

Optimizing Immunization Schedules

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**World Health
Organization**

Bottom Line Up Front

A wholistic integrated child-centred view of the schedule is important

- 1 Immunization is the backbone of PHC services**
Integration (VitA, ITNs, nutrition, family planning, develop^t, sickle screening?, AZM??)
Human-centred (child, family, health worker)
- 2 New vaccine introductions**
Many more vaccines than before.
Non-classic schedule, seasonal/hybrid schedules (e.g. RTS,S)
Lifecourse: 2YL, school entry, adolescents, adult boosters, pregnancy, older adults, HCW
Missed opportunities including in acute care
Beware well-intended harms, or: It's all about coverage!
- 3 Science**
Immunology (DTP and Measles specific), Epidemiology, Biology (Host-specific: NSE, malnourished children, other), Programmatic implementation (What does it take, readiness), Behavioural (acceptability, motivation: get something each visit), Economic, Decision, Ethics
- 4 Catch-up, Recovery, Strengthen**
Policy flexibility on age-eligibility, flexible delivery windows: permissive schedules
Outbreaks
Opportunity to fundamentally strengthen immunization systems.
We can't campaign our way out.

1974: Expanded Programme on Immunization

1968: Smallpox

Schedules were various, not based on strong evidence

Focus was outbreak response

DTP coverage <5%

1974: EPI

Built on success of smallpox eradication

Heat sensitive antigens needed cold chain

1980's: Universal Childhood Immunization

UNICEF/WHO: financing, procurement, standards, training, implementation

1990's: Polio eradication

Campaign focus

2000's: Gavi

Pneumo, Rota

Wastage issues, HSS issues

2010's: Reach and coverage, ADIPs

GVAP, RED, REC, NUVIs, HPV, Regional Ag's

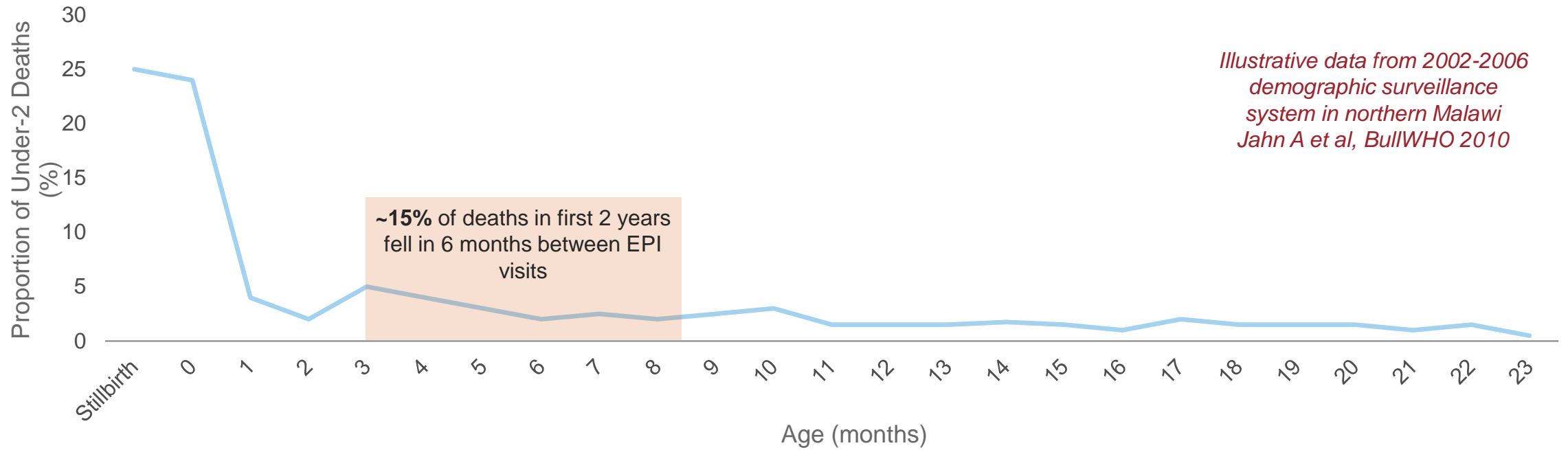
2020's: IA2030

Pandemic

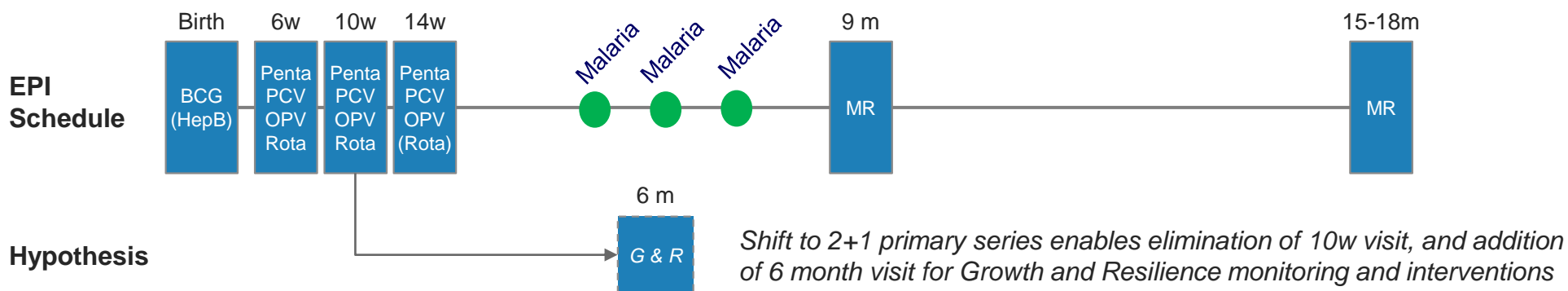
Resolution WHA 27.57 (1974):

Recommends that *WHO Member States* develop or maintain **immunization and surveillance programs** against some or all of the following diseases: *diphtheria, poliomyelitis, pertussis, tetanus, measles, tuberculosis and smallpox.*

Current EPI schedule lacks touchpoints with healthcare workers during critical growth and development period



*Illustrative data from 2002-2006 demographic surveillance system in northern Malawi
Jahn A et al, BullWHO 2010*



IA2030 goals, quantitative targets and strategic priorities

IA2030 Impact Goals

- 1 **Reduce mortality and morbidity** from vaccine-preventable diseases for everyone throughout the life course
- 2 **Leave no one behind, by increasing equitable access and use of new and existing vaccines**
- 3 **Ensure good health and wellbeing for everyone by strengthening immunization within primary health care and contributing to universal health coverage and sustainable development**

Targets

- 1.1 50mn future deaths averted globally
- 1.2 All countries achieve endorsed VPD control, elimination and eradication targets
- 1.3 All selected VDPs have a declining trend in the number of large or disruptive outbreaks
- 2.1 50% reduction in the number of zero dose children
- 2.2 500 vaccine introduction in low- and middle- income countries
- 3.1 90% global coverage for DTP3, MCV2, PCV3 and HPVc
- 3.2 Improve Universal Health Coverage

21 Strategic Priority Objectives



Strategic Priority Objective indicators:

15 global indicators

+ Indicator options available for all 21 SP objectives for **tailored regional and country M&E Frameworks** based on context



Immunization through the life course, integrated through PHC

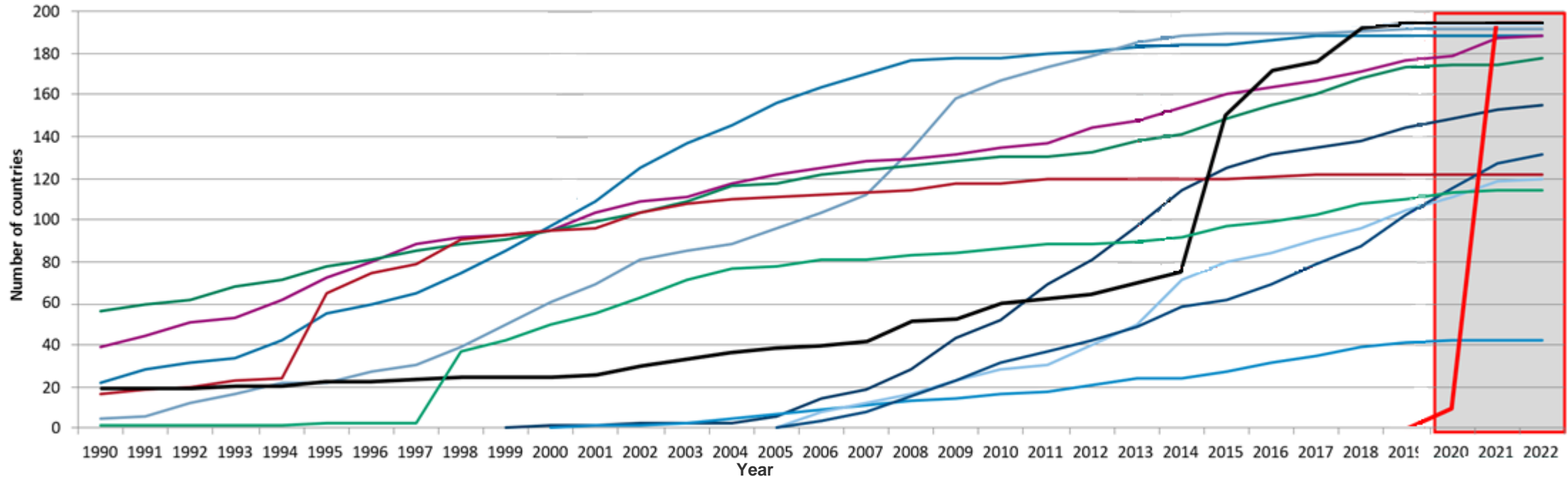
Addressing demand & vaccine misinformation

		Pregnant women	New born (24 hours)	Infant (<1 year)	Second year of life (12–23 months)	Child (2–4 years)	Adolescent (9–19 years)	Adult (25–60 years)	Older person (+61 years)		
Immunization*	Vaccines recommended by WHO for all immunization programmes	Tetanus toxoid containing vaccine (TTCV)	BCG Hep B-BD	DTPCV HepB Hib	Measles PCV Polio	Rubella Rotavirus	DTPCV booster Measles PCV3 (if 2+1 schedule)	Diphtheria booster Tetanus booster	Diphtheria booster HPV Tetanus booster	–	–
	Vaccines recommended by WHO for certain regions high risk populations/ immunization programmes with certain characteristics	Seasonal influenza		Japanese Encephalitis Meningococcal Rabies Seasonal Influenza Typhoid Yellow Fever	Cholera Hepatitis A Meningococcal Mumps Rabies Seasonal Influenza	Typhoid Varicella	Cholera Rabies Seasonal Influenza Typhoid	Cholera Dengue Rabies Seasonal Influenza Typhoid	Cholera Dengue Rabies Seasonal Influenza	Cholera Rabies Seasonal Influenza	Cholera Rabies Seasonal Influenza
Nutrition	Growth monitoring/ nutritional counselling	●	●	●	●	●					
	Vitamin A supplementation	●		●	●	●					
Malaria	Distribution of long-lasting insecticidal nets (LLNs)	●	●	●	●	●	●	●	●	●	
	Intermittent preventive treatment of malaria in infants (IPTi)			●							
	Seasonal malaria chemoprevention (SMC)			●	●	●					
Neglected tropical diseases	Deworming	●		●	●	●	●	●	●	●	
Reproductive & maternal health services	Family planning services	●	●**	●**	●**	●**	●	●			
HIV	HIV services	●	●	●	●	●	●	●	●	●	
	Male circumcision for HIV prevention						●	●			
Wash	Hygiene kit distribution	●	●	●	●	●	●	●	●	●	
Health education	Health counselling	●	●	●	●	●	●	●	●	●	

*Complete WHO immunization recommendations can be found in the Vaccine Position Papers and Summary Tables available at www.who.int/immunization/policy/en/

**For caregiver

Vaccine introductions



- Hepatitis B vaccines
- Pneumococcal conjugate vaccines
- Rubella vaccines
- Varicella vaccines
- Human Papillomavirus vaccines
- Birth dose of Hepatitis B vaccines
- Measles, DTP and Polio containing vaccines
- Heamophilus influenzae type b vaccines
- Second dose of measles containing vaccines
- Mumps vaccines
- Rotavirus vaccines
- Inactivated poliovirus containing vaccines
- COVID-19 vaccines

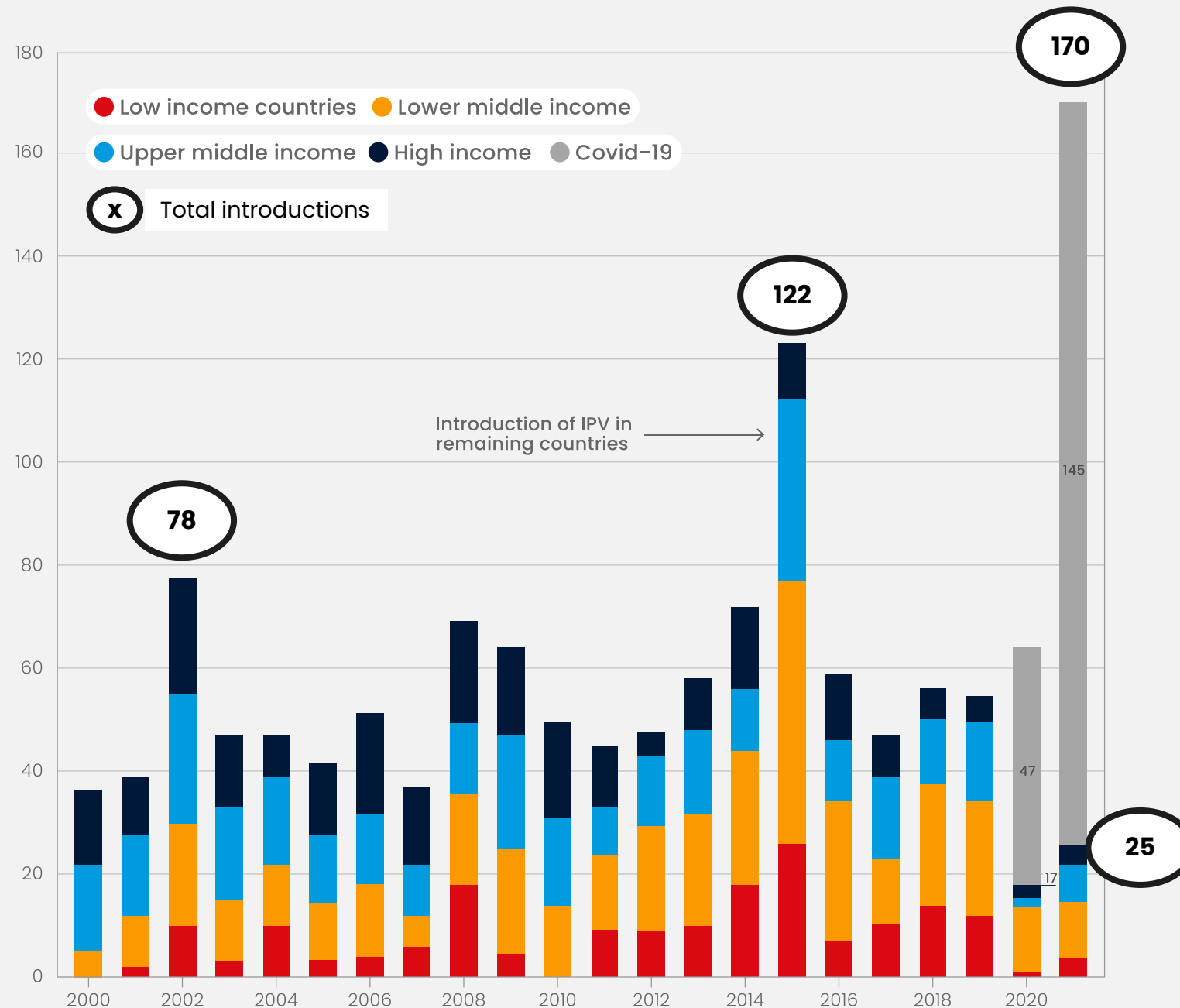
2021 - Greatest number of vaccine introductions ever in a single year

Driven by COVID-19 vaccine

- **192 Member States** introduced COVID-19 vaccines in 2020 & 2021
- **Fewer other vaccine introductions**, not seen since before 2000
- **Well below** long-run average of approx **50/year**



Introductions: HepB, HepB Birth dose, Hib, HPV, IPV, JE, MCV2, Meningitis, PCV, Rotavirus, Rubella, Yellow Fever, DTP Booster



Emerging vaccines, vaccine-like monoclonal antibodies and innovative vaccine technologies

Recently licensed vaccines

RSV monoclonal for pediatric use

Dengue

Soon to be licensed vaccines

RSV vaccines for maternal immunization

RSV vaccines for the elderly

Chikungunya

Vaccine on the horizon

TB vaccines for adults and adolescents

Group B Streptococcus

Shigella

RSV for pediatrics

Improved vaccines in the pipeline

'Universal' influenza

TCV + paratyphi A bivalent

BCG-like vaccines

Malaria

Innovative technologies mRNA, viral vector

mRNA vaccine

Microarray patches

Heat stable vaccines

More monoclonal antibodies

Pandemic impact on immunization: *special imperative to act*

Immunization System: 2020 – 2022+

5.5 Billion

Adults vaccinated
(with 13.3 billion doses)

47 Million

Children
did not get DTP1

The number of zero-dose children increased sharply during the 2020-2021 pandemic years

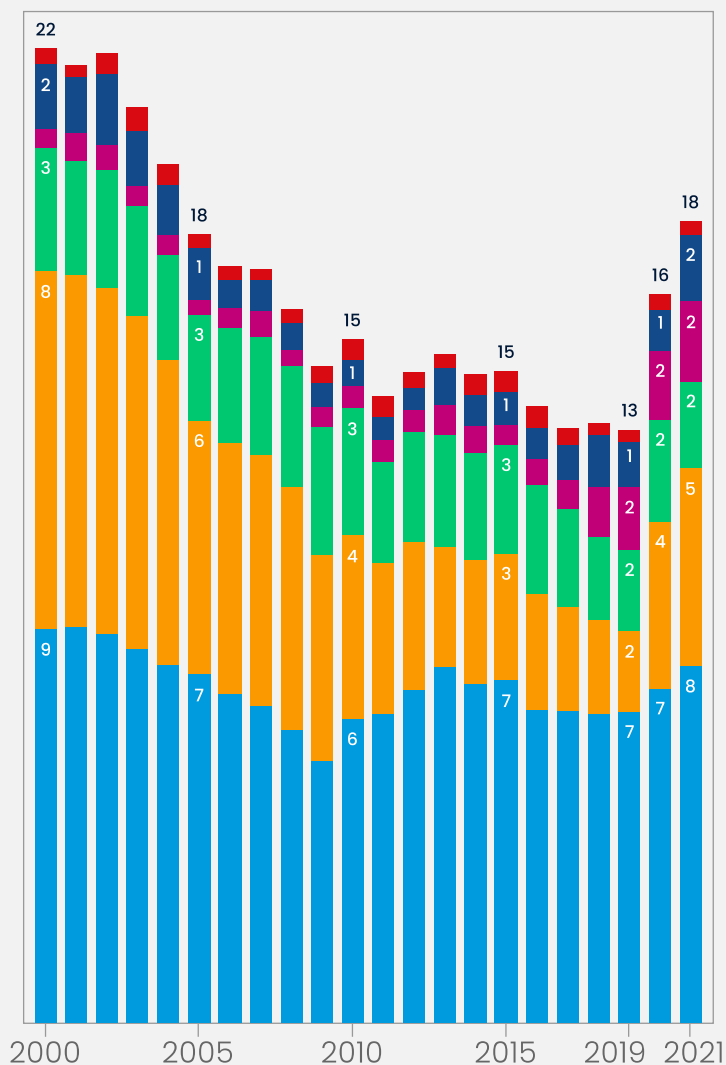
The number of zero-dose children – those never vaccinated with even a first dose of DTP-containing vaccine, increased by 37%, from 13 to 18 million since 2019.

18 million children were left out by immunization services in 2021, a number not seen since 2005. Almost all zero-dose children live in low- and middle-income countries, especially in the African and South-East Asian regions.

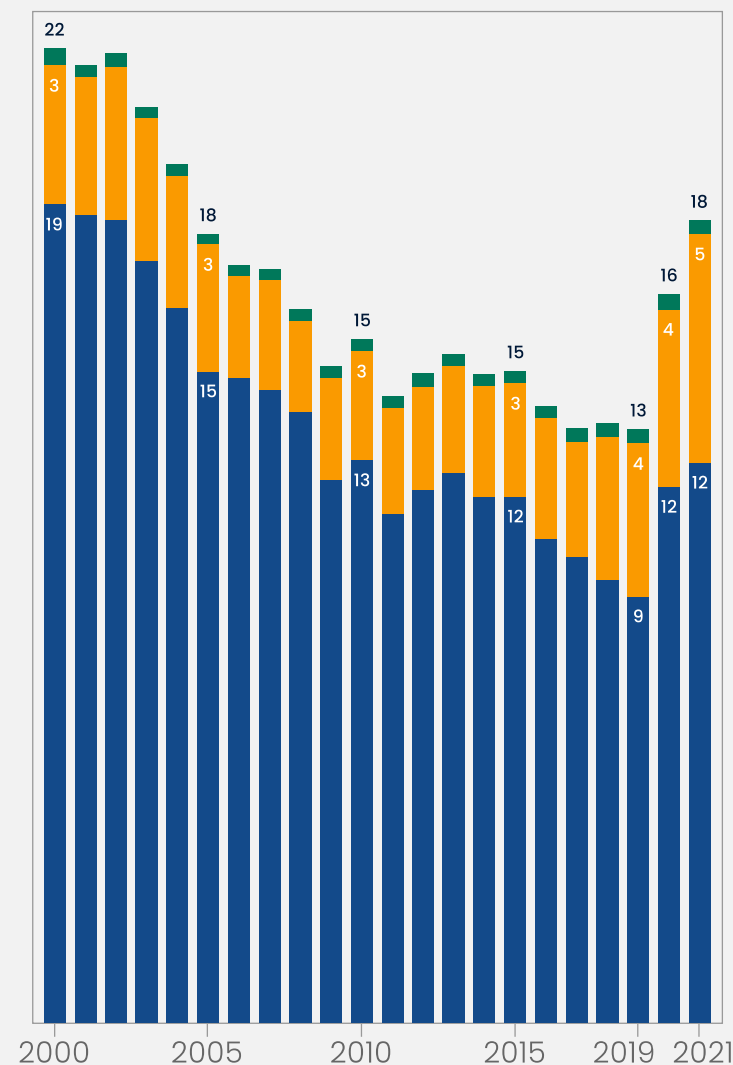
In this analysis, zero-dose children are those who lack any dose of DTP. Under-vaccinated are those who received one dose, but not a third protective dose.



Zero dose children by WHO region



Zero dose children in Gavi countries



● AFR ● SEAR ● EMR ● AMR ● WPR ● EUR

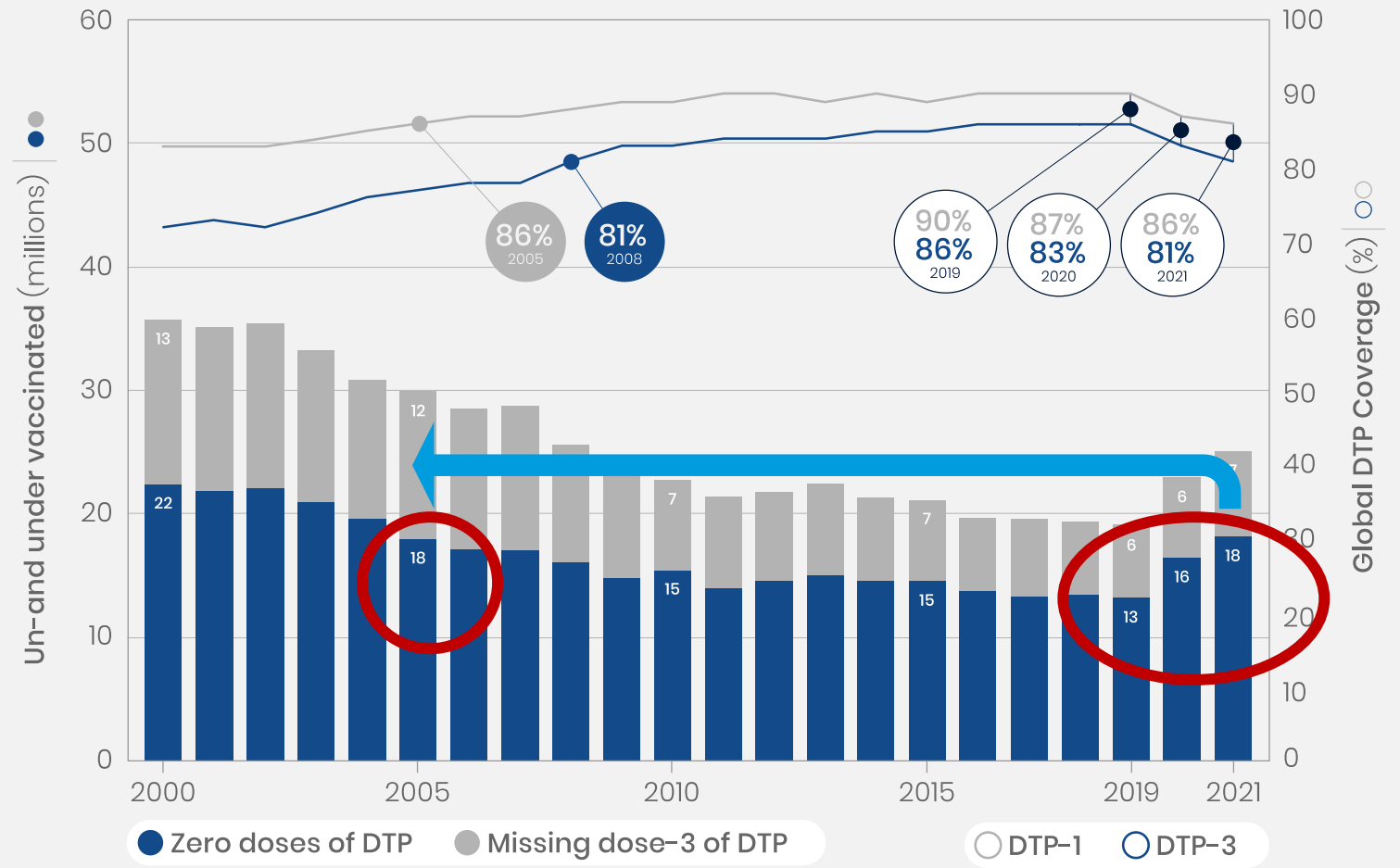
● Gavi ● Non Gavi MIC ● HIC

COVID-19 pandemic caused backsliding in immunization

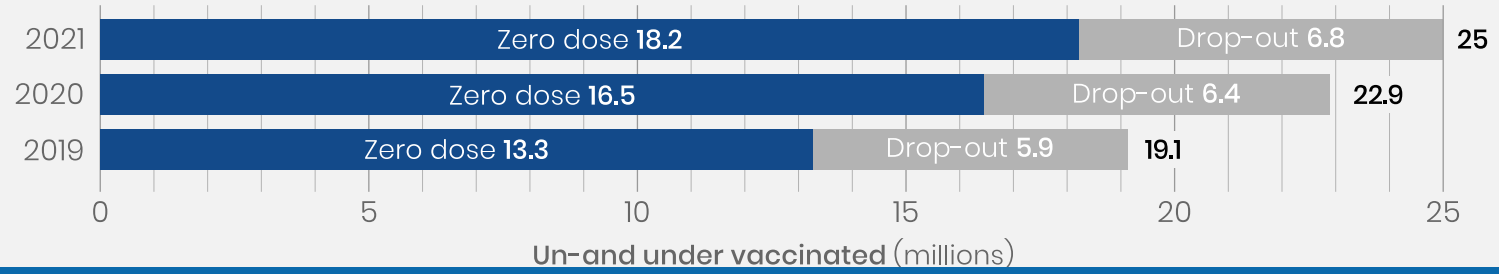
25M children were un-or under-vaccinated in 2021 alone

18.2M were zero-dose

6M more than in 2019



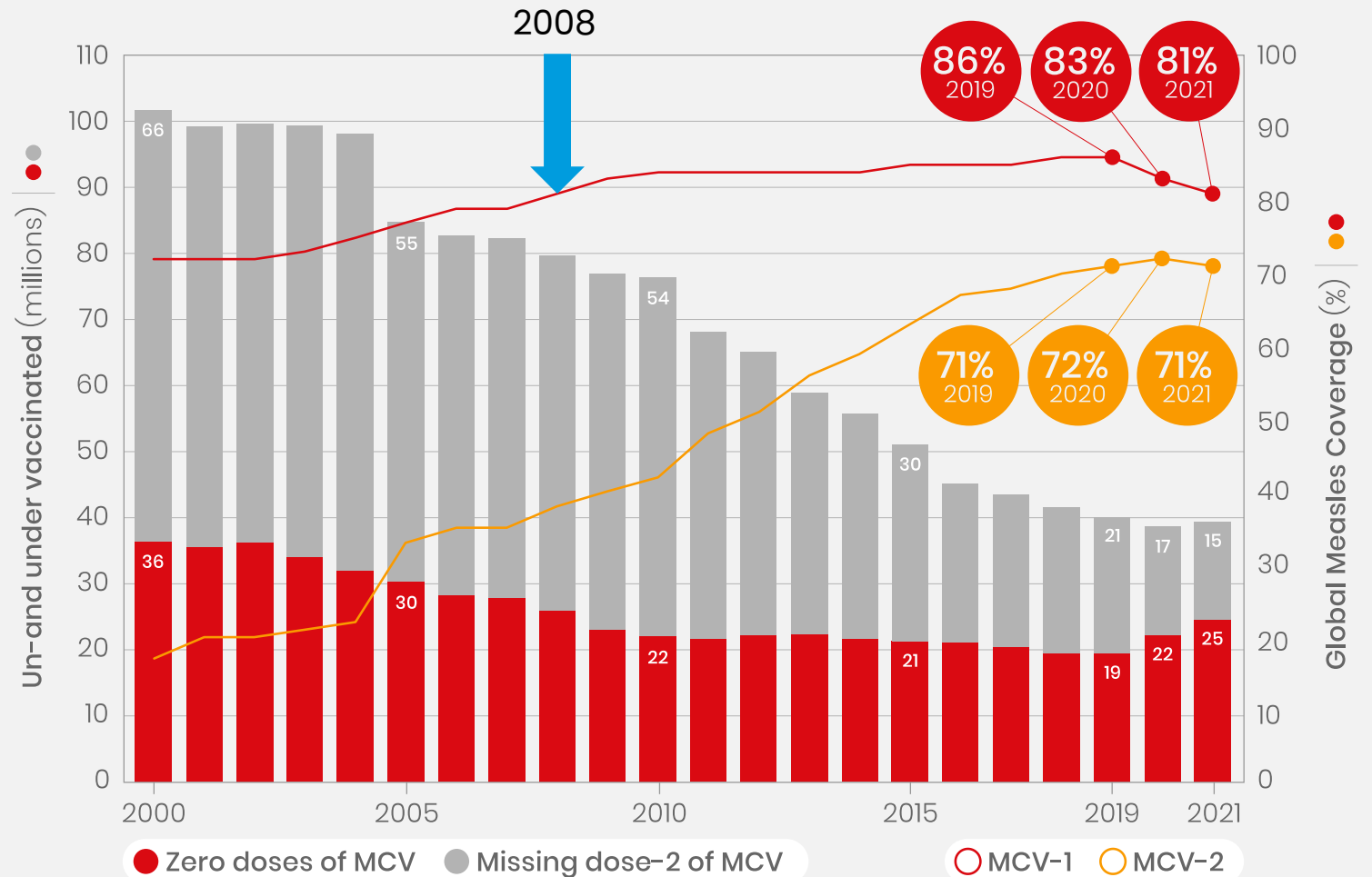
6m additional unprotected children per year since 2019, including 5m zero dose



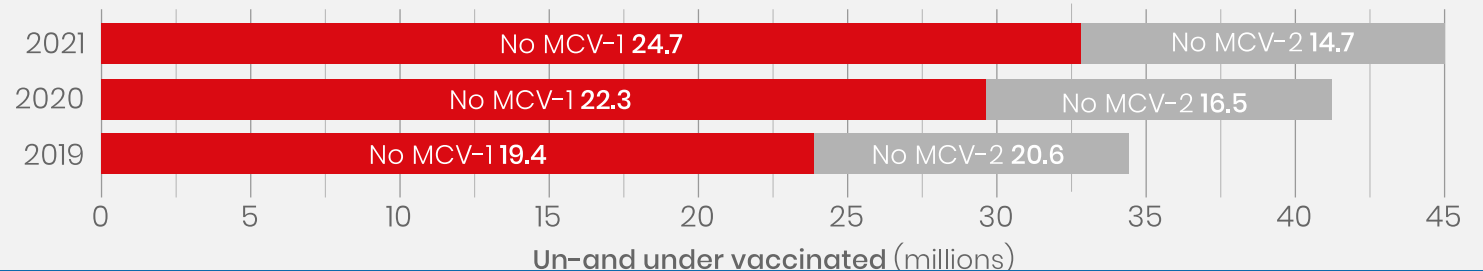
Measles is the "canary in the coal mine"

First dose measles coverage dropped to 81% (2021)

- 25 million children no MCV-1
 - 5 million more than in 2019
 - lowest coverage since 2008
- 15 million *additional* children no MCV-2
- Supplemental Immunization Activities (including campaigns) continue to be required

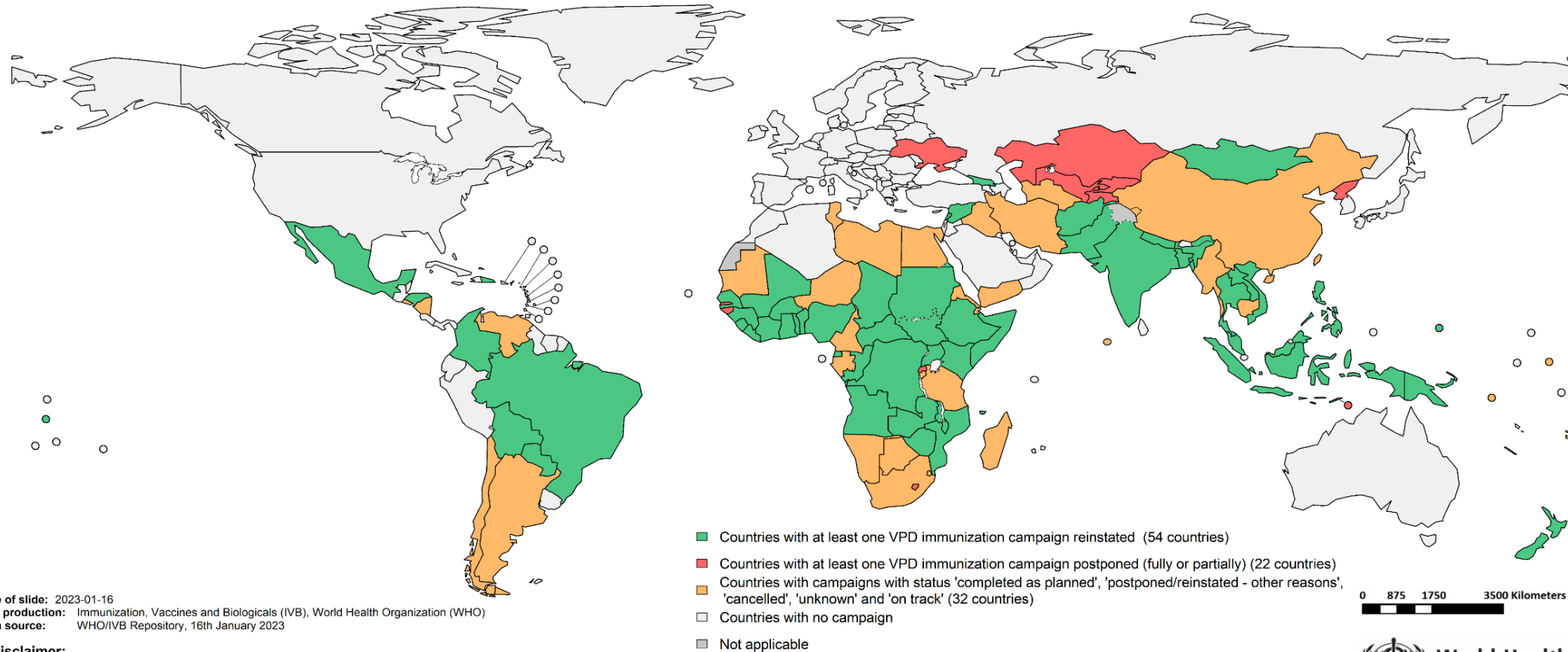


5m additional children without MCV-1 per year since 2019 (+26%)



WUENIC 2021

VPD campaigns postponed due to COVID-19: 22 countries with at least one VPD campaign still postponed, 16th January 2023



Date of slide: 2023-01-16

Map production: Immunization, Vaccines and Biologicals (IVB), World Health Organization (WHO)

Data source: WHO/IVB Repository, 16th January 2023

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, WHO, 2022. All rights reserved



2023 Immunization intensification 3-prong approach:

1

Catch-up

Reaching children who missed vaccination during 2020-2022, some of which was due to the pandemic (this includes the 2019 zero-dose and under-immunized children as part of the accumulated susceptible cohort)

2

Restore immunization programmes

Restore vaccination coverage in 2023 back to at least 2019 coverage levels

3

Strengthen immunization programmes

Strengthen immunization systems within Primary Health Care, to improve program resilience & resume the trajectory of the IA2030 goals & targets

Delivered through:



Political leadership



Advocacy and partnerships



Resource programming



Tailored country response planning & implementation

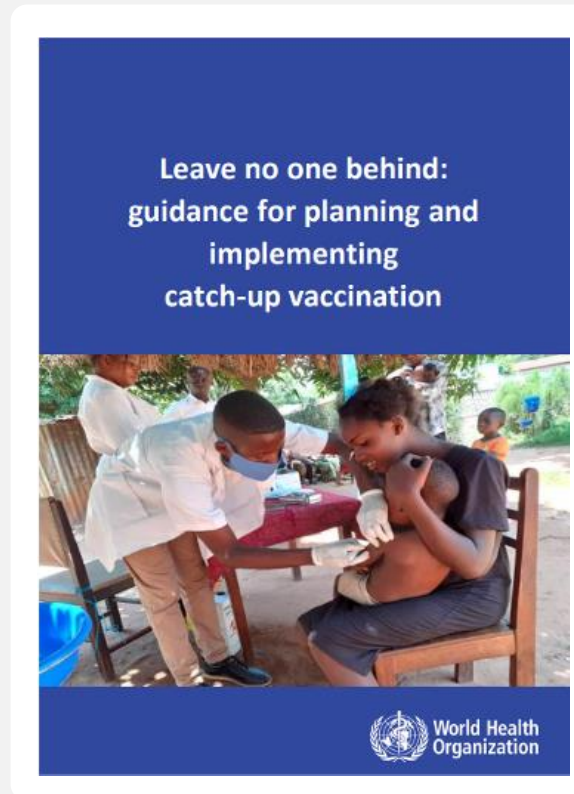
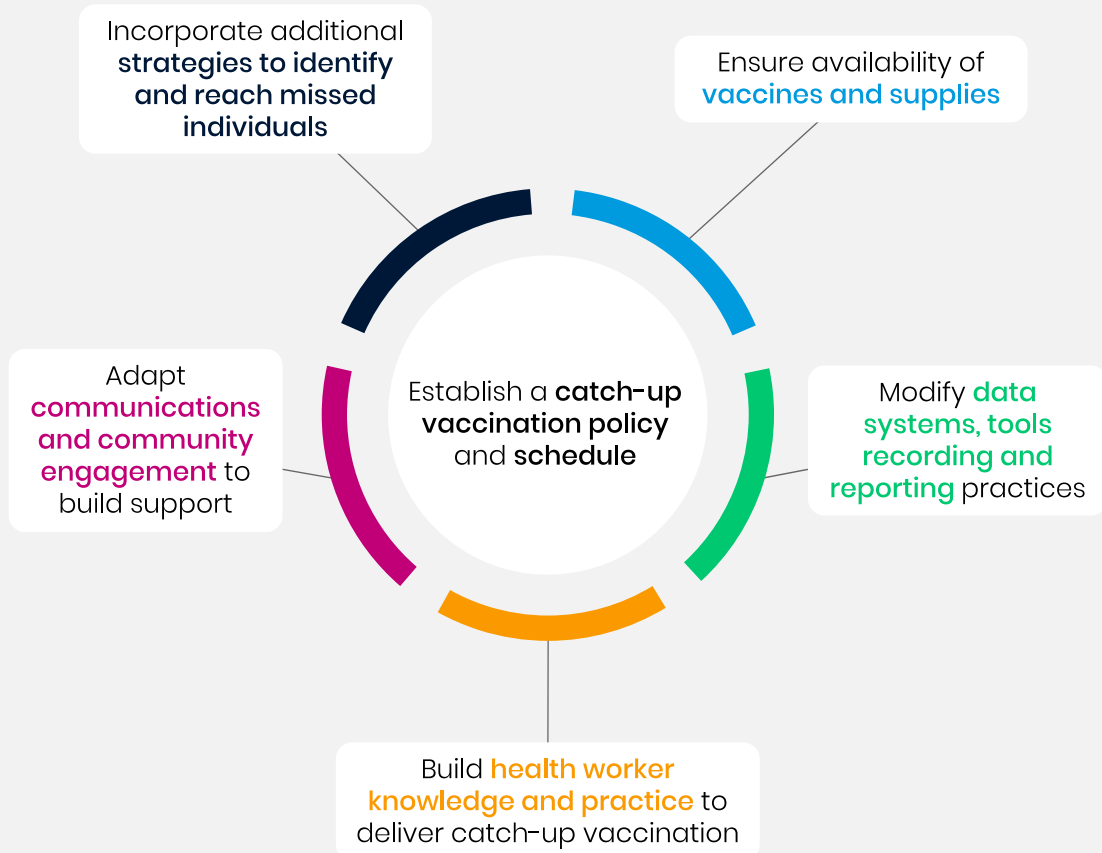


Responsive technical assistance



Monitoring and learning

A robust catch-up vaccination strategy requires a whole system approach



Country	Year	Age Group	Vaccine	Frequency	Notes
...

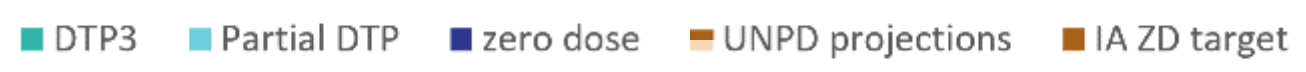
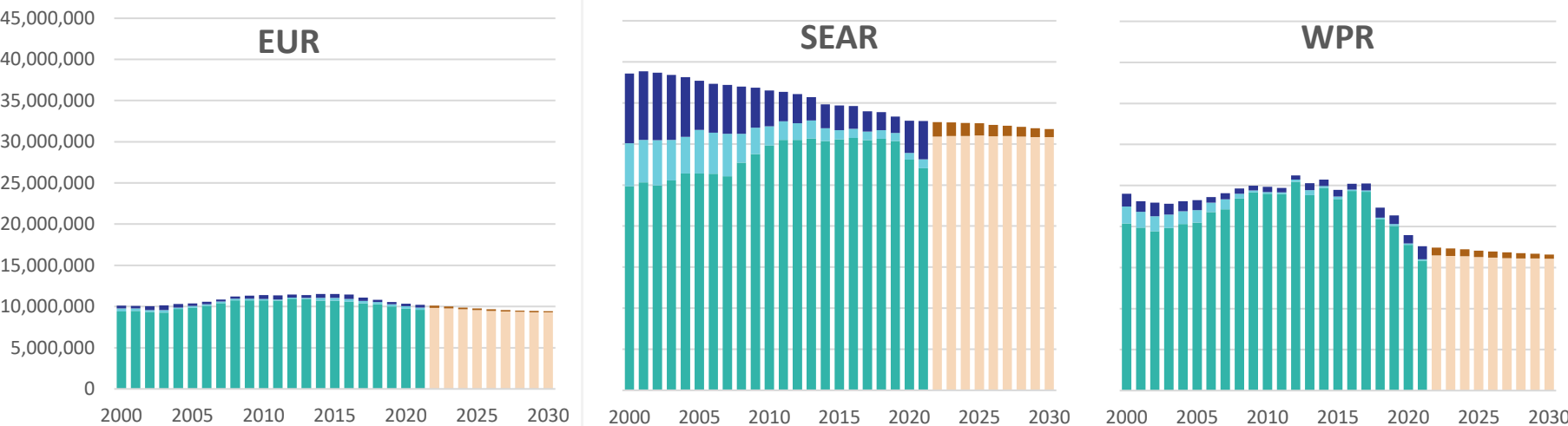
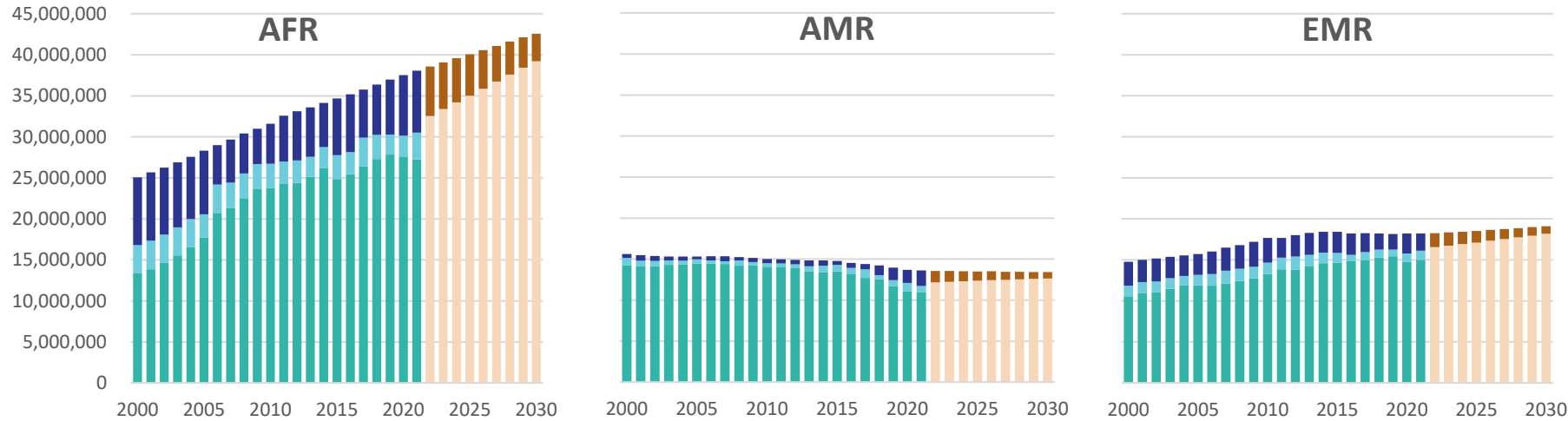
**WHO Recommendations
for Interrupted or Delayed
Routine Immunization**

WHO Guidance on catch-up
vaccination and schedules

Available in EN, FR, PT

[Read more](#)

Demographics in AFR add to the challenge of reaching everyone everywhere



The challenges posed by the pandemic jeopardize the objectives of the Immunization Agenda 2030.

IA2030 aims to leave no one behind with immunization and calls on all countries to reduce the number of “zero dose children” by half by 2030.

In this analysis, zero-dose children are those who lack any dose of DTP. Under-vaccinated are those who received one dose, but not a third protective dose.



Highest Priorities for 2023 – 2025



Zero dose child agenda & RI Strengthening (Catch-up, Recovery & Strengthening)



- Measles
- Polio
- Diphtheria
- Yellow Fever
- Health Emergency Preparedness & Response



HPV Revitalization



COVID-19 integration



Malaria introductions (regional)

Opportunities & next steps

- 1 Let's be clear – what are we after? What do we mean when we say “optimize”?
Second half of 1YL, or also first half (eg PNG 1, 2, 3 mnths) or really early measles. What are the key touchpoints for MNCH?
- 2 What are the outcomes we should track? Coverage? Other services delivered?
Community uptake? HCW satisfaction?
Define the methods (Modelling or CRTs)
- 3 Define the framework for prioritisation, decision and ethical framing
Lay out the opportunities and risks
- 4 Deeper HSS issues – campaigns vs routine immunizations. The heavier is EPI the more is lost when system is diverted, unless build in resilience in timing, call-back etc
- 5 Lead time for R&D: Are there immunological trade-offs that maximise protection (lower efficacy vs earlier coverage, in what contexts, under what epidemiological assumptions)