Highlights from the Strategic Advisory Group of Experts (SAGE) on Immunization meeting

10–13 March 2025

Geneva, Switzerland

Meeting highlights
Full report WER 6 June 2025

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AGENDA


GLOBAL & REGIONAL REPORTS


IMMUNIZATION AGENDA 2030


PNEUMOCOCCAL VACCINATION


MPOX


VARICELLA & HERPES ZOSTER


POLIOMYELITIS


NATIONAL IMMUNIZATION TECHNICAL ADVISORY GROUPS (NITAGs)


PRIORITIZATION OF VACCINES FOR INTRODUCTION

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Main meeting recommendations

GLOBAL & REGIONAL REPORTS

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Historic Changes: Domestic and global priorities, with major threats for health programmes

September 2024

Germany plans billions in cuts to development, humanitarian aid
https://www.devex.com/news/germany-plans-billions-in-cuts-to-development-humanitarian-aid-108259

Dutch right-wing government cuts development aid as deficit balloons
https://www.reuters.com/world/europe/dutch-right-wing-government-cuts-development-aid-deficit-balloons-2024-09-17/

February 2025

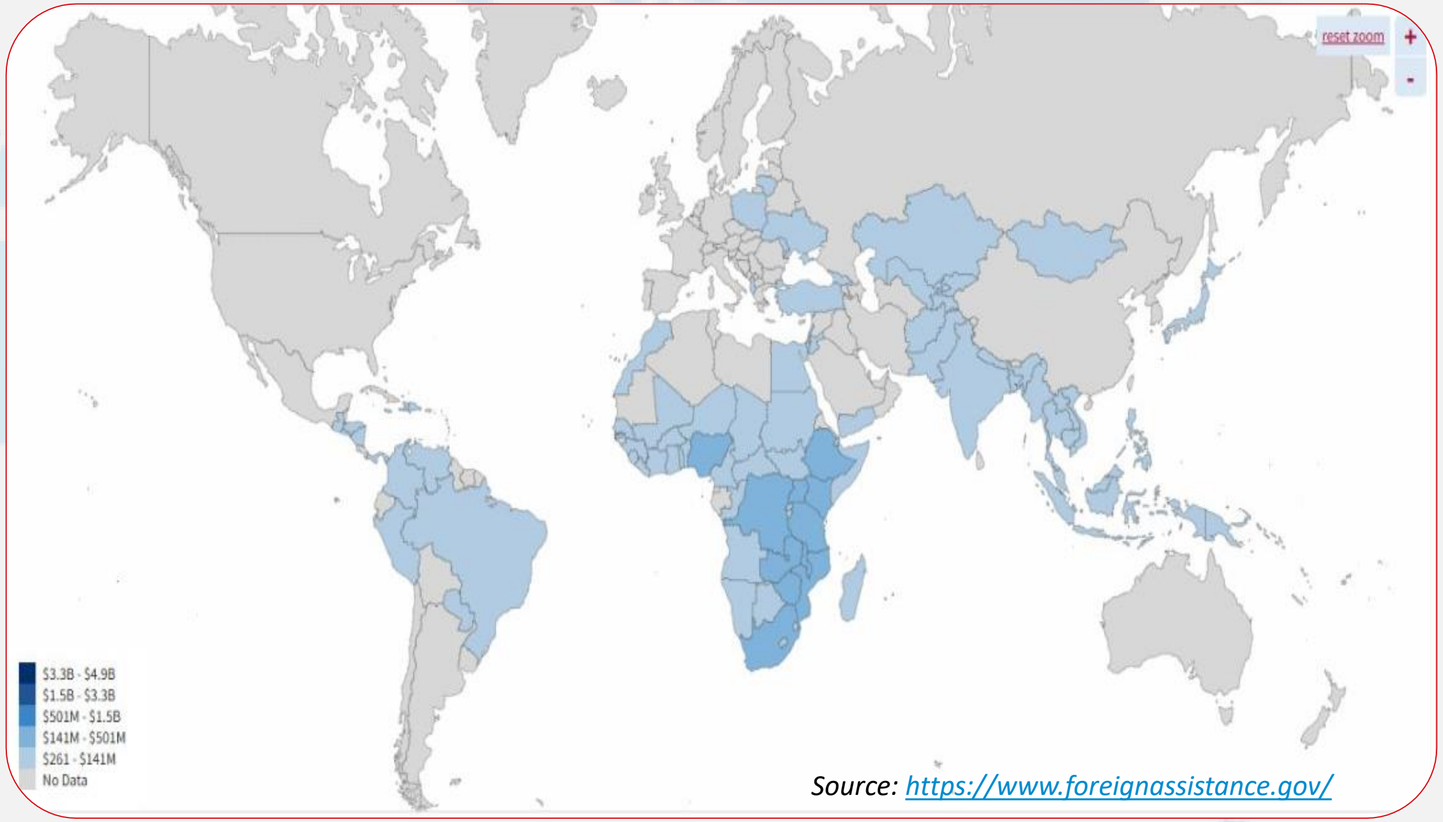
USAID to put nearly all staff on leave Friday; overseas missions shuttering
https://www.cbsnews.com/news/usaid-missions-overseas-ordered-shutdown-by-friday/

UK to reduce aid to 0.3% of gross national income from 2027
https://commonslibrary.parliament.uk/uk-to-reduce-aid-to-0-3-of-gross-national-income-from-2027/

France's proposed budget cuts set to slash overseas development aid
https://www.rfi.fr/en/france/20250205-france-proposed-budget-cuts-slash-overseas-development-aid-coordinationo-sud

Distribution of USAID funding for health in 2024

$9.8 B Obligations | **1.3K** Activities | **116** Countries / Regions



Source: https://www.foreignassistance.gov/

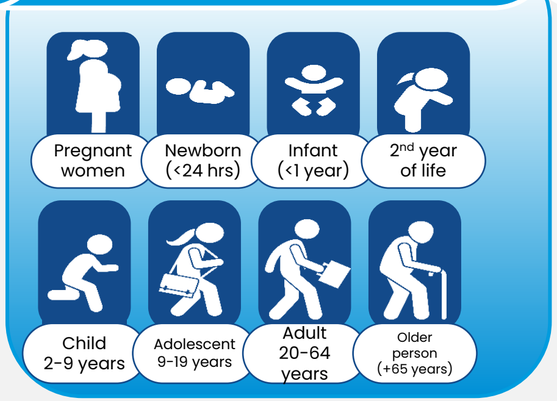
Essential Programme on Immunization in 2025, and into next 50 years

Countries in the driver's seat: *National Immunization Strategy, Resources, Efficiency, Lusaka Agenda*

1. Political Leadership
2. Prioritization & Decision-Making
3. Optimization through Targeting & Efficiency
4. Regional Manufacturing

Structure, scope, context

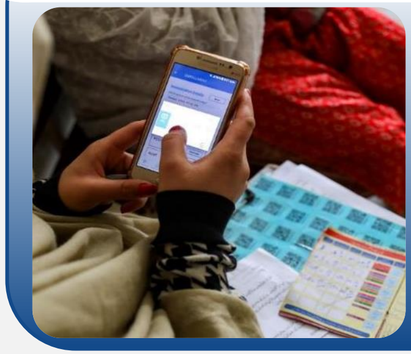
5. Life Course through PHC



6. Critical New Vaccines & Delivery Technology

7. Climate Change

8. Digitization, Surveillance & AI



Commitment to equity & sustainability

9. Humanitarian Settings
10. Break out of negative spiral Outbreak/Campaign/RI Reach

IVB REPORT – HIGHLIGHTS

The report underscored the **progress & impact** made in global immunization while acknowledging the **significant challenges** ahead.

The role of WHO across the **immunization value chain** was detailed, e.g., accelerating introduction of **TB vaccines**, scaling up **malaria** & **HPV** vaccination, **regulatory competency** development and **regionalizing** vaccine **manufacturing**

SAGE expressed **deep concerns** about the **diversion** of **resources away from public health** and the consequent **threats** to global immunization programmes, in particular the **sudden discontinuation** of funding.

Financial constraints, misinformation, **geopolitical** shifts, and health system strains pose **risks to preserving gains** and to **continued success**.

WHO aims to support countries in building **resilient, equitable, and sustainable immunization programmes** for the next 50 years and beyond through strategic prioritization, innovation, and global collaboration.

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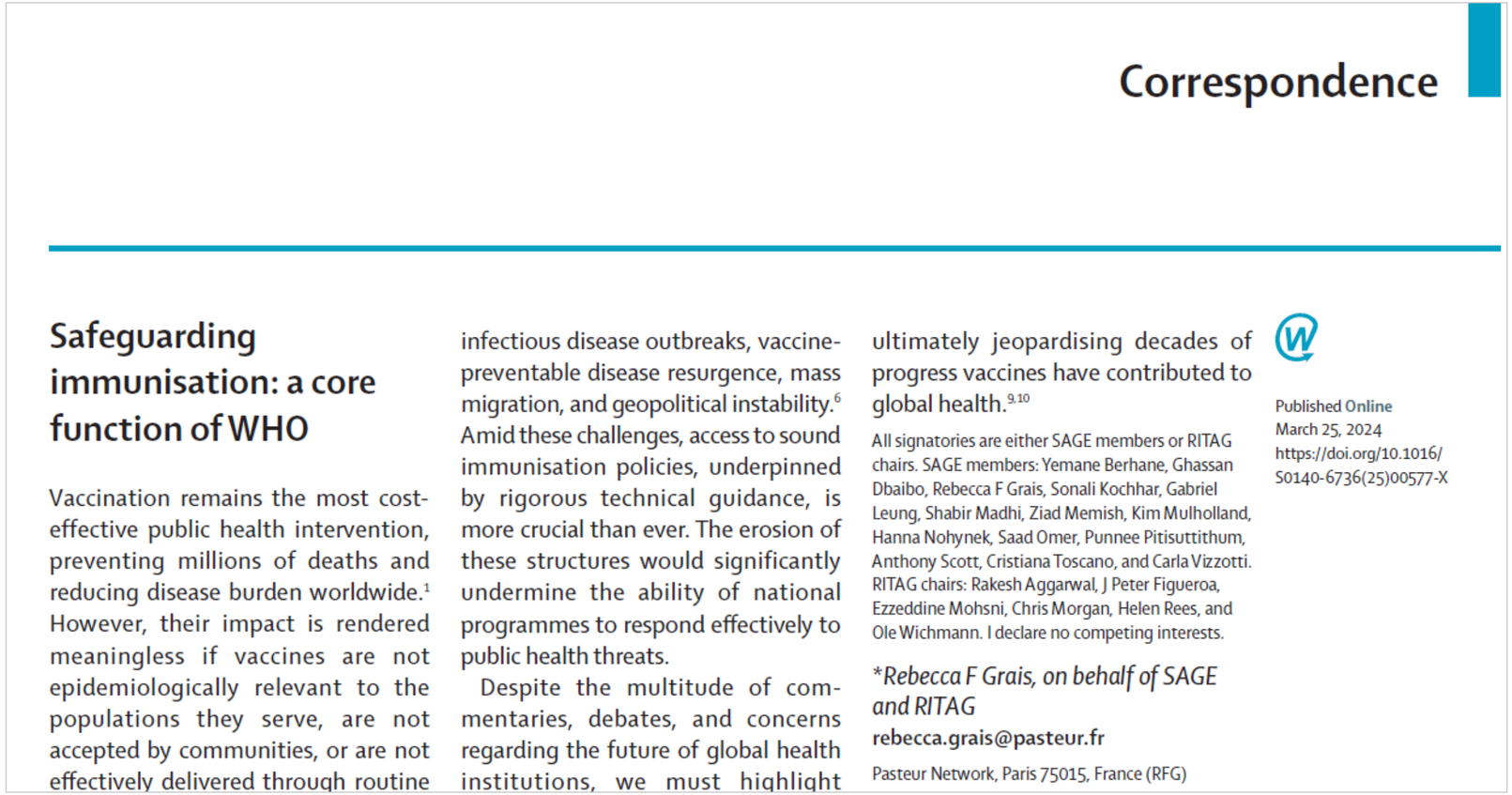
SAGE members call to WHO and the World:

Preserve and strengthen the role of WHO as global normative agency and continue to lead on immunization



Correspondence

Safeguarding immunisation: a core function of WHO

Vaccination remains the most cost-effective public health intervention, preventing millions of deaths and reducing disease burden worldwide.[1] However, their impact is rendered meaningless if vaccines are not epidemiologically relevant to the populations they serve, are not accepted by communities, or are not effectively delivered through routine

infectious disease outbreaks, vaccine-preventable disease resurgence, mass migration, and geopolitical instability.[6] Amid these challenges, access to sound immunisation policies, underpinned by rigorous technical guidance, is more crucial than ever. The erosion of these structures would significantly undermine the ability of national programmes to respond effectively to public health threats.

Despite the multitude of commentaries, debates, and concerns regarding the future of global health institutions, we must highlight

ultimately jeopardising decades of progress vaccines have contributed to global health.[9,10]

All signatories are either SAGE members or RITAG chairs. SAGE members: Yemane Berhane, Ghassan Dbaibo, Rebecca F Grais, Sonali Kochhar, Gabriel Leung, Shabir Madhi, Ziad Memish, Kim Mulholland, Hanna Nohynek, Saad Omer, Punnee Pitisuttithum, Anthony Scott, Cristiana Toscano, and Carla Vizzotti. RITAG chairs: Rakesh Aggarwal, J Peter Figueroa, Ezzeddine Mohsni, Chris Morgan, Helen Rees, and Ole Wichmann. I declare no competing interests.

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SAGE's concern on safeguarding immunization as a core function of WHO: The Lancet, 24 March 2025

Regional reports

Three regional reports highlighted the **resurgence of measles** and the need for urgent actions to mitigate the **risk of large outbreaks** while noting the challenges with improving routine coverage and timely preventive vaccination activities. The problems could be further **exacerbated** with a **shift in resources away from health** to fund other priorities.

The number of **zero-dose children** has increased in some regions even after the restoration of routine immunization programmes following the COVID-19 pandemic response. While the **Big Catch-up** had helped, it has **only partially addressed the problem** and further efforts are required to fill immunity gaps

The report from the **South-East Asian Region** struck a positive note and reported on the **successes with scaling up HPV vaccination**; SAGE recommendations for the use of a single-dose schedule have made an important contribution to the scale up.

IA2030

IA2030 & National Immunization Strategies (NIS)- CONCLUSIONS

Though many countries remain **off track against key metrics** for measuring progress against IA2030 indicators, there have been **notable achievements** such as the Big Catch-up and the **scale up** of **malaria** and **HPV** vaccination.

A review of 51 **national immunization strategy (NIS)** documents from LMICs showed that countries are setting specific targets to reach IA2030 goals. Linkages to PHC have been strengthened, and NIS have been utilized for **advocacy and resource mobilization** to secure political commitment and adequate funding for immunization programs.

Immunisation **data systems** in many countries **lack** the **granularity**, context, nuance or discernment **to inform actions** required to improve programme performance.

Country-centred, **continuous quality improvement** processes supported by sufficiently **capacitated WHO Regional Offices** are required to enable the required changes in **programme monitoring**.

PRIORITIZING THE INTRODUCTION OF NEW VACCINES

Multi Criteria Decision Analysis (MCDA) is being used to support decision making accross multiple sectors

Definition

MCDA is a **structured approach** used to assess and prioritize various options based on multiple factors.

Principles

- Providing a **clear value assessment framework,** improving transparency through criterion weighting, and fostering stakeholder engagement to build consensus.
- MCDA should be **a deliberative process involving key stakeholders** (e.g., health authorities, experts, policymakers, civil society) to ensure transparency, inclusivity, and legitimacy.
- Countries can **systematically evaluate trade offs** between alternatives looking at multiple factors — including disease burden, vaccine safety, economic impact, programmatic considerations, equity, political commitment, and opportunity costs

In practice

- **Widely implemented across sectors** such as transportation, migration, and energy, where it aids in balancing considerations like cost, efficiency, and sustainability.
- **Used by Health Technology Assessment (HTA) agencies** for setting healthcare priorities based on best-practice guidance.

SAGE observations on prioritization of new vaccine introduction

SAGE acknowledged that each country should be empowered to **prioritize new vaccines** and determine the **timing** of introduction of the vaccines into national programmes. These decisions should be made using a **systematic**, **country-owned** process based on the local context.

SAGE acknowledged that **NITAGs play a crucial role** in leading a deliberate **evidence-based** approach leveraging available tools such as **multi-criteria decision analysis** (MCDA) and engaging relevant stakeholders.

SAGE called on countries to **engage their NITAG** in the **prioritization** of new vaccines for and **optimizing vaccination** schedules in close consultation with their respective national programmes and in alignment with the **National Immunization Strategies**.

SAGE noted the challenges countries face with access to evidence to support informed choices. **Regional and sub-regional advisory bodies** should be **engaged** in supporting NITAGs.

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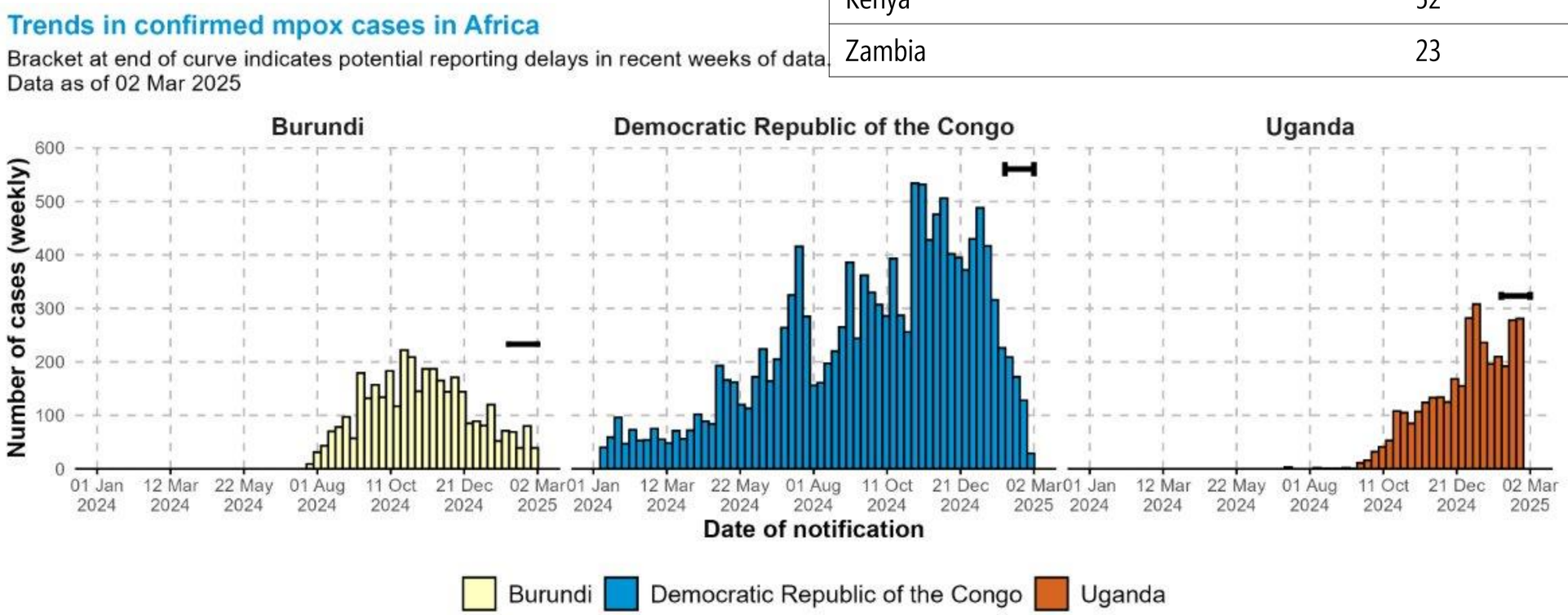
MPOX

Trends in clade Ib MPXV cases

Confirmed cases since 2024

Note DRC cases are a mix of clade Ia and Ib MPXV

Country	Cases reported 2024/25	Cases in last 6 weeks
Democratic Republic of the Congo	17 339	1080
Burundi	3463	350
Uganda	3391	1157
Rwanda	110	10
Kenya	52	16
Zambia	23	15

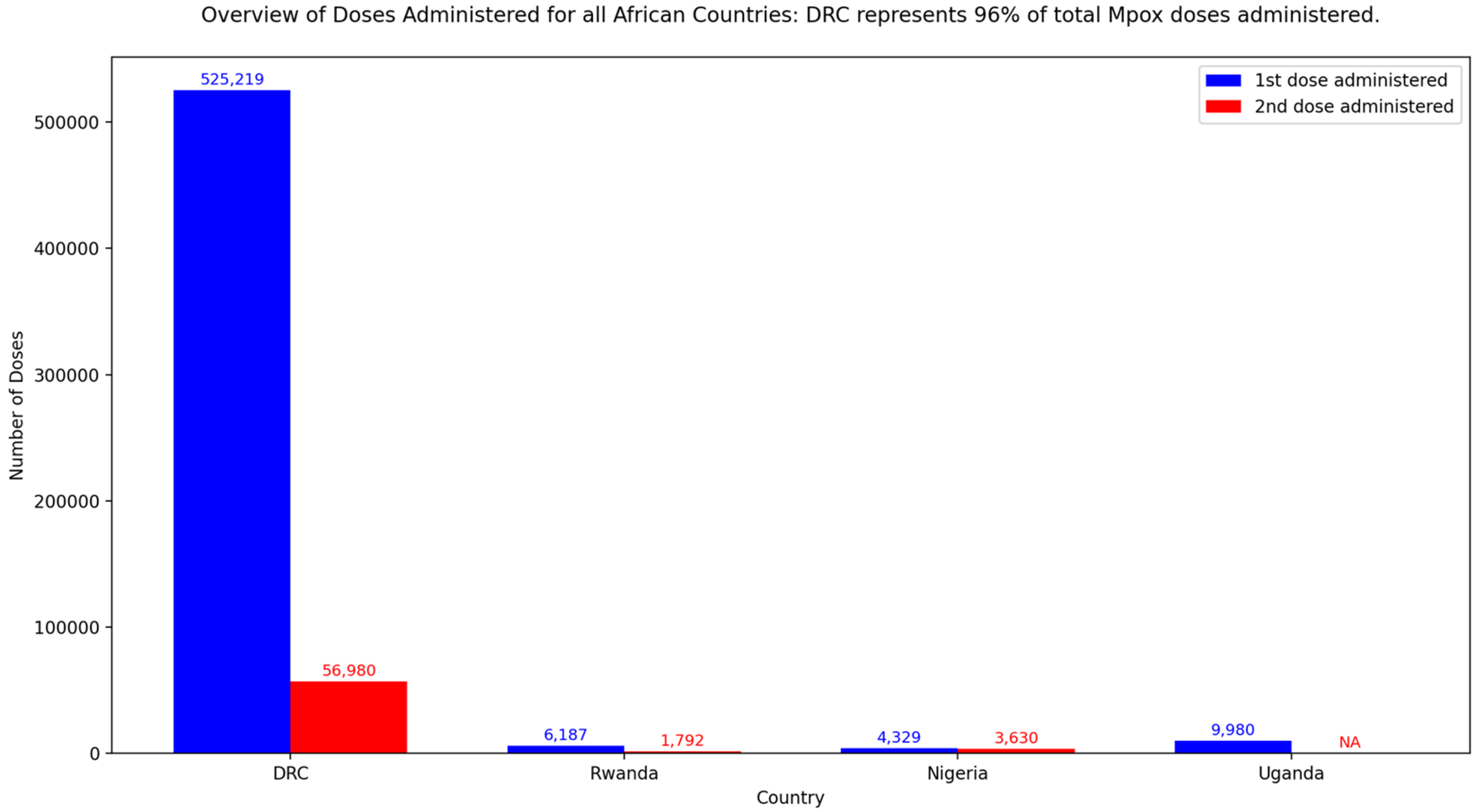


Source: WHO

More than 608,000 doses (MVA-BN vaccine) have been administered in African countries (96% in DRC)

From October 2024 to 24 March 2025

- **DRC:** 582,199 doses
  Rwanda: 7,979 doses
- **Nigeria:** 7,959 doses
- **Uganda:** 9,980 doses



Note: No information on mpox vaccination has been reported by CAR. For DRC the figure represents Plan 1 and Plan 2 “Intensification phase”.

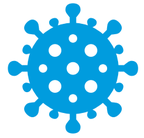
Mpox – SAGE observations & recommendations

While Mpox continues to be reported in all WHO Regions, the **numbers of cases** are **increasing** in **Africa**.

Five African countries have initiated **vaccination** and over **600 000 vaccine doses** have been administered in the **Democratic Republic of the Congo**. However, with the acceleration of vaccination activities, vaccine **supply** is again **constrained**.

Current WHO recommendations allow for the "**off-label**" use of a **single dose** or **intradermal fractional dosing** of **MVA-BN** in supply-constrained outbreak situations and SAGE recommended consideration of these strategies if indicated.

SAGE noted that while **pre- and post-exposure vaccination** to control the ongoing outbreak was appropriate under the current circumstances, the **next phase** should focus on **preventive vaccination**.



SAGE expressed concern about **reduced funding** for HIV programmes, which could lead to a **resurgence of HIV** infections and a rise in the number of people living with undiagnosed or uncontrolled HIV, who are **particularly vulnerable** to severe **mpox**.

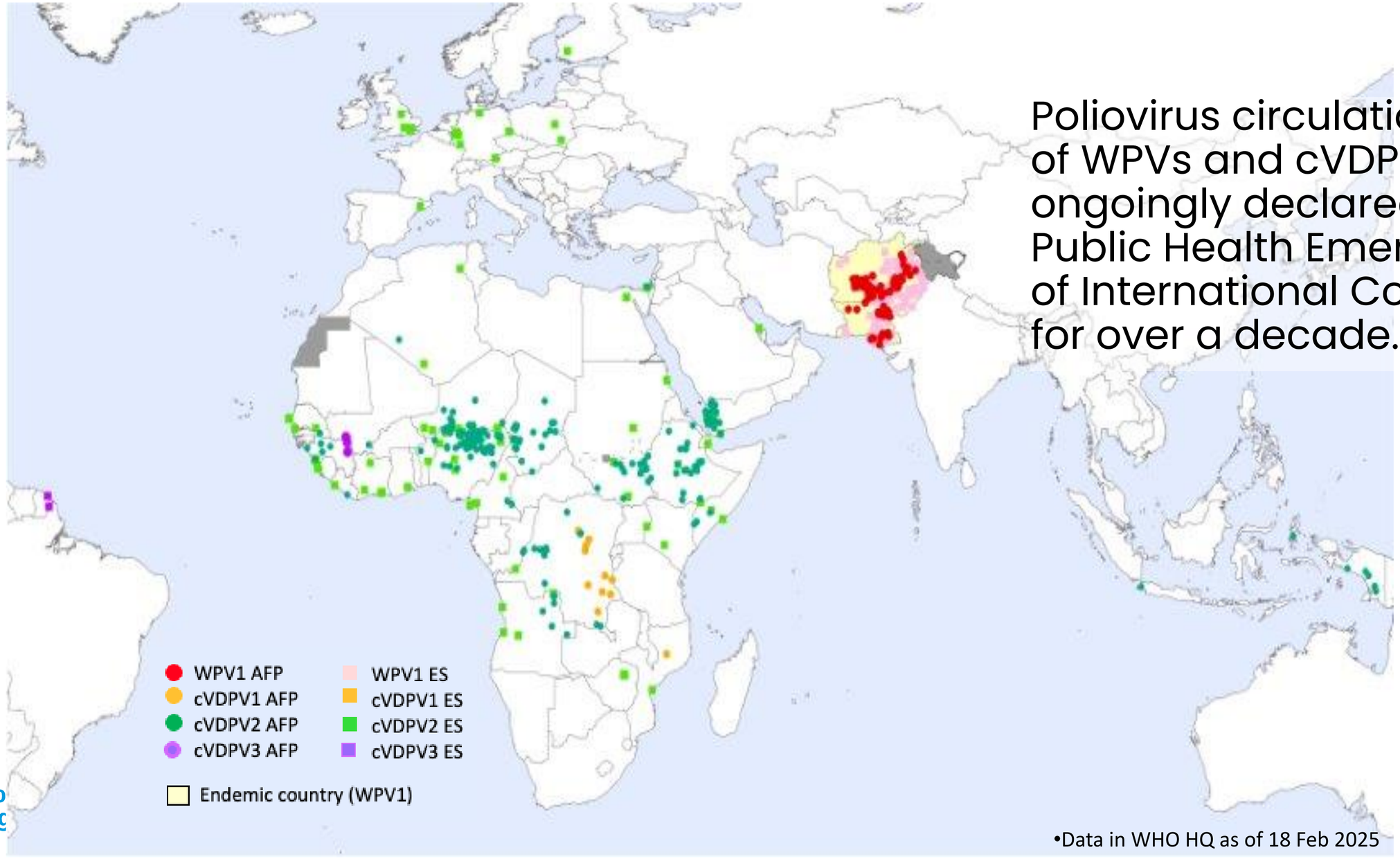
POLIOMYELITIS

Poliomyelitis - agenda

- Update on the **status** of polio **eradication**
- Update on **bOPV Cessation Planning** and proposed **guidance** for countries considering moving to **IPV-only schedules**
- **Immunogenicity** of the **hexavalent vaccine*** and the programmatic & supply implications of including a booster dose of the vaccine

**Containing diphtheria toxoid, tetanus toxoid, whole-cell pertussis, recombinant hepatitis B surface antigen, Haemophilus influenzae type b (Hib) conjugate and inactivated poliovirus vaccines.*

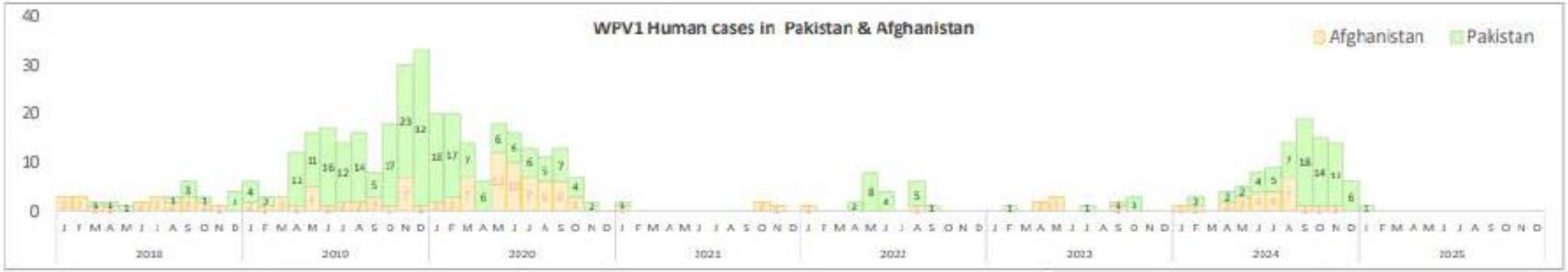
Global WPV1 & cVDPV Cases, 2024

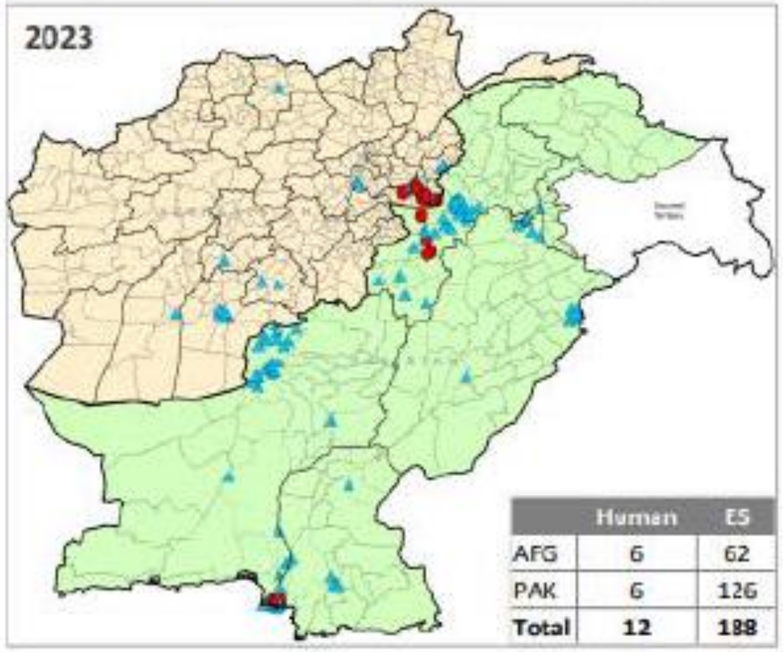


Poliovirus circulation, both of WPVs and cVDPVs, is ongoingly declared a Public Health Emergency of International Concern for over a decade.

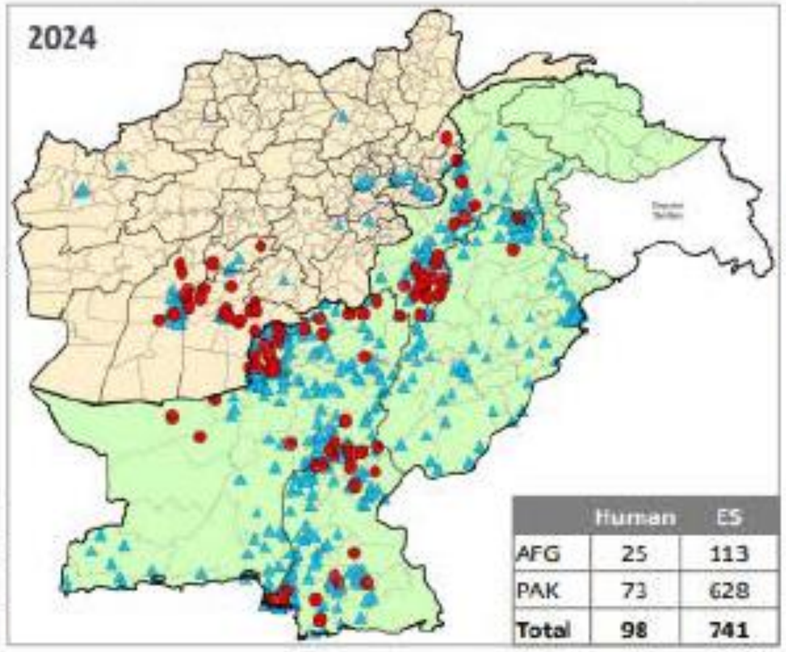
•Data in WHO HQ as of 18 Feb 2025

Increasing number of cases of WPV1 in Afghanistan and Pakistan

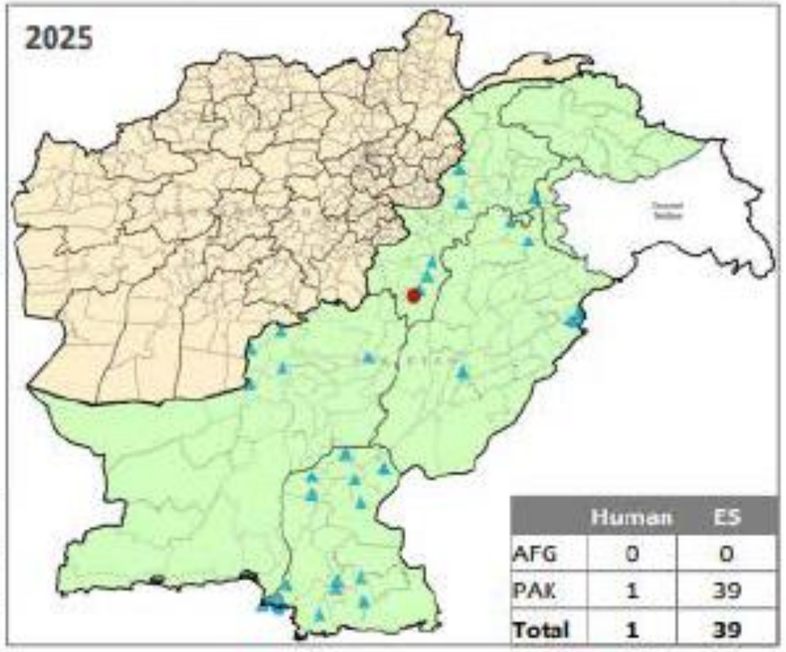




	Human	ES
AFG	6	62
PAK	6	126
Total	**12**	**188**



	Human	ES
AFG	25	113
PAK	73	628
Total	**98**	**741**



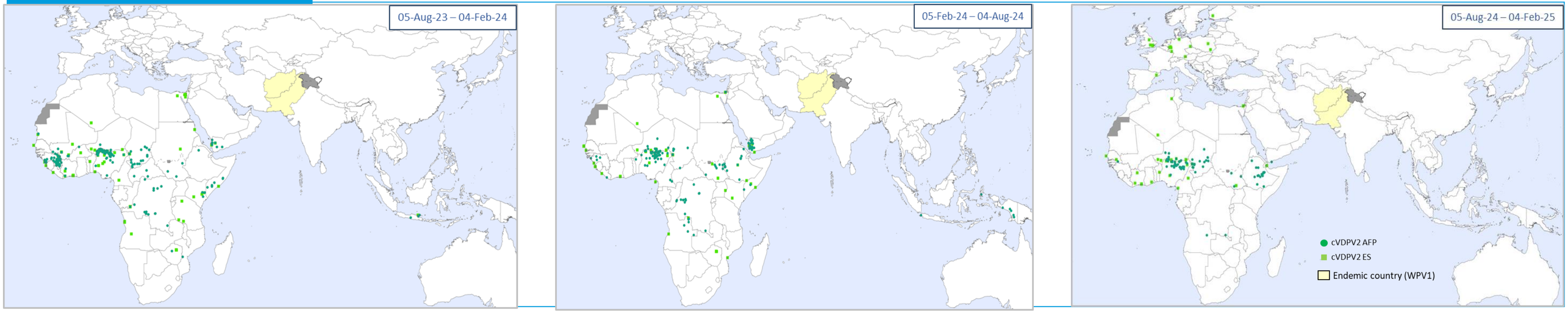
	Human	ES
AFG	0	0
PAK	1	39
Total	**1**	**39**

ES positive isolate Human case

Data from WHO as of Feb 1, 2025

cVPDV2 continues to circulate though with lower number of cases in 2024 compared to 2023

Global cVDPV2 isolates[1]

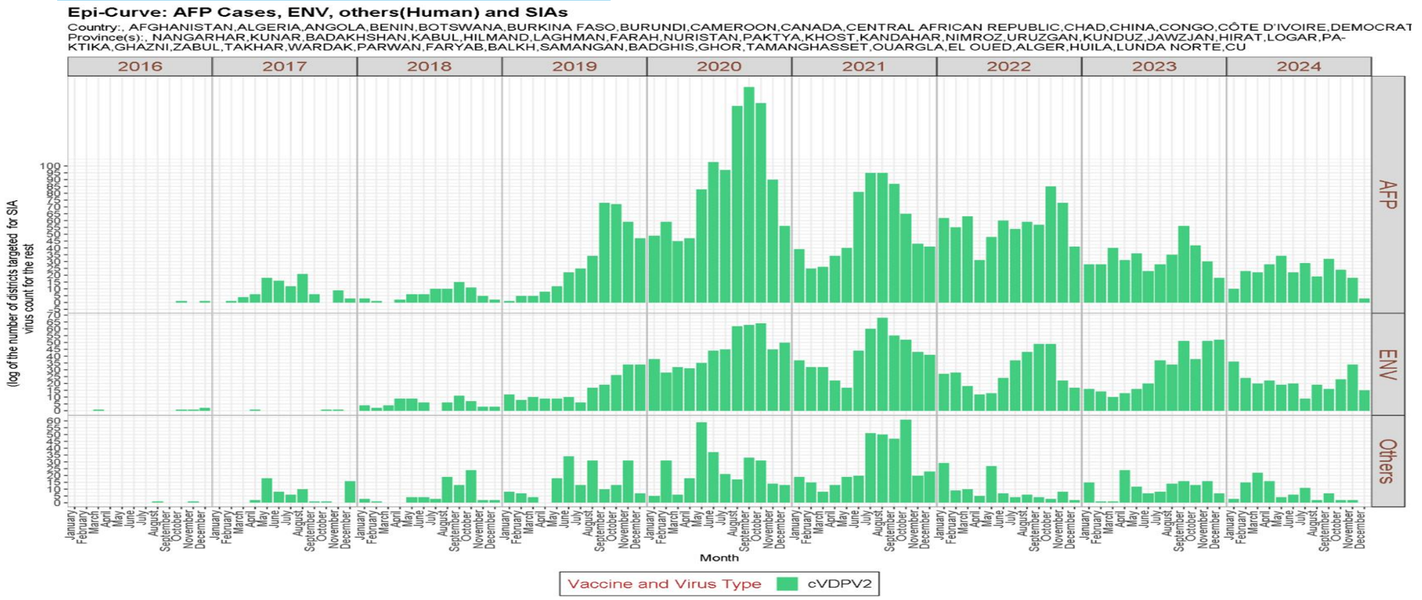


- Total of 264 cVDPV2 cases reported in 2024 (04 Feb) compared to 395 cVDPV2 cases in 2023 and 688 in 2022—Overall downward trend since 2022

- cVDPV2 detections from wastewater samples—multiple countries of WHO's European Region

Global cVDPV2 AFP cases, environmental samples, and others

Data in WHO HQ as of 04 Feb. 2025

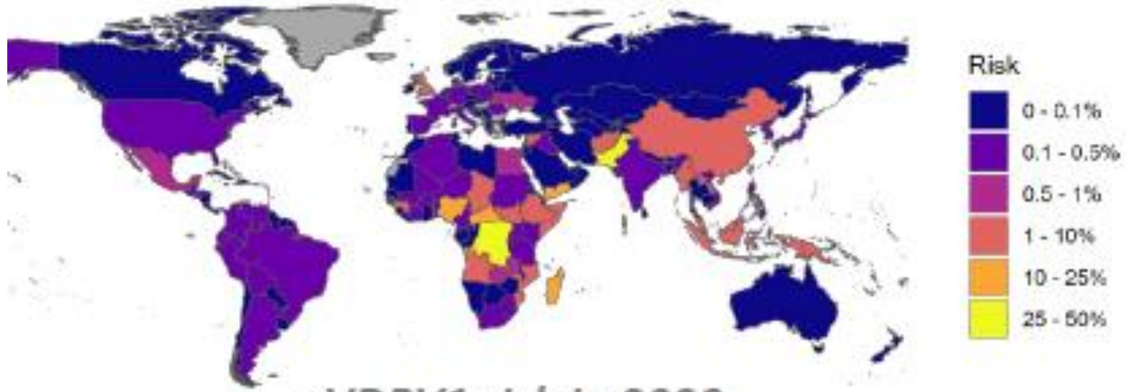


bOPV Cessation Planning*: The Need for Pre-Cessation Immunity Boosting SIAs

***Globally synchronised bOPV Cessation is anticipated in 2030** contingent on a set of triggers and GPEI strategy milestones

Modelling analyses to determine where/when/how many pcSIAs need to be implemented based on:

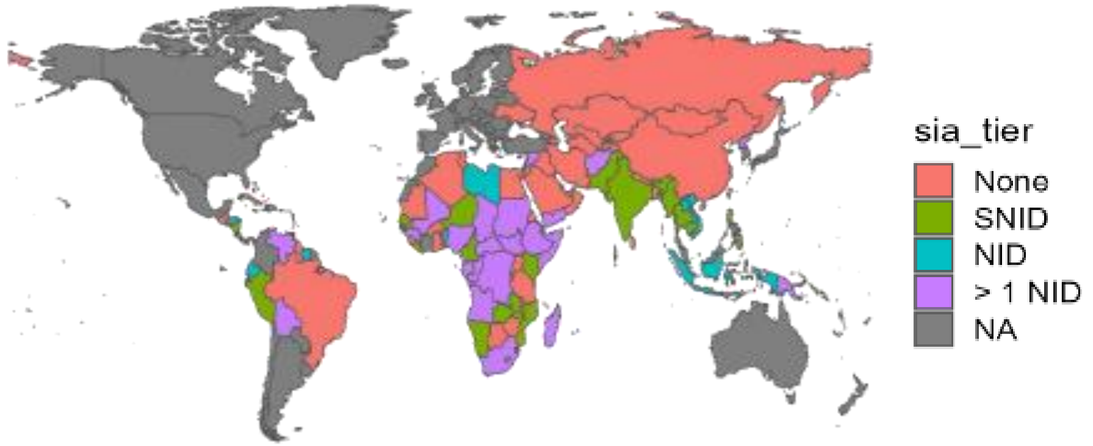
- modelled risk of cVDPV1/3 emergences (Imperial College London) and;
- target population immunity (Institute of Disease Modelling)



cVDPV1 risk in 2029

Outcome: a by-country risk tiering coupled with recommended (S)NIDs.

- Expert inputs were incorporated into the final classification
- Further region/country adjustments will be requested



Need for pre-cessation SIAs

Approximately 1.7 billion doses of bOPV will be needed for pre-cessation vaccination campaigns in 46 countries

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Anticipated Transition to IPV-Only RI Schedules

WHO + Imperial College London developed a three-part risk-grading framework to **assess country readiness to safely transition to an IPV-only** routine immunization schedule ahead of synchronized bOPV cessation to assist national decision-making.

1. Adherence to relevant SAGE Recommendations

- DTP3 coverage >90%
- At least 3 IPV doses
- ≥2 years since IPV2 introduction

2. Risk-tiering countries by:

- Population immunity
- Poliovirus transmission efficiency
- Poliovirus importation risk
- Risk of cVDPV1/3 emergence
- Political fragility / civil conflict

Output

A by-country categorization of **'High', 'Medium' and 'Low' readiness** for safe IPV-only RI schedule

3. Evaluation of national poliovirus outbreak preparedness and response

To assess ability to detect and respond to potential post-transition outbreaks of cVDPV1/3

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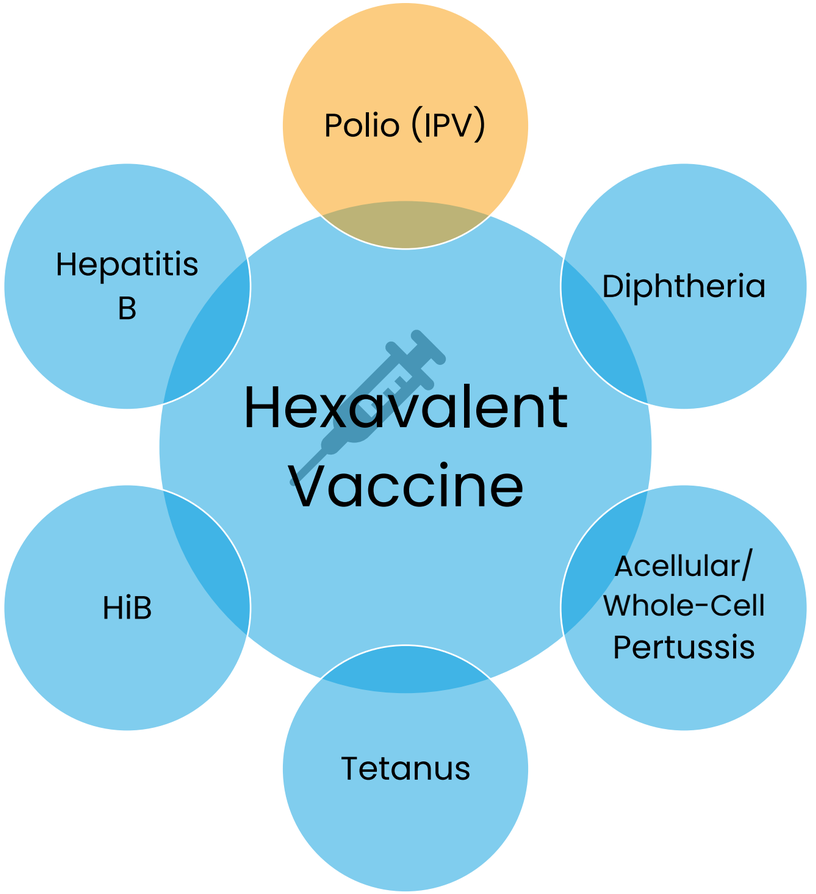
Revision of the Hexavalent Vaccine Schedule for Polio

Background:

In 2021, SAGE recommended a **4-dose** RI schedule with a hexavalent vaccine when the **first dose is administered <8 weeks of age** and a **3-dose** schedule when the **first dose is administered ≥8 weeks of age**.



Revision:

- Updated evidence on the **immunogenicity** of hexavalent vaccine and the estimates of the **cost** of a four-dose schedule were reviewed.
- The evidence showed that seroconversion rates achieved with 6-10-14 week schedules ranged from 92% - 98% across the three polio serotypes and there was only a small incremental benefit from the 4th dose.
- Programmatically and economically challenging and may be slowing implementation and uptake of wP Hexavalent

Outcome:

- SAGE concluded that a **3-dose** schedule of the hexavalent vaccine is adequate when initiated ≥ 6 weeks of age and with a minimum of 4 weeks interval between doses.
- **Existing recommendations for booster doses in the second year of life with other antigens remain unchanged.**

SAGE recommendations on poliomyelitis

SAGE expressed **concern** about the **increasing number of WPV1 cases** in Afghanistan and Pakistan and the continued transmission of cVPDV2. SAGE called for transformative change in the eradication strategy and to increase routine immunization coverage.

SAGE reiterated its support for **safe cessation of bOPV** and **agreed with plans for pre-cessation bOPV vaccination campaigns** based on the proposed methods to determine the need for such campaigns.

SAGE **endorsed** the **proposed risk-grading framework** as a guide for countries considering **transitioning to IPV-only routine immunization schedules** ahead of synchronised cessation and urged WHO to initiate consultations on this topic with its Member States and Regional Offices.

SAGE reviewed updated evidence and concluded that a **schedule** with a **minimum of three doses** of the **hexavalent** vaccine **starting at 6 weeks of age or later** is **adequate** and revised existing recommendations accordingly.

This recommendation does not change WHO's existing recommendations for providing booster doses of other antigens in the second year of life.

PNEUMOCOCCAL VACCINATION

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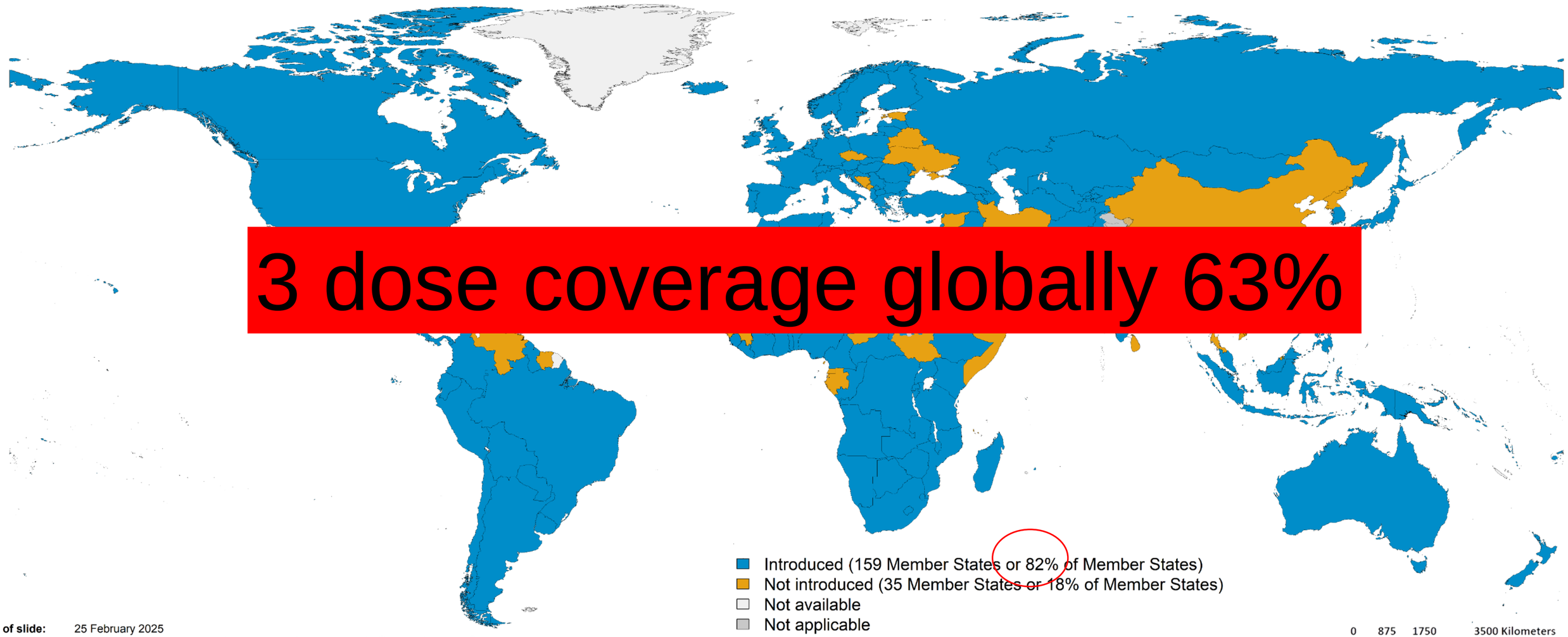
Countries with PCV (Pneumococcal conjugate vaccine) in the national immunization programme, 2023



Date of slide: 25 February 2025
Map production: Immunization, Vaccines and Biologicals (IVB), World Health Organization (WHO)
Data source: IVB database as at 25 February 2025

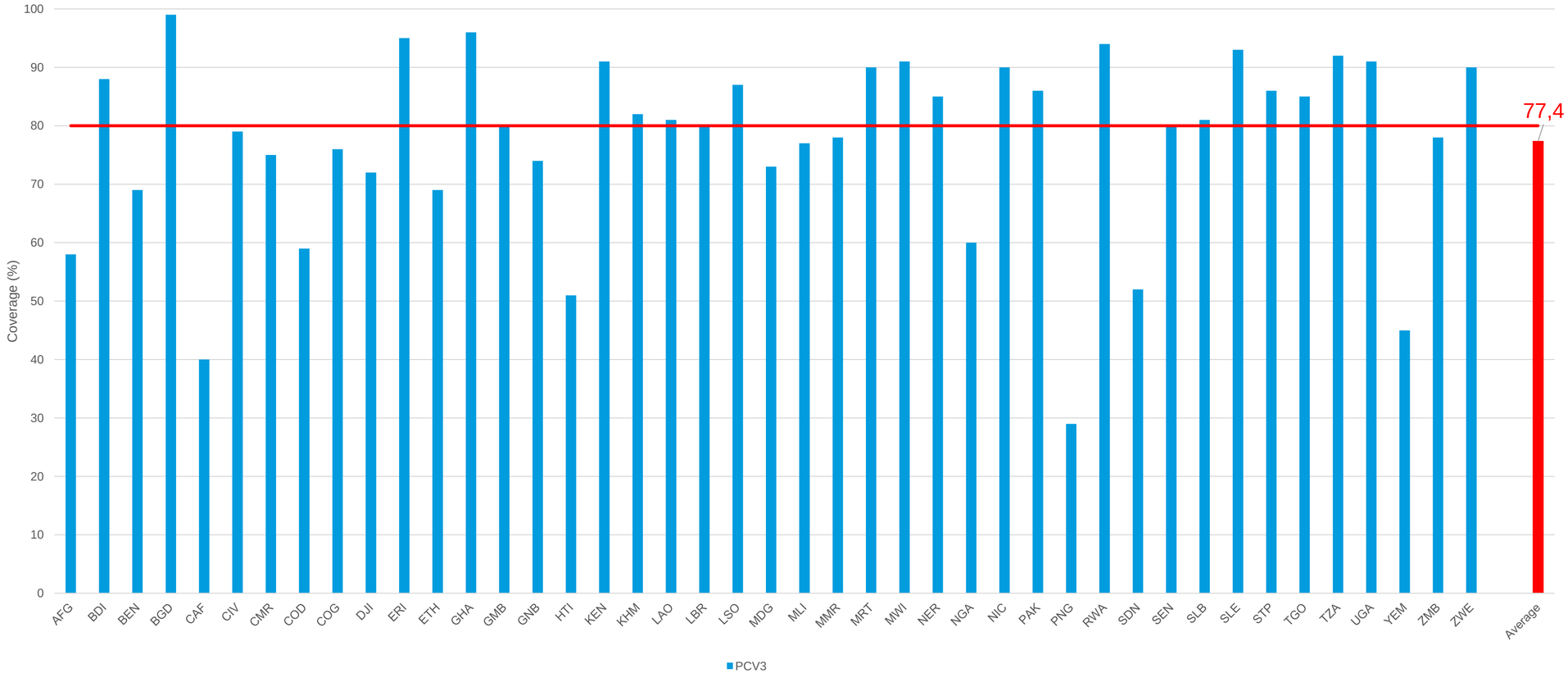
Disclaimer:

The boundaries and names shown and the designations used on this map do not imply the expression of any opinion whatsoever on the part of the World Health Organization concerning the legal status of any country, territory, city or area nor of its authorities, or concerning the delimitation of its frontiers or boundaries. Dotted and dashed lines on maps represent approximate border lines for which there may not yet be full agreement.

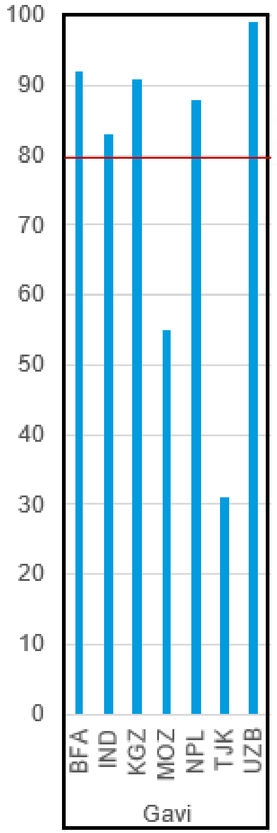
World Health Organization

Coverage of PCV3 in GAVI-eligible countries, WUENIC 2023

3p+0



2p+1



Pneumococcal Conjugate Vaccines

Policy Question 1: what is optimal 3 dose schedule, 3p+0 vs. 2p+1

- 2019 WHO position paper recommends a 3-dose schedule administered either as 2p+1 or as 3p+0, starting as early as 6 weeks of age.
- Two available polysaccharide-conjugate vaccines; PCV13 (Pfizer) and PCV10 (GSK)

2019, 94, 85–104 No 8

World Health Organization
Organisation mondiale de la Santé

Weekly epidemiological record
Relevé épidémiologique hebdomadaire

22 FEBRUARY 2019, 94th YEAR / 22 FÉVRIER 2019, 94e ANNÉE
No 8, 2019, 94, 85–104
http://www.who.int/wer

Contents

Sommaire

Pneumococcal conjugate vaccines in infants and children under 5 years of age: WHO position paper – February 2019

Introduction

In accordance with its mandate to provide guidance to Member States on health policy matters, WHO issues a series of regularly updated position papers on vaccines and combinations of vaccines against diseases that have an international public health impact. These papers are concerned primarily with the use of vaccines in large-scale vaccination programmes. They summarize essential background information on diseases and vaccines and conclude with the current WHO position on the use of vaccines worldwide.

The papers are reviewed by external experts and WHO staff and endorsed by the WHO Strategic Advisory Group of Experts (SAGE) on Immunization (http://www.who.int/immunization/sage/en). The Grading of Recommendations Assessment, Development and Evaluation (GRADE) method is used to assess the quality of the available evidence systematically. The SAGE decision-making process is reflected in "evidence-to-recommendation" tables. The processes followed for the preparation of vaccine position papers are described at: http://www.who.int/immunization/position_papers/position_paper_process.pdf. The position papers are intended for use mainly by national public health officials and managers of immunization programmes. They may also be of interest to international funding agencies, vaccine advisory groups, vaccine manufacturers, health professionals, researchers, the scientific media and the general public.

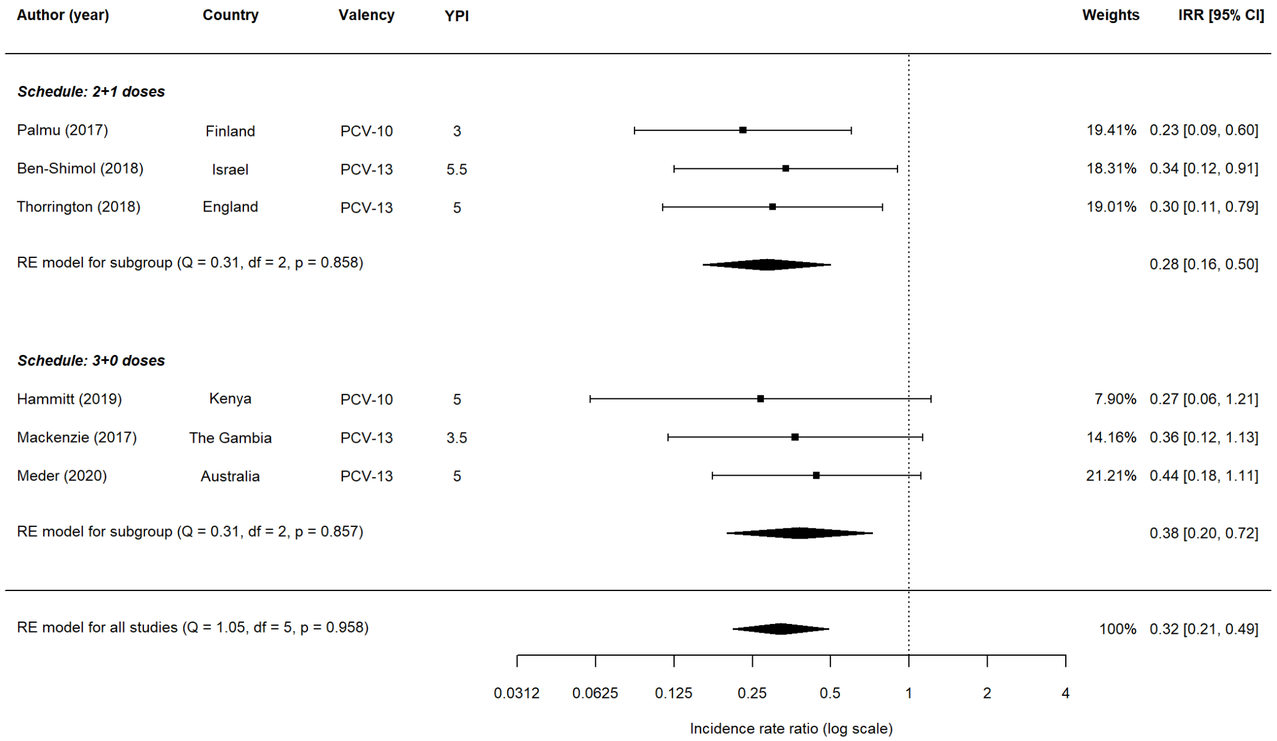
Vaccins antipneumococciques conjugués chez les nourrissons et les enfants de moins de 5 ans: note de synthèse de l'OMS – février 2019

Introduction

Conformément à son mandat, qui prévoit qu'elle conseille les États Membres en matière de politique sanitaire, l'OMS publie une série de notes de synthèse régulièrement mises à jour sur les vaccins et les associations vaccinales contre les maladies ayant une incidence sur la santé publique internationale. Ces notes, qui portent essentiellement sur l'utilisation des vaccins dans les programmes de vaccination à grande échelle, résument les informations essentielles sur les maladies et les vaccins et présentent en conclusion la position actuelle de l'OMS concernant l'utilisation de ces vaccins à l'échelle mondiale.

Ces notes sont examinées par des experts externes et des membres du personnel de l'OMS, puis approuvées par le Groupe stratégique consultatif d'experts sur la vaccination (SAGE) de l'OMS (http://www.who.int/immunization/sage/fr). La qualité des données disponibles est évaluée de manière systématique au moyen de la méthode GRADE (Grading of Recommendations Assessment, Development and Evaluation). Le processus de décision du SAGE est reflété dans des tableaux illustrant le passage des preuves aux recommandations («evidence-to-recommendation»). La description des procédures suivies pour élaborer les notes de synthèse sur les vaccins est disponible à l'adresse: http://www.who.int/immunization/position_papers/position_paper_process.pdf. Les notes de synthèse s'adressent avant tout aux responsables nationaux de la santé publique et aux administrateurs des programmes de vaccination, mais elles peuvent également présenter un intérêt pour les organismes internationaux de financement, les groupes consultatifs sur la vaccination, les fabricants de vaccins, les professionnels de la santé, les chercheurs, les médias scientifiques et le grand public.

Updated review of evidence does not indicate any difference in impact between the 3p+0 and 2p+1 PCV schedules



- No difference between the IRRs for prevention of of pneumococcal pneumonia between different schedules (Figure).
- No statistically significant difference in the prevalence of all-cause pneumonia, radiological pneumonia total carriage, vaccine-type carriage or non-vaccine type carriage following the use of PCV10 or PCV13 in 3p+0 or 2p+1 schedules
- A 2p+1 schedule elicits lower Ab levels than the 3p+0 schedule after the primary series, but higher Ab levels after the final dose (+1)

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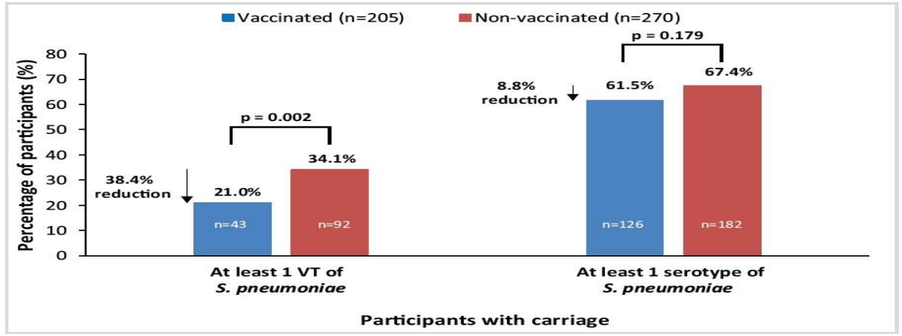
Use of PCV10/SII (Pneumosil) in a 3 dose schedule

Subgroup Analysis of Carriage in Children Within the Same Age Range (16.1-20.8 Months of Age) in Both Groups

- The age distributions between the two study groups were unequal as the vaccinated group was slightly younger as compared to nonvaccinated group. As age is likely to have an influence on nasopharyngeal carriage, a post hoc subgroup analysis of children in the same age range was conducted to see the effect.



- Post-hoc analysis of 475 children within the same age range in both groups (16.1 to 20.8 months of age) showed a **38.4% reduction in VT carriage** with PNEUMOSIL® vaccination (21.0% [95% CI 15.6-27.2] versus 34.1% [95% CI 28.4-40.1], p=0.002).

Nasopharyngeal carriage of S pneumoniae and vaccine-type pneumococcus in children who were unvaccinated or vaccinated with PCV10-SII. Pune, India

	Pre-PCV era prevalence (2009-2010) N= 1013	Synflorix (GSK) era prevalence (2012-2021) N= 5570	Pneumosil (SII) era prevalence (2023) N= 1001	SII vs GSK Adjusted, age-standardized PR (95% CI)	SII vs Pre-PCV Adjusted, age-standardized PR (95% CI)
All SPN					
<5 years	229 (75.3%)	1371 (79.0%)	212 (71.1%)	0.91 (0.84-0.98)	1.08 (0.99-1.17)
5-14 years	103 (52.5%)	555 (50.8%)	100 (49.3%)	0.93 (0.80-1.09)	0.99 (0.81-1.20)
≥15 years	123 (24.0%)	596 (21.7%)	70 (14.0%)	0.72 (0.56-0.93)	0.75 (0.55-1.02)
6A & 19A					
<5 years	25 (8.2%)	225 (13.0%)	23 (7.7%)	0.63 (0.41-0.97)	1.19 (0.91-1.56)
5-14 years	9 (4.6%)	57 (5.2%)	7 (3.4%)	0.60 (0.27-1.33)	0.74 (0.27-2.02)
≥15 years	12 (2.3%)	51 (1.8%)	7 (1.4%)	0.92 (0.38-2.20)	1.11 (0.38-3.20)
Common VT					
<5 years	101 (33.2%)	121 (7.0%)	15 (5.0%)	0.67 (0.39-1.16)	0.17 (0.10-0.29)
5-14 years	25 (12.7%)	58 (5.3%)	19 (9.3%)	1.83 (1.08-3.11)	0.76 (0.43-1.34)
≥15 years	21 (4.1%)	25 (0.9%)	3 (0.6%)	0.78 (0.23-2.64)	0.17 (0.05-0.60)

Pneumococcal carriage prevalence and age-standardized prevalence ratios in the pre-PCV, PCV10-GSK and PCV10-SII periods., Kilifi Kenya

SAGE recommendation: 3-dose schedule

- SAGE reaffirmed that achieving high coverage of three doses of pneumococcal conjugate vaccines (PCVs) using either a 3p+0 or 2p+1 schedule is the most effective way to prevent pneumococcal disease.
- A review of the most recent evidence did not show an advantage for either schedule over the other; the choice of schedules should be based on local epidemiological and programmatic factors.
    - Coverage of 3rd dose
    - Other vaccines given at time points
    - Disease in older children and adults (2p+1 favored)
- In addition to PCV10 (Synflorix ®, GlaxoSmithKline) and PCV13 (Prevenar13®, Pfizer), recent evidence supports the use of a second PCV10 (Pneumosil®, Serum Institute of India) for routine immunization of infants using either of the two recommended 3-dose schedules. All three vaccines have received WHO prequalification.

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Pneumococcal Conjugate Vaccines

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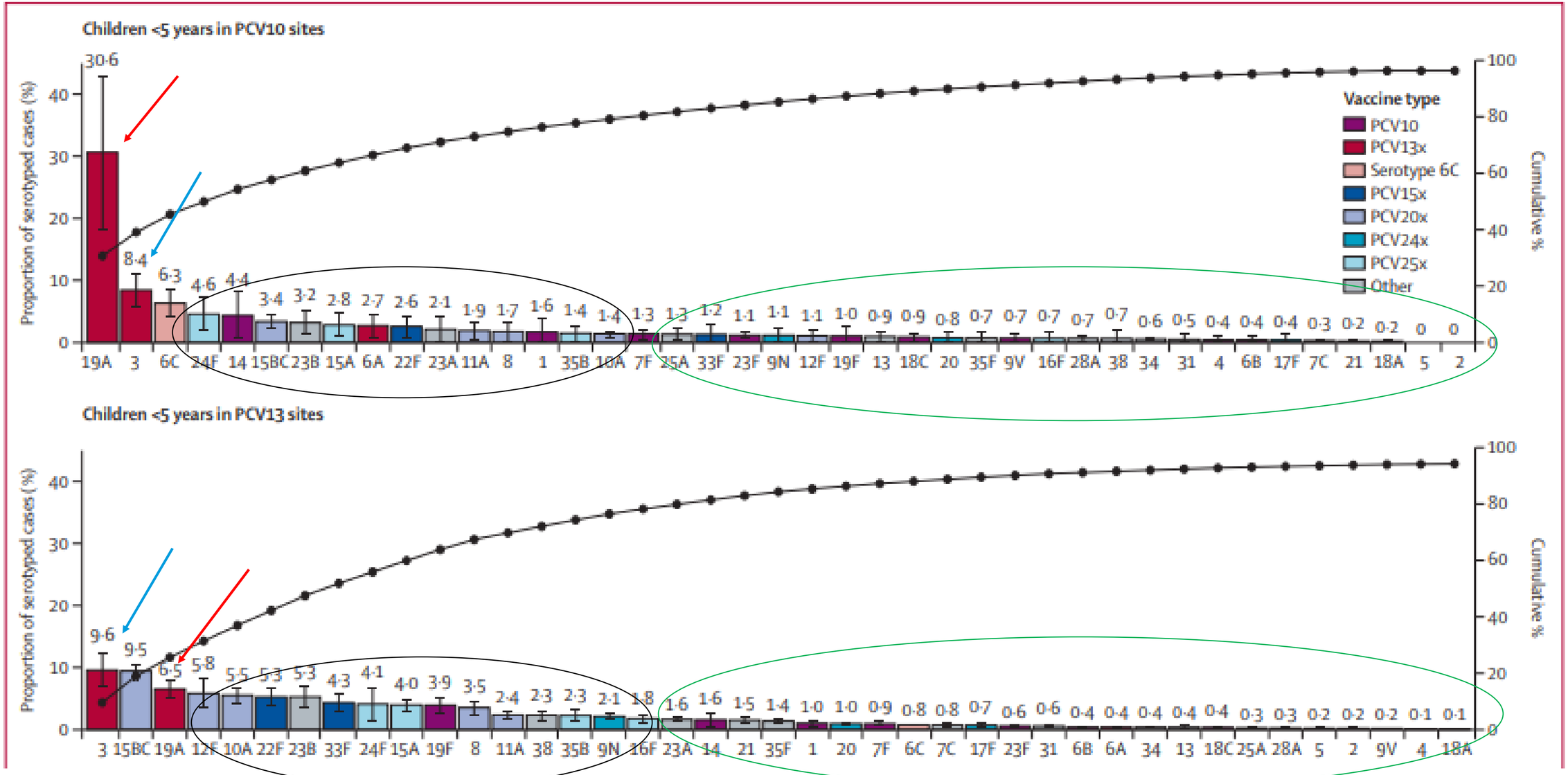
Policy Question 2: Use of higher valency PCVs

PSERENADE: ST distribution in children post PCV10/13 era



Serotype distribution of remaining invasive pneumococcal disease after extensive use of ten-valent and 13-valent pneumococcal conjugate vaccines (the PSERENADE project): a global surveillance analysis - The Lancet Infectious Diseases

PCV Pipeline - 2024

	Preclinical	Phase 1/2	Phase 3/ Licensure	Licensed	Prequalified
HIC manufacturers	*PCV22 (Aeolin)* *PCV25 (PnuVax)* *PCV30+ (GSK)* *PCV? (Merck/MSD)* *PCV? (Virometix)*	*PCV24 (GSK)* *PCV24 (Vaxcyte)* **PCV25 (Inventprise)** *PCV31 (Vaxcyte)* *PCV30+ (Alopexx)* *PCV? (Matrivax)* *PCV? PG4 for children (Pfizer)* *PCV? Adult adjuvanted (Pfizer)*	*PCV21 (Sanofi / SK Bioscience)*	*PCV15 (Merck/MSD)* **PCV20 (Pfizer)** *PCV21 (Merck/MSD)*	**PCV10 (GSK)** **PCV13 (Pfizer)**
Dev. Country Manufacturers	*PCV16 (SPbSRIVS)* *PCV20 (Aim)* *PCV21 (SII)* *PCV24 (Aim)* *PCV? (LIBP)* *PCV? (Bravovax)* *PCV? (CanSino)*	*PCV13 (BravoVax)* *PCV13 (Eubiologics)* *PCV20 (Innovax)* *PCV23 (Adgenvax)* *PCV24 (Adgenvax)* *PCV24 (BioE)* *PCV? (CanSino)* *PCV? (Butantan)*	*PCV7 (Finlay)* *PCV11 (Panacea)* **PCV12(Biomangiunhos)** *PCV13 (Aim)* *PCV13 (CanSino)* *PCV13 (Adgenvax)* *PCV13 (CDIBP)*	*PCV13 (Walvax)* *PCV13 (BioKangtai)* *PCV13 (Nanolek)* **PCV14 (BioE)** *PCV15 (Tergene)*	**PCV10 (SII)**

Notes: Candidates in **bold** have expressed interest in WHO prequalification as of Aug 2023. This list may not be exhaustive and products in italics may not be up to date. PCV? Indicates a broader spectrum approach

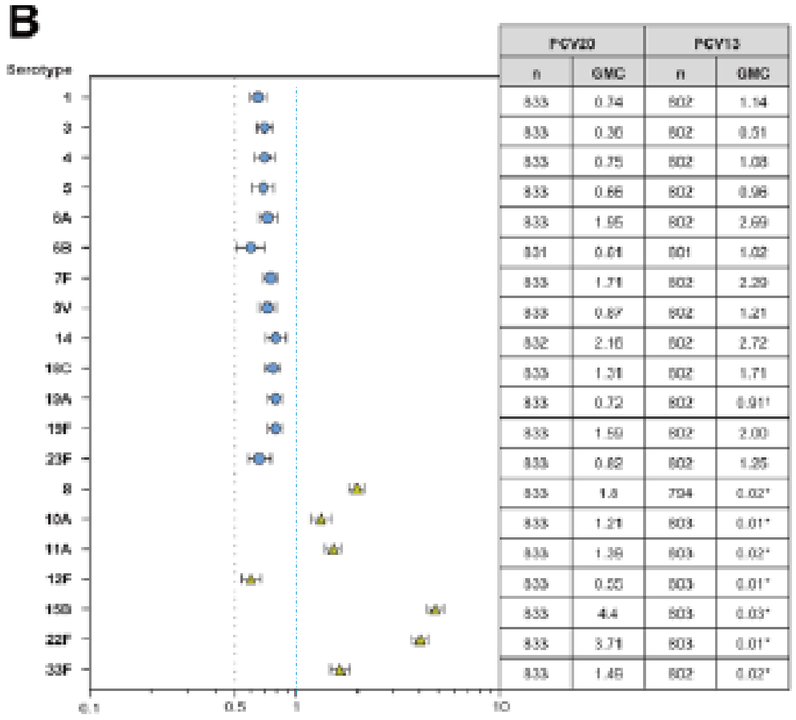
With the increasing valency of PCVs, antibody declines

The level of antibodies elicited by PCVs against shared serotypes appears to diminish with the increasing valency of vaccines.

Ab levels against shared serotypes in PCV13 was < PCV7

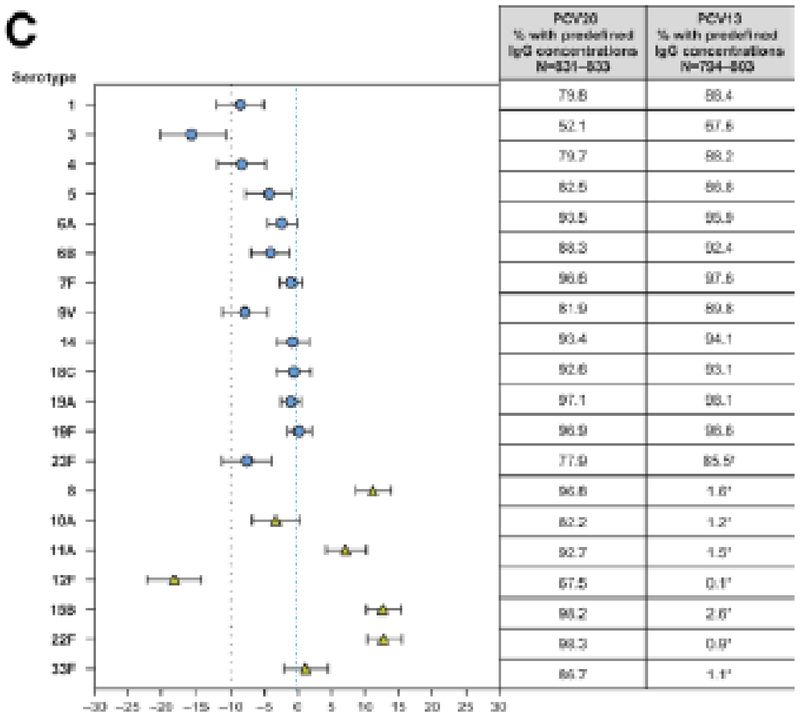
The Ab levels against shared serotypes in PCV20 is < PCV13.

This phenomenon is referred to as an "**immunogenicity creep**".



	PCV20		PCV13	
	n	GMC	n	GMC
1	833	0.74	802	1.14
3	833	0.30	802	0.51
4	833	0.75	802	1.08
5	833	0.66	802	0.96
6A	833	1.95	802	2.69
6B	831	0.61	801	1.02
7F	833	1.71	802	2.29
9V	833	0.87	802	1.21
14	832	2.16	802	2.72
18C	833	1.31	802	1.71
19A	833	0.72	802	0.911
19F	833	1.59	802	2.00
23F	833	0.82	802	1.25
8	833	1.8	794	0.02*
10A	833	1.21	803	0.01*
11A	833	1.39	803	0.02*
12F	833	0.55	803	0.01*
15B	833	4.4	803	0.03*
22F	833	3.71	803	0.01*
33F	833	1.48	802	0.02*

IgG GMR post-dose 3 PCV20 vs PCV13



	PCV20 % with predefined IgG concentrations N=831–833	PCV13 % with predefined IgG concentrations N=794–803
1	79.8	88.4
3	52.1	57.6
4	79.7	88.2
5	82.5	86.8
6A	93.5	95.9
6B	88.3	92.4
7F	96.6	97.6
9V	81.9	89.8
14	93.4	94.1
18C	92.6	93.1
19A	97.1	98.1
19F	96.9	98.6
23F	77.9	85.5*
8	96.8	1.6*
10A	82.2	1.2*
11A	92.7	1.5*
12F	67.5	0.1*
15B	98.2	2.6*
22F	98.3	0.9*
33F	86.7	1.1*

Difference in % subjects meeting pre-defined Ab thresholds post-dose 3 PCV20 vs PCV13

Senders S et al. Pediatr Infect Dis J. 2024;43:596-603.

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SAGE recommendation. Extended valency vaccines

- New PCVs with more serotypes have been licensed
  - PCV14 BioE; PCV15 Merck; PCV20 Pfizer
  - PCV14 BioE has been submitted for WHO PQ
- All extended valency vaccines were licensed on bridging immunogenicity data only
- Evidence shows with extended valency vaccines there is some lower immune responses to serotypes in common with PCV10/13, called immunogenicity creep.
  - Immunogenicity creep is greater with more serotypes in the vaccine
- Countries considering switching to recently extended valency vaccines to broaden serotype coverage must consider trade-offs that may exist; greater serotype coverage with potential reduced disease control due lower immunogenicity

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Pneumococcal Conjugate Vaccines

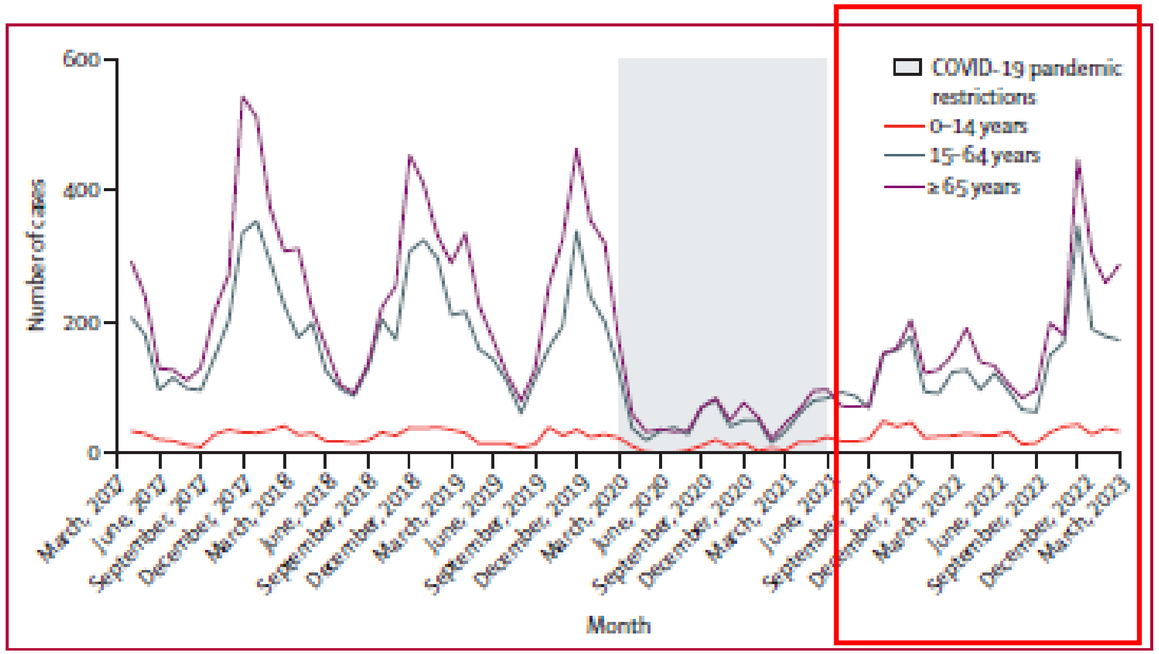
World Health Organization

Cost saving alternative schedules

Policy Question 3: Reduced dose PCV schedules (1p+1)

Policy Question 4: Fractional dose PCV schedules

In countries with mature 3-dose PCV programmes, a switch to a 1p+1 schedule can sustain low disease & carriage rates



In England, a switch from a 2p+1 schedule to a 1p+1 schedule in January 2020 did not result in an increase in the rates of IPD.

Bertran et al. Lancet Infect Dis. 2024;24:546-56.

Alternative schedule (1p+1)			Standard schedule (3p+0)			Unadjusted incidence proportion ratio (95% CI)	Adjusted incidence proportion ratio (95% CI)
Events (n)	Subjects (n)	Incidence (95% CI)	Events (n)	Subjects (n)	Incidence (95% CI)		
254	17089	0.015 (0.012, 0.018)	196	13714	0.014 (0.011, 0.017)	1.07 (0.81, 1.42)	1.07 (0.81, 1.41)

A cluster-randomized study did not show any change in the incidence of radiological pneumonia, clinical pneumonia with VT carriage or community VT carriage between clusters using a 3p+0 or 1p+1 PCV schedule

A systematic review showed no difference in VT carriage after the final dose between children vaccinated using a 3p+0, 2p+1 or 1p+1 vaccination schedule.

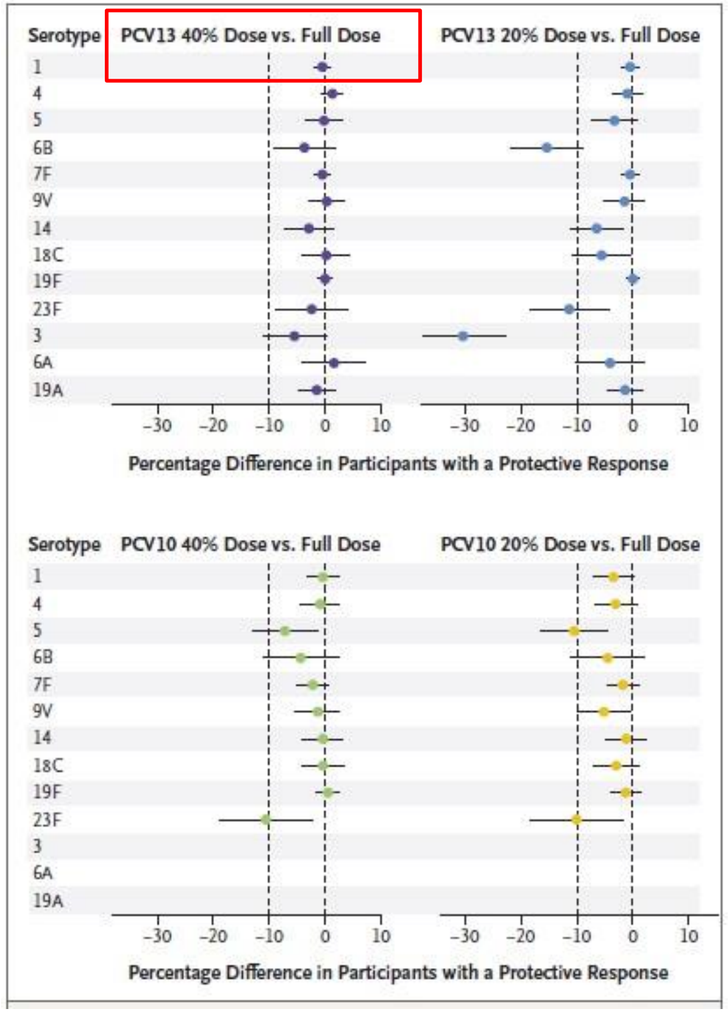
Ab concentrations are generally lower following the primary series with a 1p+1 schedule compared to a 2p+1 or 3p+0 schedule, but after the final dose, the Ab levels are comparable.

A modelling study predicted some loss in effect against carriage and IPD following a switch from a 3-dose to a 2-dose PCV schedule, though the magnitude of the effect varies between settings.

Fractional doses of PCV used in routine immunization schedules

The difference in the proportion of responders (fractional vs full dose)

- PCV13 40% dose met the non-inferiority criteria for 12 /13 serotypes (all except ST3)
- PCV13 20% dose met the non-inferiority criteria for 7/13 serortypes (all except ST3, 6A, 6B, 14, 18C and 23F).
- PCV10 40% and 20% met the non -inferiority criteria for 7 or the 10 serotypes (all except 5, 6B, 23F)



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Gallagher K, NEJM 2024; DOI: 10.1056/NEJMoa2314620

SAGE recommendations. Alternative PCV cost-saving strategies

- To reduce costs, countries with mature PCV programs that have achieved adequate levels of herd immunity could consider one of two cost-saving strategies: (i) the use of a reduced dose 1p+1 schedule; or (ii) the use fractional dose of PCV13.
- Both strategies should only be considered in countries with mature PCV programs, with high coverage (e.g., at least 80% average) for five years OR evidence of population immunity (e.g., well controlled VT disease)
- Careful monitoring with contingency plans to revert to full 3-dose schedules if indicated is needed for both strategies

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Pneumococcal Conjugate Vaccines

World Health Organization

Policy Question 5: Can PCV campaign strategies improve population immunity in settings with low population immunity

Fractional doses of PCV and multi-age cohort campaigns

- In Niger, in a setting with moderate PCV coverage, a multi-age cohort (MAC) campaign among children 1-9 years old resulted in a reduction in VT carriage using one full dose and 20% dose of PCV10-SII.

  Colidron et al. Lancet Infect Dis. 2025. doi: 10.1016/S1473-3099(24)00719-9.

- A mathematical model predicted a temporary reduction in the prevalence of VT carriage of 33-45% following a MAC campaign in an internally displaced persons camp in Somaliland. The prevalence returns to baseline within 3 to 5 years unless routine immunization coverage increases, or another campaign is conducted

SAGE recommendation: Campaign strategies to improve population immunity

- In settings with evidence of reduced population immunity (i.e., high pneumococcal disease burden in children, persistently low vaccination coverage), as well as in humanitarian emergencies, MAC campaigns with a single dose of PCV could be considered to rapidly achieve population immunity
- In most epidemiological settings, PCV MAC campaigns should include children aged 6 weeks to 5 years; however, a broader age range may be appropriate based on local epidemiology (e.g., disease or outbreaks in older children)
- Reactive campaigns in pneumococcal outbreaks are generally not recommended; unless outbreak is detected early and response can be initiated within 2 weeks.

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SAGE recommendations: Pneumococcal Surveillance

- WHO recommends that the epidemiological impact of PCVs be carefully monitored via sustained serotype-specific surveillance for pneumococcal disease or in periodic serotype-specific nasopharyngeal carriage surveys.
- Such surveillance and surveys should be conducted to monitor changes in disease and the circulation of pneumococcal serotypes in the community after use of different PCV products at different doses and/or alternative schedules.
- While not every country is likely to have capacity for surveillance, establishing capacity for surveillance **in early-adopter countries**, and ideally some countries in each WHO region, is desirable to generate real-world evidence.

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VARICELLA & HERPES ZOSTER

Epidemiology and burden of varicella

- Primary infection results in varicella disease (chickenpox).
- Subsequent reactivation of the virus from latency in neurons results in herpes zoster (shingles).
- Varicella is **common in all countries** though the epidemiology varies between temperate and tropical regions.
- In **tropical regions** infection occurs later in life with **higher susceptibility in adults**.

- The annual incidence ranges from **300 to 1291/100 000 population**, with almost **all people infected by adulthood.**
- **Between 1990 and 2021**, the global, age-standardized **varicella and herpes zoster death rate declined by 46%** (95% uncertainty interval (UI): 40.4–50.9) to a rate of 0.19 deaths (0.17–0.21) per 100 000.
- In 2021, varicella accounted for an estimated **13900 deaths** (95% UI 12500-15600). The majority of **varicella-related deaths in children** occurred in the 6-11 months age group[1].

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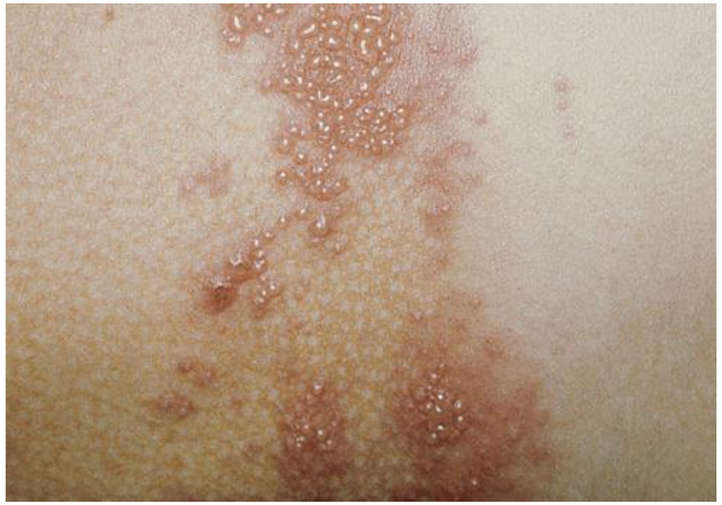
[1]Institute for Health Metrics and Evaluation (IHME). GBD 2021 Cause and Risk Summary: Varicella and herpes zoster. Accessed 25 February 2025. Seattle, USA: IHME, University of Washington, 2024.

Varicella vaccines

- All available varicella vaccines are **live, attenuated vaccines**. The Oka VZV strain is used for all vaccine production except in South Korea where the MAV strain is used.
- Available as **monovalent vaccines** or as **combination (MMRV)** vaccines.
- The first national varicella programme was in the USA in 1995; since then, **≥44 countries** have **introduced** the **varicella vaccine** as a **universal** vaccination for **infants** (28 countries use a universal 2-dose varicella vaccine regimen for infants).
- The **vaccine efficacy of 2 doses of MMRV vaccines** against varicella (moderate/ severe) after 10 years follow-up of **99%** (95% CI 98% to 100%)**; efficacy is 90%** (95% CI 88% to 92%) **for monovalent vaccines**.
- The pooled **1-dose vaccine effectiveness (VE) from a meta-analysis was 81%** (95% CI: 78%-84%) **against all varicella** and **98%** (95% CI: 97%-99%) **against moderate/severe varicella**.
- Median **VE 1-dose** against **severe disease** was **100%**. **The pooled 2-dose VE against all varicella was 92%** (95% CI: 88%-95%**).**

Herpes zoster epidemiology

- Overall, **>95% of individuals aged > 50 are seropositive for VZV** and thus at risk of developing herpes zoster (HZ)
- The **incidence of zoster increases with age** and the **lifetime risk** of developing HZ in those who live **up to 85 years is 50%.**
- An estimated **14.9 million cases of HZ** occurred globally **in 2020** in individuals aged over 50 years, and this is predicted to increase to up to **19.1 million cases by 2030**.
- **Post-herpetic neuralgia** (PHN) occurs **in approximately 20% of patients with HZ**; the frequency and severity of PHN increases with age.
- **Immunosuppression increases the risk** of HZ by at least **10-fold**; however, immunosuppressed people are only estimated to account for less than 10% of the burden of disease.



Herpes zoster vaccines

- **Recombinant zoster vaccine**
  - A two-dose adjuvanted recombinant zoster vaccine (RZV) (Shingrix® by GlaxoSmithKline/ HZ/su)[3] was first licensed for global use in 2017 for adults 50 years or older and immunocompromised adults over the age of 18 years.

- **Live attenuated vaccine**
  - The first single-dose live-attenuated herpes zoster vaccine (Zostavax® by Merck)[1] was licensed in 2006 for use in immunocompetent adults aged 50 years and older. The manufacturer has now discontinued this vaccine.
  - Contraindicated in immunocompromised adults (live vaccine).
  - Vaccine efficacy of Zostavax was about 51.3% in adults aged 60 years and older. Vaccine effectiveness was 67.5% (95%CI:65.4,69.5) during the first year after vaccination and was then 31.8% (95%CI:15.1,45.2), eight years post-vaccination.[2]
  - Two additional live-attenuated zoster vaccines licensed for use in domestic market in few countries only (SK bioscience SkyZoster (NBP608) developed in South Korea in 2019 and Bcht Biotechnology Co. Ltd. Zoster vaccine China in 2023).

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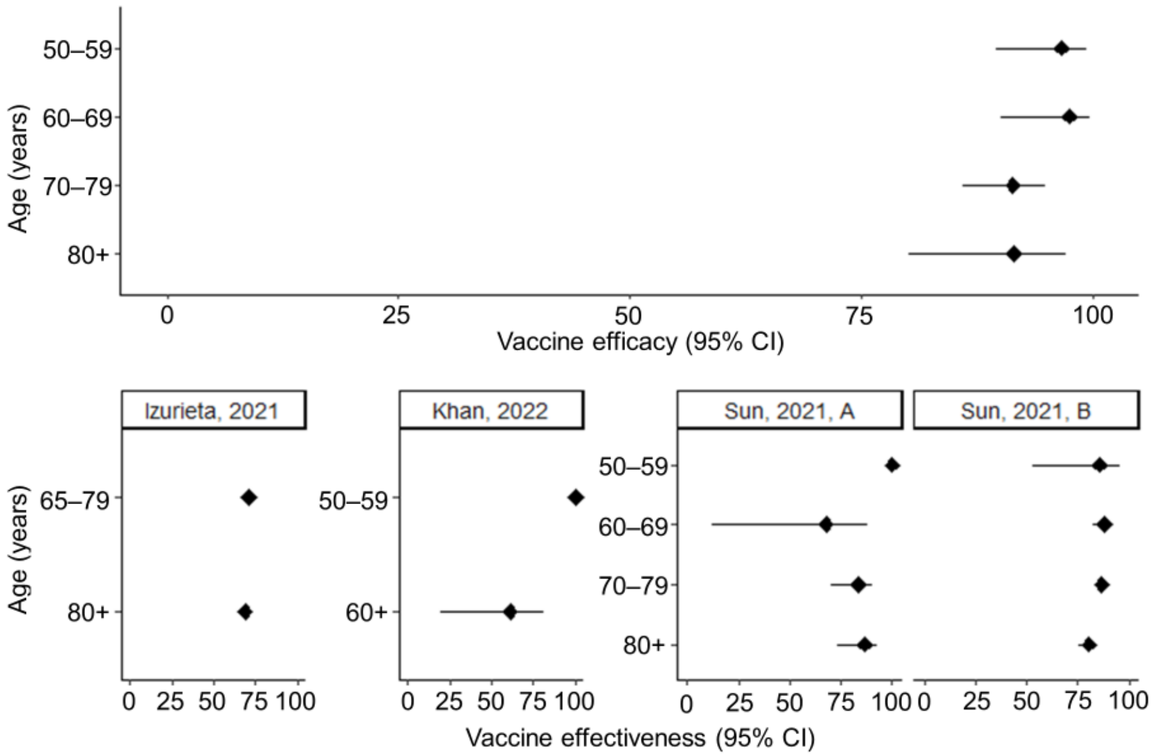
[1] Oxman MN, et al. A vaccine to prevent herpes zoster and postherpetic neuralgia in older adults. N Engl J Med. 2005;352:2271-84.
[2] Baxter R, et al. Long-Term Effectiveness of the Live Zoster Vaccine in Preventing Shingles: A Cohort Study. Am J Epidemiol. 2018;187:161-9
[3] Lal H, Cunningham AL, Godeaux O, Chlibek R, Diez-Domingo J, Hwang SJ, et al. Efficacy of an adjuvanted herpes zoster subunit vaccine in older adults. New England journal of medicine. 2015;372(22):2087-96..

Vaccine efficacy and effectiveness against herpes zoster

Williams, et al. Vaccines 2025, 13, 250.)

- Pivotal phase III clinical trials among 50 and 70-yr-olds showed **high efficacy of 97.2%** (95% CI: 93.7-99) **and 89.8%** (95% CI: 84.2 to 93.7), respectively.
- Pooled efficacy estimates above 90% across different age groups.
- High efficacy maintained throughout 11 years (82.0% (95% CI 63.03–92.22) in ≥50 years and 72.0% (33.41–89.77) in ≥70 years).
- Vaccine effectiveness ranged between 71% and 86%.



SAGE recommendations on varicella and zoster vaccination

SAGE recommended that the use of varicella vaccines using a **2-dose schedule** with a minimum **4-week interval between doses** be considered for the prevention of varicella in **children** in **populations where varicella is an important public health problem**.

Countries introducing the varicella vaccine should define vaccination **coverage targets** to avoid the **theoretical risk** of a **shift in the age of infection** resulting in higher morbidity if coverage is low or modest, guided by national and subnational **disease burden**, **affordability**, **cost-effectiveness**, seroprevalence rates and **age of infection** acquisition .

SAGE also recommended consideration of **varicella vaccination of special populations** such as **certain groups of immunocompromised** and those living with **well-controlled HIV infection** and **adequate CD4 counts**, and health care workers without evidence of prior VZV infection or vaccination, particularly if they care for immunocompromised persons or children.

SAGE recommended that the use of the **recombinant herpes zoster** vaccine in a **2-dose schedule** with a minimum 2-month interval between doses, for the prevention of herpes zoster **in older adults**, including in those with **chronic conditions** and **immunocompromised**, be considered in countries **where herpes zoster is an important public health problem** with due consideration to its cost-effectiveness and affordability.

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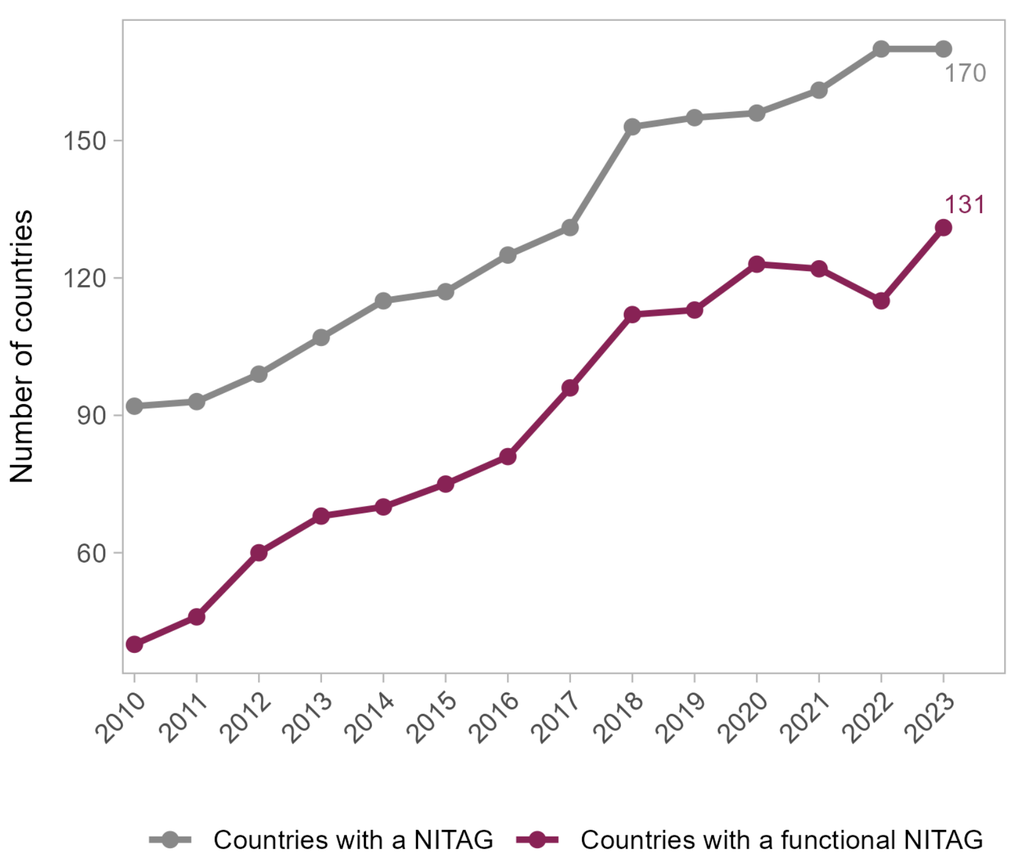
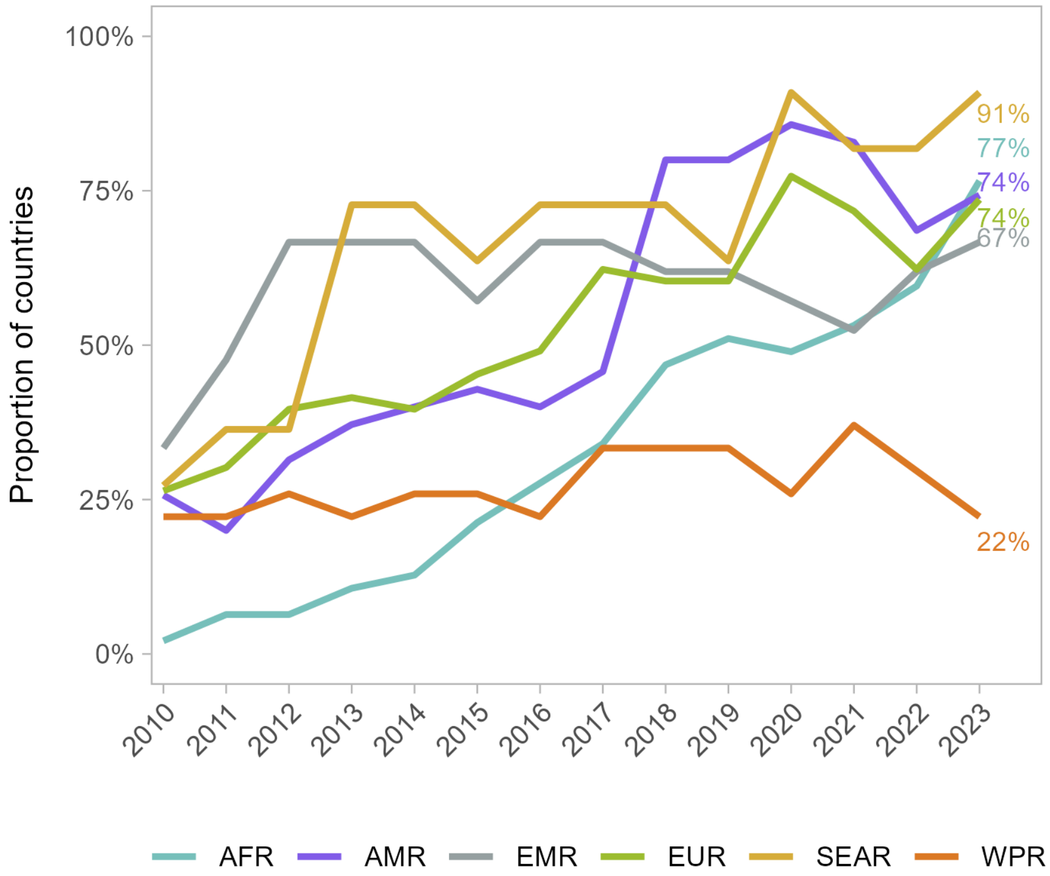
GLOBAL PROGRESS WITH NATIONAL IMMUNIZATION TECHNICAL ADVISORY GROUPS (NITAGs)

Significant global and regional progress in NITAG functionality, with opportunities for further advancement in WPRO

Global trends since 2010

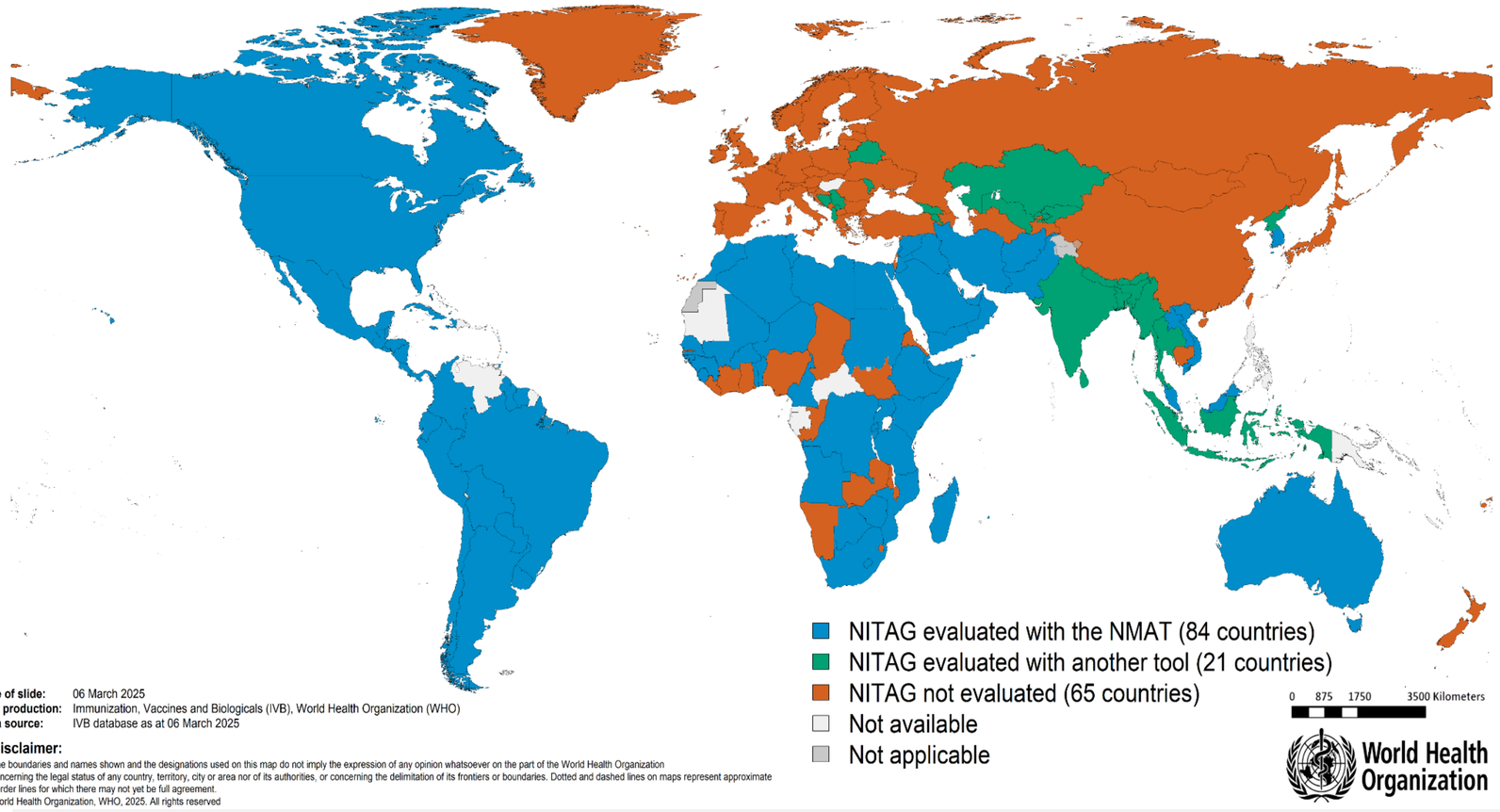


Regional trends



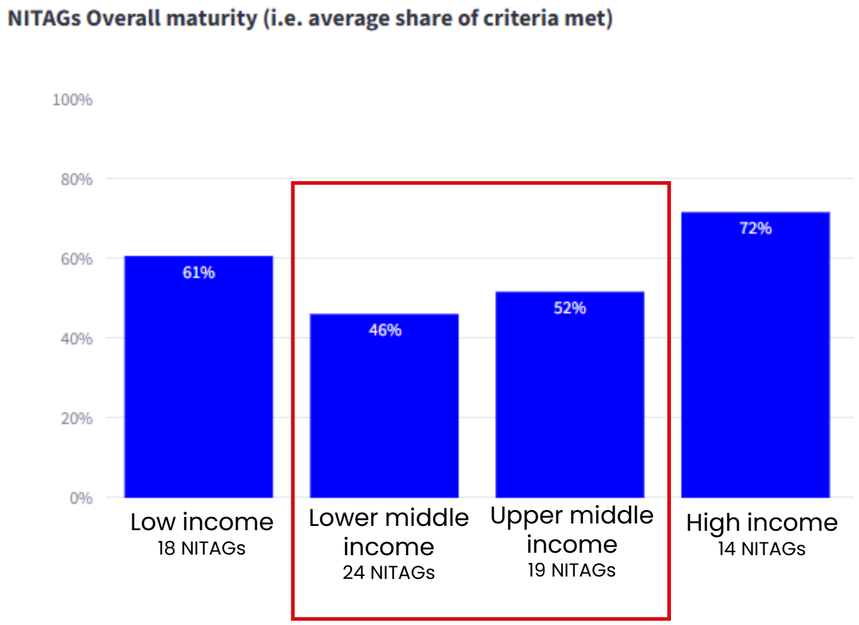
NITAGs and their partners are gradually conducting evaluations

- **84 countries** conducted an evaluation using the NITAG Maturity Assessment Tool
- **21 NITAGs** were evaluated with another tool
- **NITAGs from EURO & WPRO** need to continue evaluation efforts
- **Evaluation should be regularly conducted**, ideally with the NMAT, and improvement plans should be monitored.

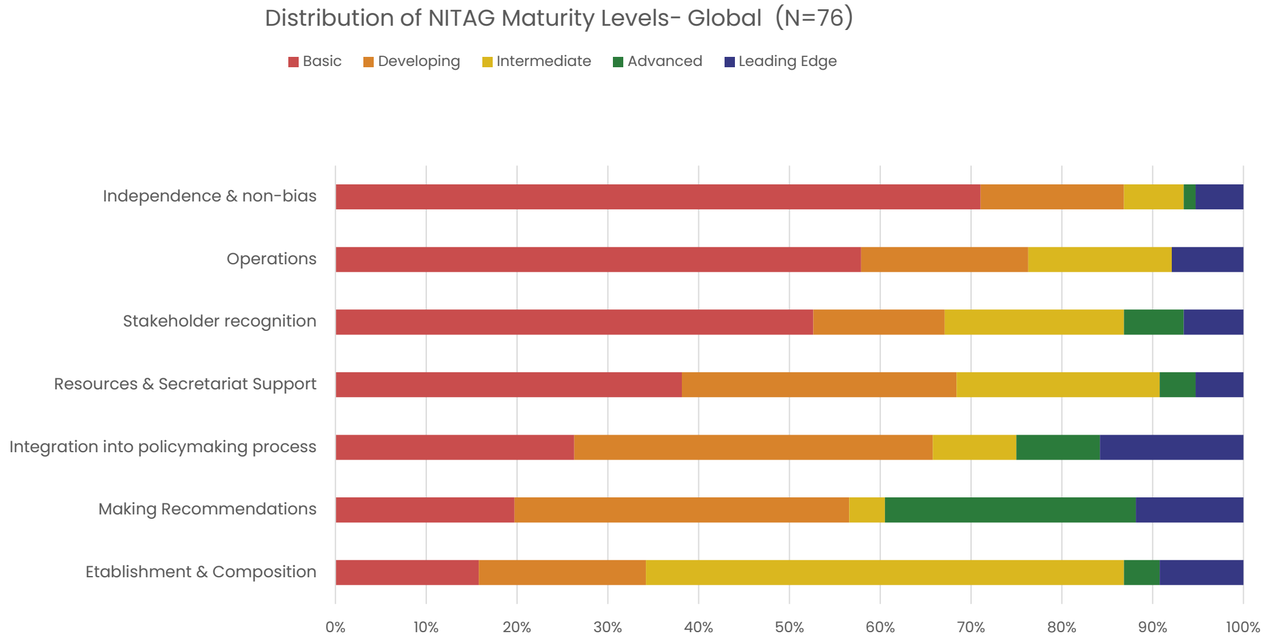


Analysis of NITAG maturity based on the NMAT of countries across four regions: AFRO, EMRO, PAHO, and WPRO

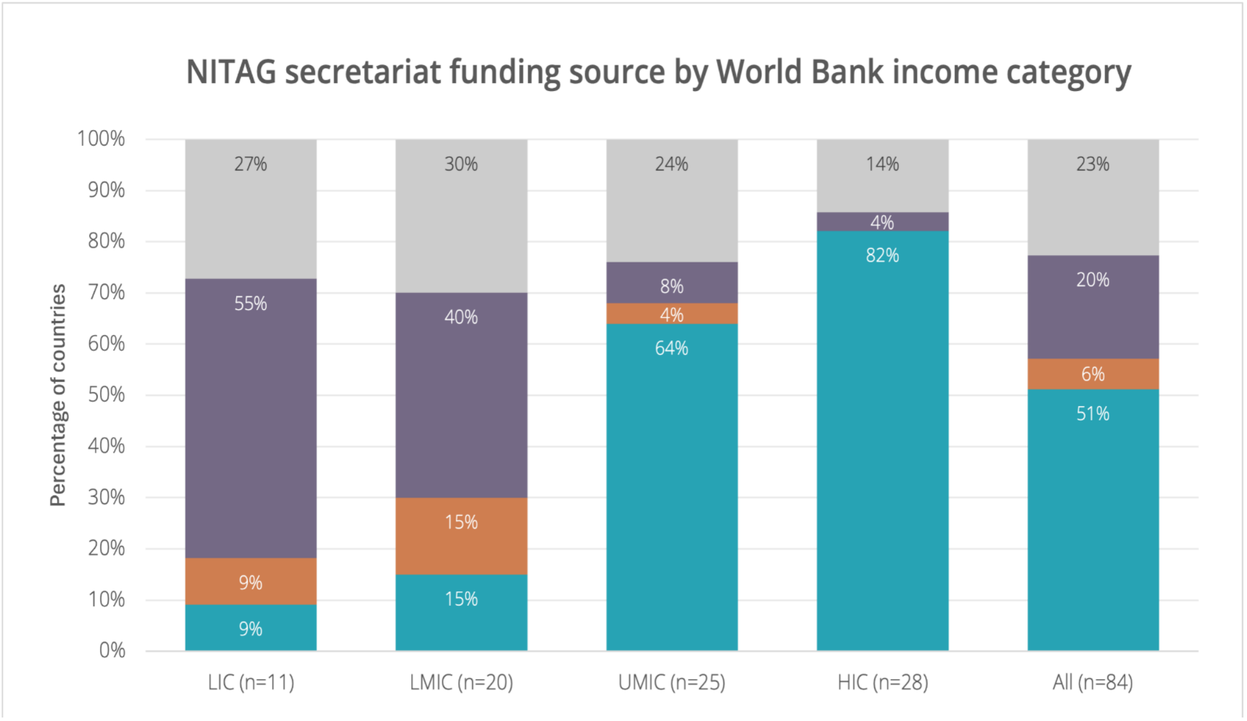
Overal maturity varies by income level

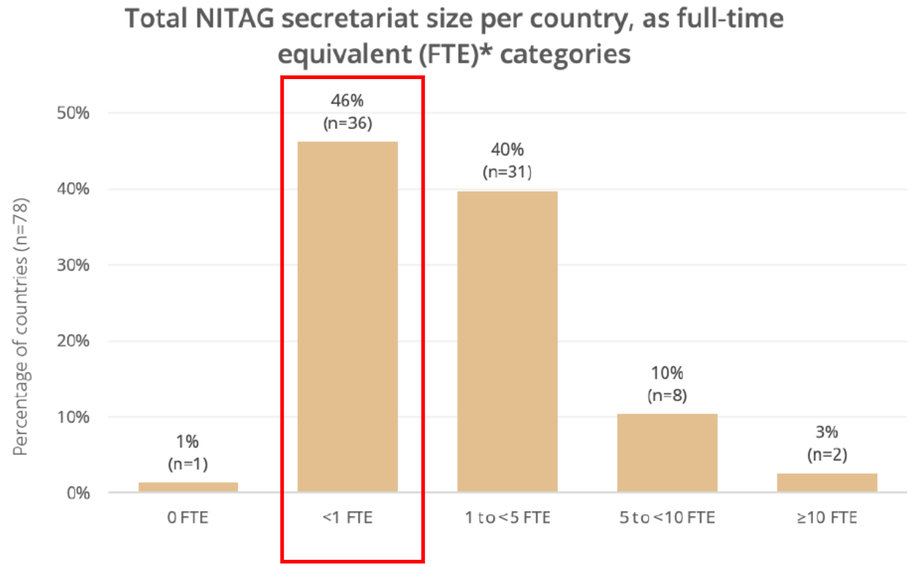


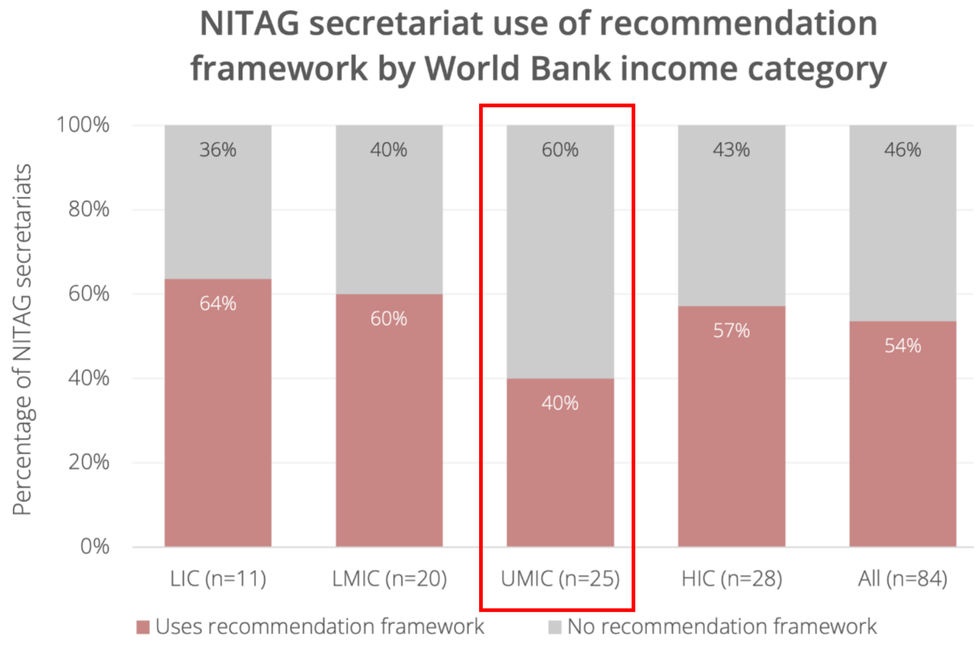
Independence and non-bias, followed by operations and stakeholder recognition, are the indicators with the lowest performance



The structure, funding, and staffing of NITAG secretariats vary across income levels. The majority of NITAGs rely on fewer than one full-time staff member







Expanding NITAG mandate

Current efforts

- Scope of work of NITAGs shifted from childhood vaccination to life course
- Progressively broadening mandates, extending beyond new vaccine introductions to **monitoring coverage,** evaluating programme performance, and optimizing vaccine use**.**
- NITAGs now are increasingly integrating **economic** and **equity considerations** into their evidence review process
- GAVI applications necessitate NITAG recommendations also for campaigns and some switches.

What could be further enhanced

- Active involvement in development of the **National Immunization Strategy as a key stakeholder**
- Provide recommendations on **programme priorities** using a Multi-criteria decision analysis approach
- Advise on **complex immunization-related issues** such as vaccine hesitancy, low vaccine uptake, pandemic preparedness

Rethinking the technical assistance to support the expanding competencies of NITAG members is essential

ONSITE → ONLINE

- WHO training on their **roles and responsibilities** results in most NITAGs having Terms of reference, Standard operating procedures, and conflict of interest management policies in place.
- WHO and its partners conduct three-day multi-country workshops on the evidence-to-recommendation process, **using a policy question to facilitate hands-on learning**.
- Exposure to **vaccinology concepts** through courses and training is on the rise
- However, **expansion of mandate** and the natural **turnover** of members necessitate **continuous support** for training (virtual).

The Online learning journey (ongoing project)

A **10-week online course** targeting NITAG members and secretariat. **Self-paced interactive module** and meet for a **facilitated discussion with a lead expert**. Coordinated by WHO and **launch initially planned in fall 2025**. Funding no longer secured.

Tentative curriculum:

1. EPI & Immunization system
2. NITAG roles and operations
3. Vaccinology overview
4. Demand and market
5. Evidence to recommendation (EtR)
6. Evidence gathering
7. Economic considerations
8. Evidence appraisal
9. Modelling
10. Communicating with policy makers

SAGE observations on NITAGs

SAGE encouraged efforts to sustain and further **enhance** the **capacity of NITAGs** through **trainings** and advocated for **periodic evaluations** of their capacity and functioning.

SAGE reiterated the need **for sub-regional immunization technical advisory groups** to serve **countries with small populations** and inadequate technical capacity.

SAGE called for **countries** to demonstrate their **commitment** to NITAGs by **increasing domestic funding** to support the NITAG **secretariats** and their operations, and enacting **legislation** that recognizes the **role, importance and functionality** of NITAGs.

SAGE applauded the strong **coordination** of NITAG support through the **Global NITAG Network** and called WHO and partners to continue supporting this initiative.

World Health Organization | IVB

Thank you