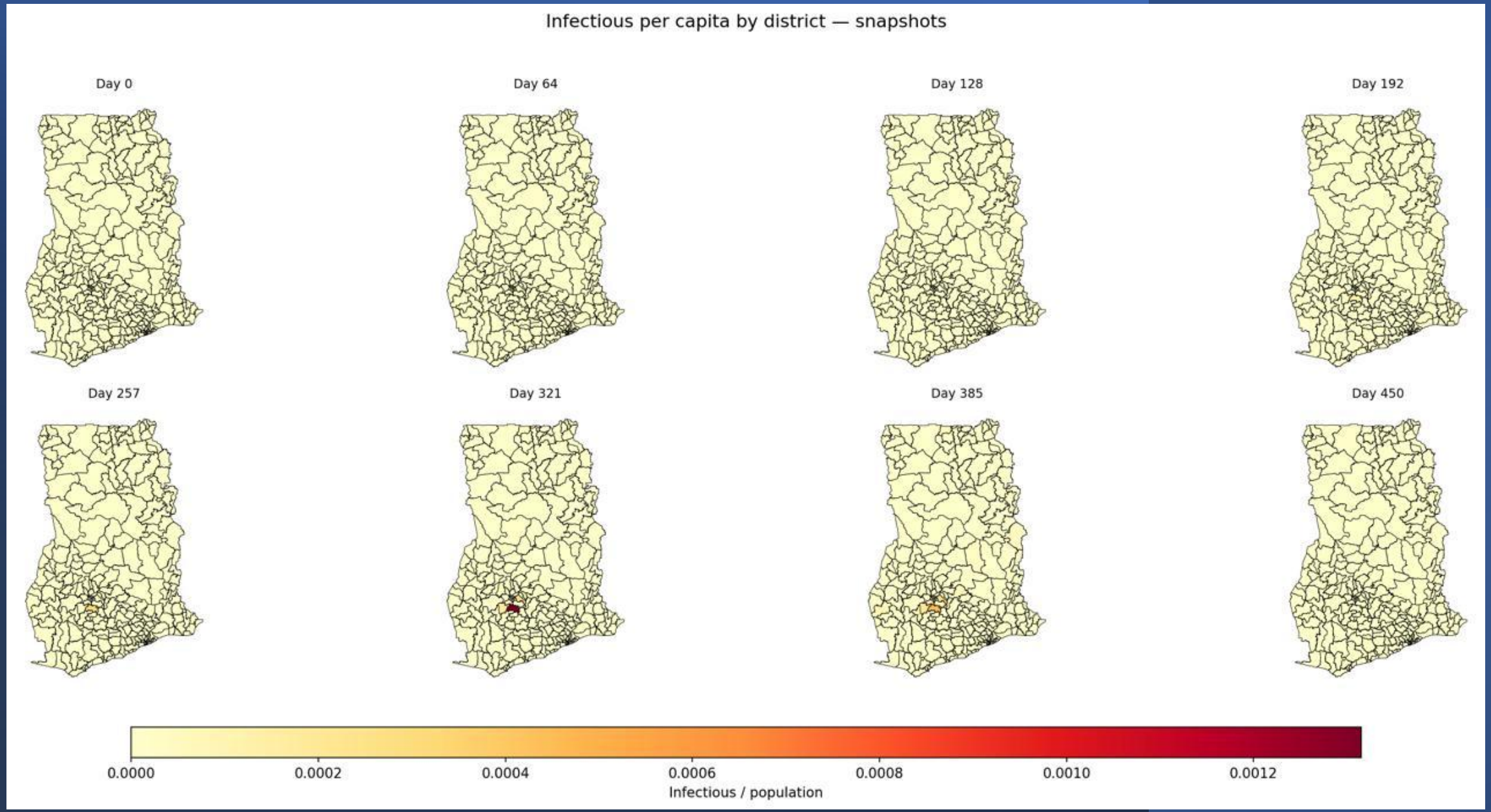
Built on real geography and demography

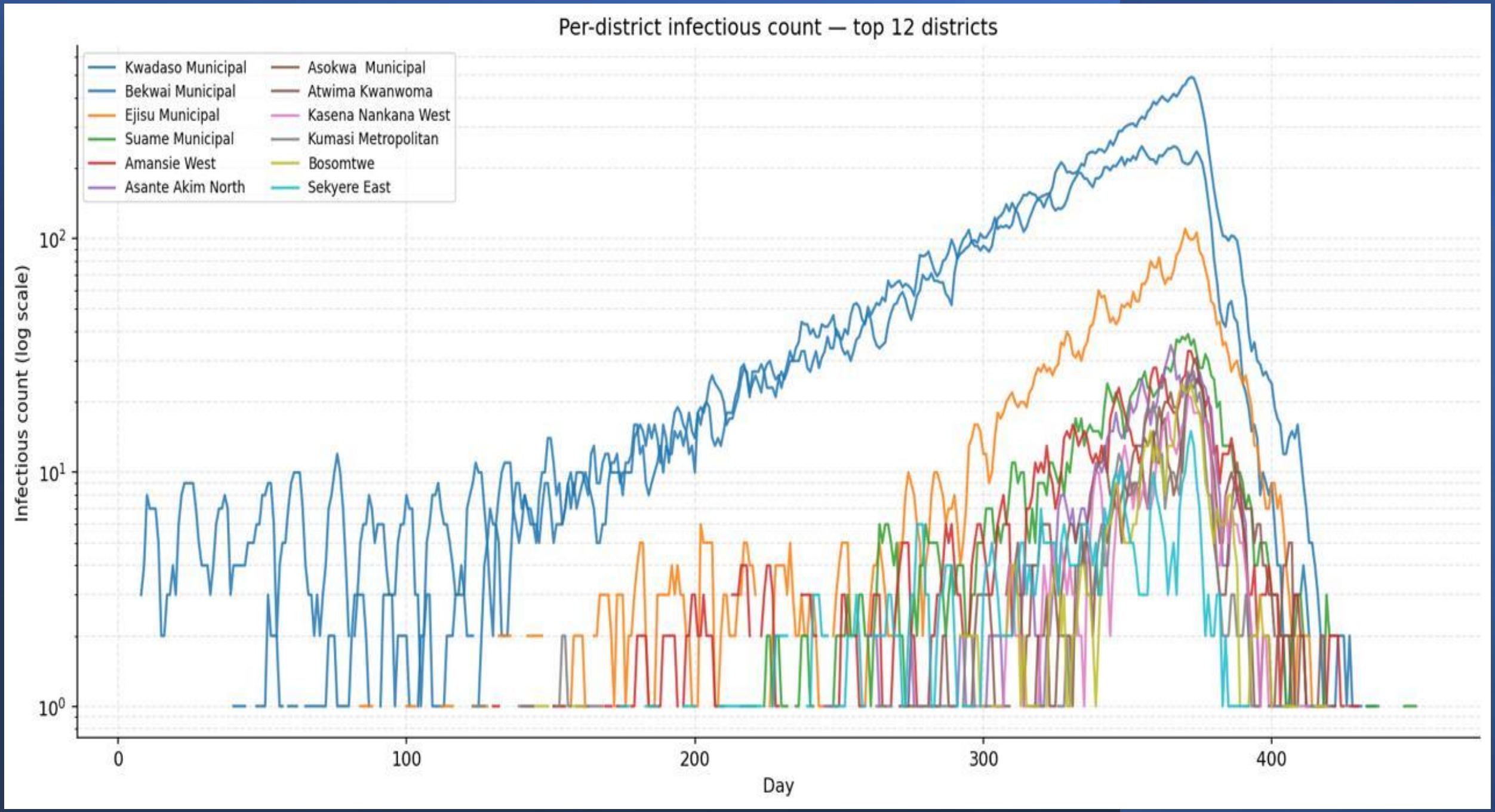
UNCALIBRATED

260	admin-2 districts
19.2 M	population, real birth/death rates
R_0 = 15	SEIR with gravity mixing between districts
MCV1 + SIA	routine dose at 9 mo + periodic campaigns



Simulated arrival time — the epidemic spreads from the populous south; the remote north is reached last.

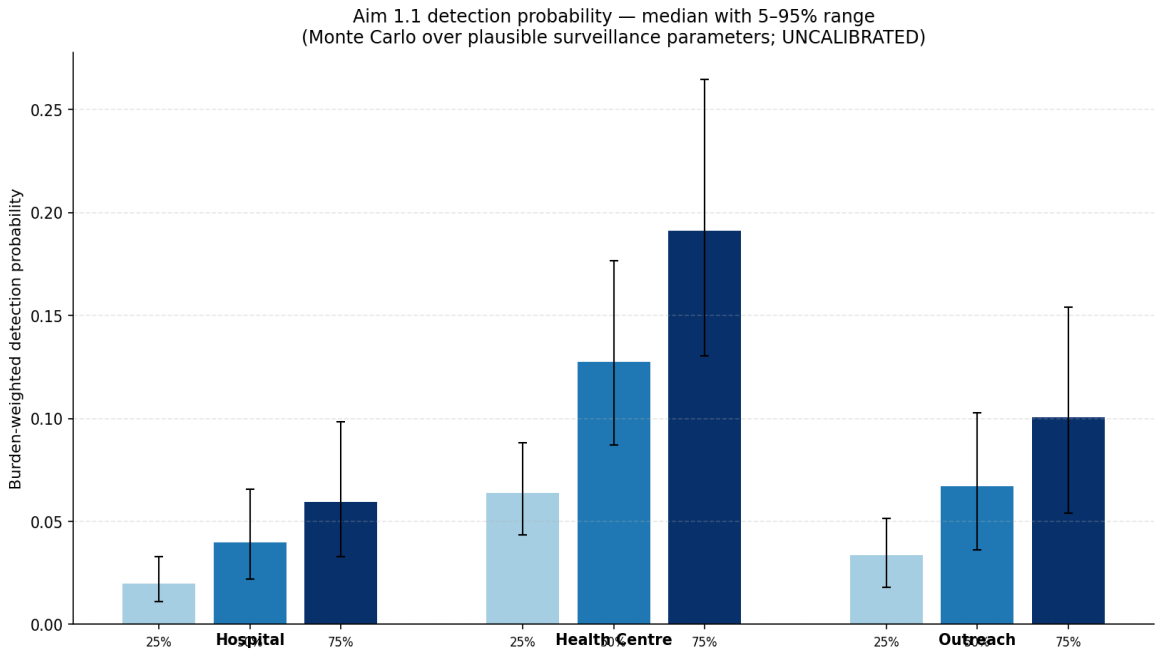

Infectious per capita by district — snapshots
Day 0
Day 64
Day 128
Day 192
Day 257
Day 321
Day 385
Day 450
0.0000
0.0002
0.0004
0.0006
0.0008
0.0010
0.0012
Infectious / population


Per-district infectious count — top 12 districts
Kwadaso Municipal
Bekwai Municipal
Ejisu Municipal
Suame Municipal
Amansie West
Asante Akim North
Asokwa Municipal
Atwima Kwanwoma
Kasena Nankana West
Kumasi Metropolitan
Bosomtwe
Sekyere East
Infectious count (log scale)
10^2
10^1
10^0
0
100
200
300
400
Day

PRELIMINARY RESULT — AIM 1.1

Detection is robust across the parameter range

Across 5,000 Monte-Carlo parameter draws



Detection vs coverage by placement, with sensitivity bands across draws.

UNCALIBRATED

Health-centre placement wins

Maximises detection at every coverage level; and survives the full parameter range.

Equity gains in the north

Timeliness gains are largest in remote district.

What this model does not yet do

Uncalibrated

Not yet fit to DHIMS2 district case counts → absolute numbers are illustrative.

Aim 2 (outbreak impact) not built

Needs a detection → reactive-response → transmission loop (structural).

Placeholder surveillance parameters

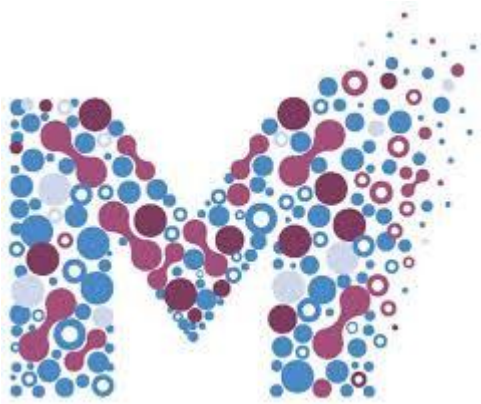
Care-seeking, sensitivity, travel time and lab turnaround are all assumed requires actual data.

Single stochastic realisation

One epidemic trace; seasonality = 0.

Aim 1.2 (PPV) not built

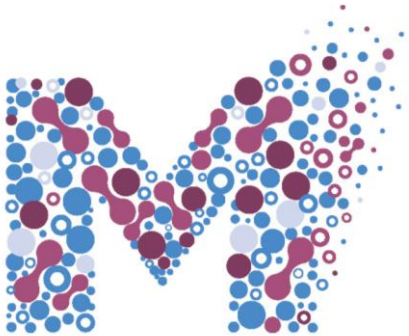
Needs a non-measles febrile-rash background to generate false positives.



Next steps

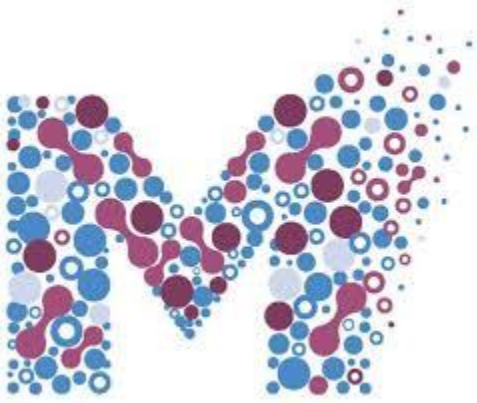
- **Source data:**
  - Weiss travel raster (travel time) · GHS lab turnaround · care-seeking rate
- **Calibrate:**
  - Fit baseline to DHIMS2 → the true preliminary result
- **Aim 1**— PPV Non-measles background + confirmatory pathway
- **Aim 2** — impact Reactive-SIA loop + R_e
- **Aim 3** — equity Prioritisation & equity analytics

Thank you



Imperial College London

IDM INSTITUTE FOR DISEASE MODELING



Olumuyiwa James Peter

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Modelling and Evaluating the Cost and Operational Trade-offs of Introducing Measles IgM RDTs Compared with Traditional Laboratory-Based Surveillance in Nigeria

Team members

✓	**Olumuyiwa James Peter**	***(PI) University of Medical Sciences Ondo, Nigeria***
✓	*Gboyega Famokun*	*State Disease Surveillance and Notification Officer at the Ondo State Ministry of Health, Nigeria/NCDC*
✓	*Ogunmola Oyinlola*	*Ondo State Primary Healthcare University of Medical Sciences Ondo, Nigeria*
✓	*Oseyemi Blessing Akingbulu*	*University of Medical Sciences Ondo, Nigeria*
✓	**Han Fu**	***London School of Hygiene & Tropical Medicine***
✓	Kaja Abbas	*London School of Hygiene & Tropical Medicine*
✓	Elizabeth Fitchett	*Institut Pasteur de Dakar (Senegal)*

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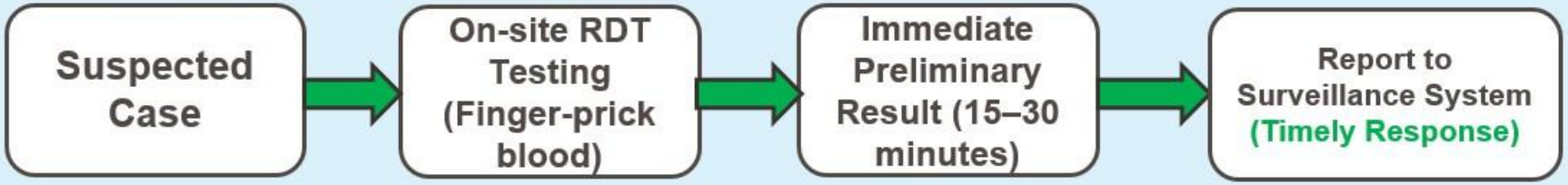
Current Measles Surveillance Pathway and Potential Role of RDTs in Nigeria

- **TRADITIONAL LAB PATHWAY**

- **RDT PATHWAY**



Project aims

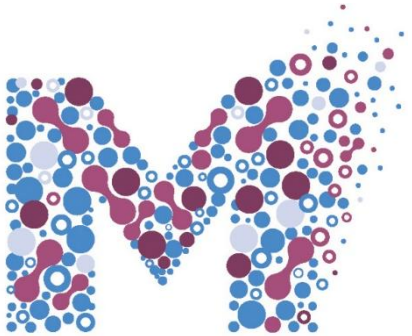
- To evaluate the cost, operational and surveillance trade-offs of introducing IgM RDTs compared with traditional laboratory-based surveillance strategies in Nigeria

The policy question is not whether RDTs work diagnostically — but whether they improve surveillance performance in a cost-effective and operationally feasible way in Nigeria.

Specific Objectives

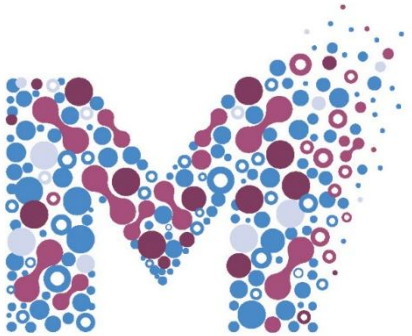
- To evaluate the cost, operational feasibility, and surveillance performance implications of measles IgM RDT rollout strategies in Nigeria
- To develop a **decision-analytic modelling framework** comparing traditional laboratory confirmation and RDT-based strategies
- To parameterize the model using surveillance, operational, and cost data and published sources
- To quantify impacts on timeliness, diagnostic pathways, and outbreak detection
- To estimate incremental costs and operational implications under alternative RDT rollout strategies
- To conduct scenario and sensitivity analyses to assess uncertainty and policy robustness

Primary research questions



- What are the cost, operational, and surveillance performance trade-offs of introducing measles IgM RDTs compared with traditional laboratory-based confirmation in Nigeria?
- How does RDT deployment affect time/delay to confirmation and outbreak detection?
- What is the impact on false positives and confirmation pathways?
- What are the budget implications under alternative rollout strategies?

Analytical framework



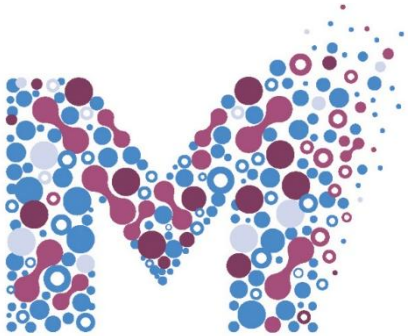
Decision-analytic modelling approach

- Comparison of diagnostic outcomes across strategies
- Assessment of surveillance timeliness and operational performance
- Evaluation of resource requirements and costs under alternative rollout scenarios

Expected policy Relevance

- Engagement with policy stakeholders along the project
- Provision of evidence on whether and how measles IgM RDT deployment could improve surveillance performance and support decision-making in Nigeria

Three surveillance strategies



(1) Traditional Laboratory-based Surveillance *(comparator)*

- All suspected cases undergo laboratory confirmation.
- Relies on specimen transport and centralized testing

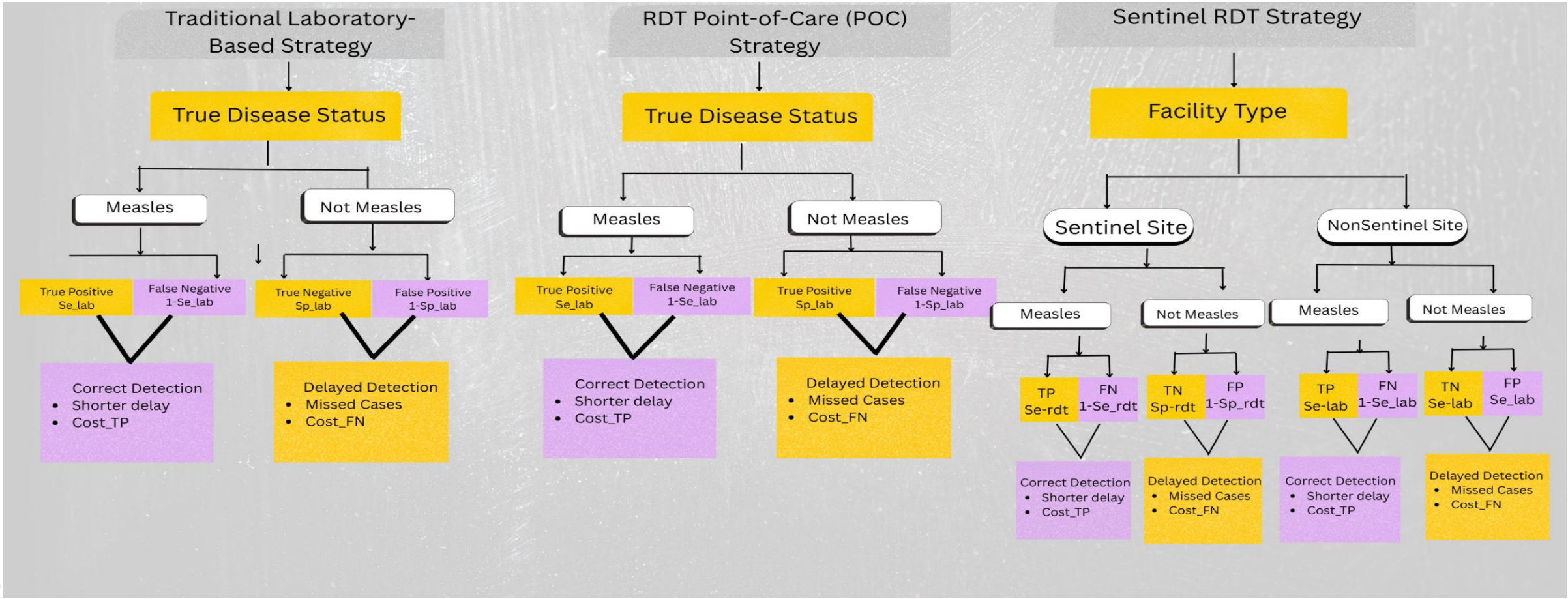
(2) Point-of-Care RDT Strategy

- Suspected cases are tested using measles IgM RDTs at the health facility level.
- Enables rapid case confirmation

(3) Sentinel RDT Strategy

- RDTs deployed at selected sentinel sites
- Laboratory confirmation continues at non-sentinel sites.

Modelling the three surveillance strategies



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Data sources

Data sources include surveillance and epidemiological data, demographic data, immunization coverage data, cost and operational data, diagnostic performance parameters, and service utilization inputs.

Epidemiological & demographic data	Cost & operational data
✓ Nigeria CDC case-based measles surveillance and IDSR reports ✓ Ondo State Ministry of Health case surveillance ✓ WHO/UNICEF Joint Reporting Form ✓ Nigeria Demographic and Health Survey (DHS) on prevalence of respiratory symptoms	✓ Ministry of Health administrative and costing reports ✓ WHO-CHOICE databases ✓ Published micro-costing studies ✓ Literature review on measles RDT tests ✓ Stakeholder consultations on service utilization

Current progress

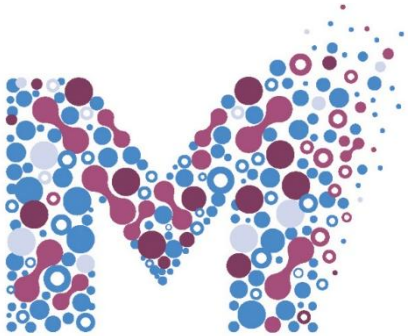
Since the project initiation in March 2026…

- Literature review completed
- Conceptual framework developed
- Decision-tree model structure developed
- Diagnostic pathways specified for all surveillance strategies
- Cost and operational evaluation framework established
- Key model and data requirements parameters identified

Ongoing activities

- Collection of surveillance and cost data, in consultation with stakeholders and partners
- Parameterization of model using national data and published evidence
- Preparation for scenario and sensitivity analyses

Outbreak triggers and responses: Relationship to our modelling framework



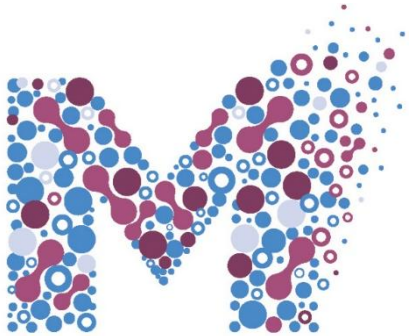
Scope of current work

- Our project does not explicitly model outbreak triggers or outbreak response processes.

- Instead, the model will identify alternative RDT strategies in disease surveillance in Nigeria and evaluate how diagnostic accuracy and algorithm affect costs and operational performance (e.g. delay, yield rate) and costs.

- While outbreak response is not incorporated in our modelling, mapping and improving RDT rollout strategies will enable earlier and more effective case confirmation, which will contribute to earlier outbreak detection and initiation of public health response activities.

Conceptual link to outbreak response



Earlier Case Confirmation

Earlier Surveillance Signal

Earlier Outbreak Trigger Response

Earlier Public Health Response

THANK YOU

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Value of RDT Negatives

(interactive discussion)

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