A global comprehensive VPD surveillance strategy for Immunization Agenda 2030: WHO Surveillance guidelines

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Adult Immunization Board (AIB)

Technical meeting, 20-21 April 2023

Klooster van de Grauwzusters University of Antwerp (Belgium)

World Health Organization | IVB

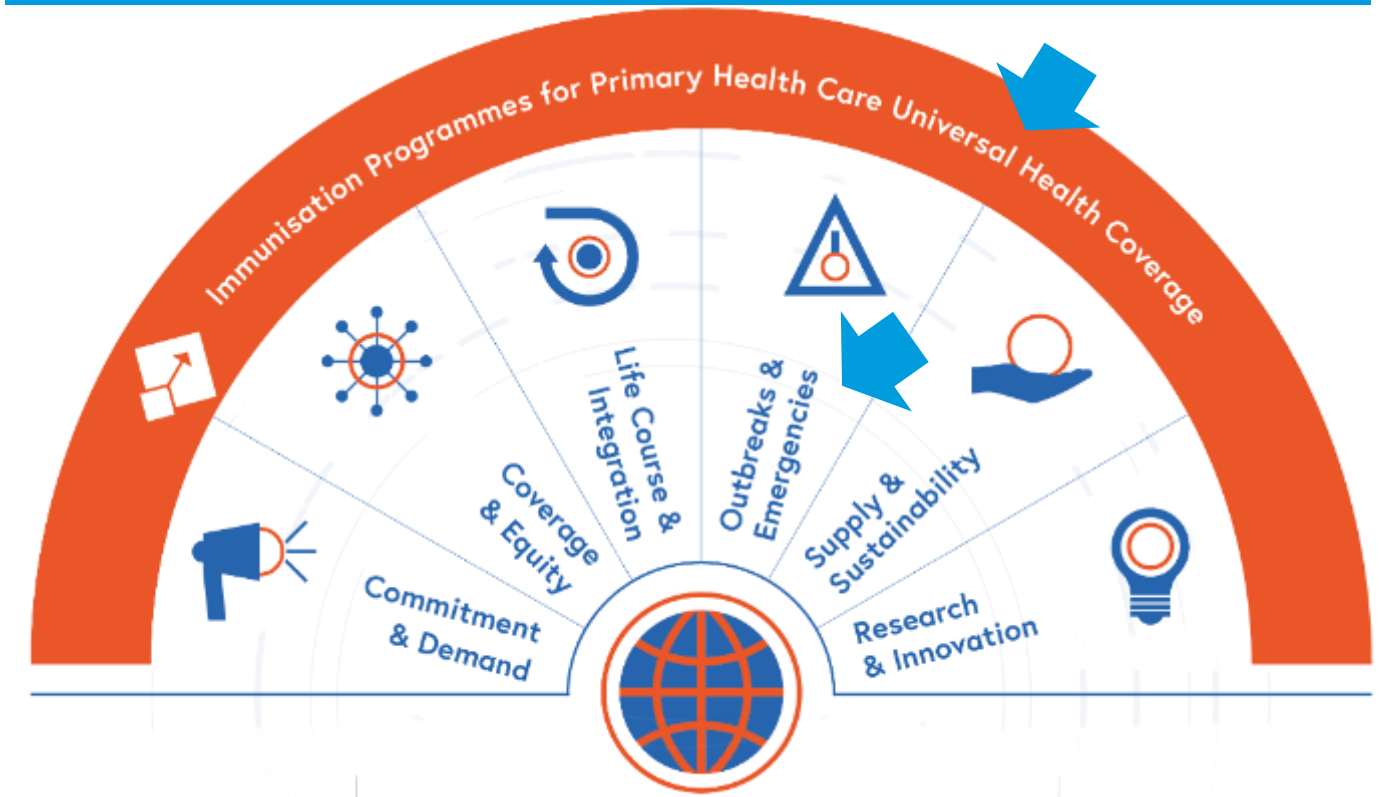
Immunization Agenda 2030 proposes a strategic framework

VPD surveillance embedded in SP1 and SP5

7 Strategic Priorities

informed by

4 Core Principles for action



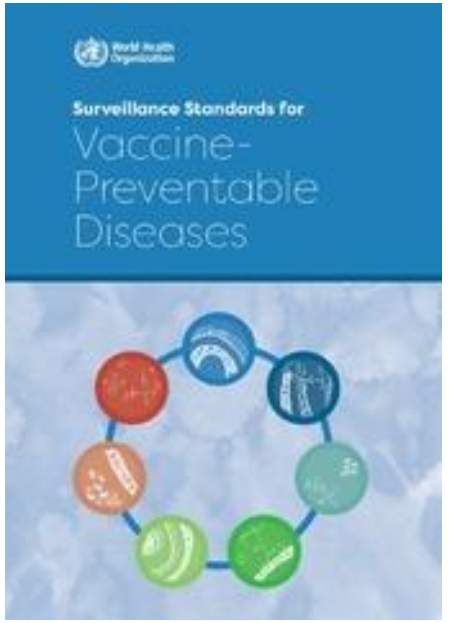
People Centred

Country Owned

Partnership Based

Data Guided

WHO's role in vaccine-preventable disease (VPD) surveillance



- To help countries generate data (for action) and monitor VPD trends globally
- To lead, coordinate, and advocate for surveillance activities with countries and partners
- To set global norms and standards for surveillance including quality assurance and control systems → VPD surveillance standards
- To support countries with technical assistance and evidence-based policy decisions
- To build on surveillance platforms and inform immunization program monitoring and policy

Our vision

All countries have sustainable, high-quality VPD surveillance systems, supported by strong laboratories, that detect and confirm cases and outbreaks and generate useful data to guide outbreak prevention and response, immunisation program management, and vaccine policy to decrease the burden of VPDs as efficiently and effectively as possible

National case-based surveillance

- Meningococcus
- Diphtheria
- Rubella
- Measles
- Neonatal tetanus
- Polio (AFP)

Sentinel case-based surveillance

- Typhoid
- Influenza
- Pneumococcus
- Hib
- Rotavirus
- JE
- CRS

Notifiable disease surveillance

- Cholera
- Non-neonatal tetanus
- Yellow Fever

Outbreak/event surveillance

Governance

Program management

Workforce capacity

Logistics & communication

Laboratory

Supervision

Monitoring & evaluation

Coordination

Surveillance support functions

First dose measles coverage dropped to 81% in 2021, leaving 5 million more children unvaccinated compared to in 2019

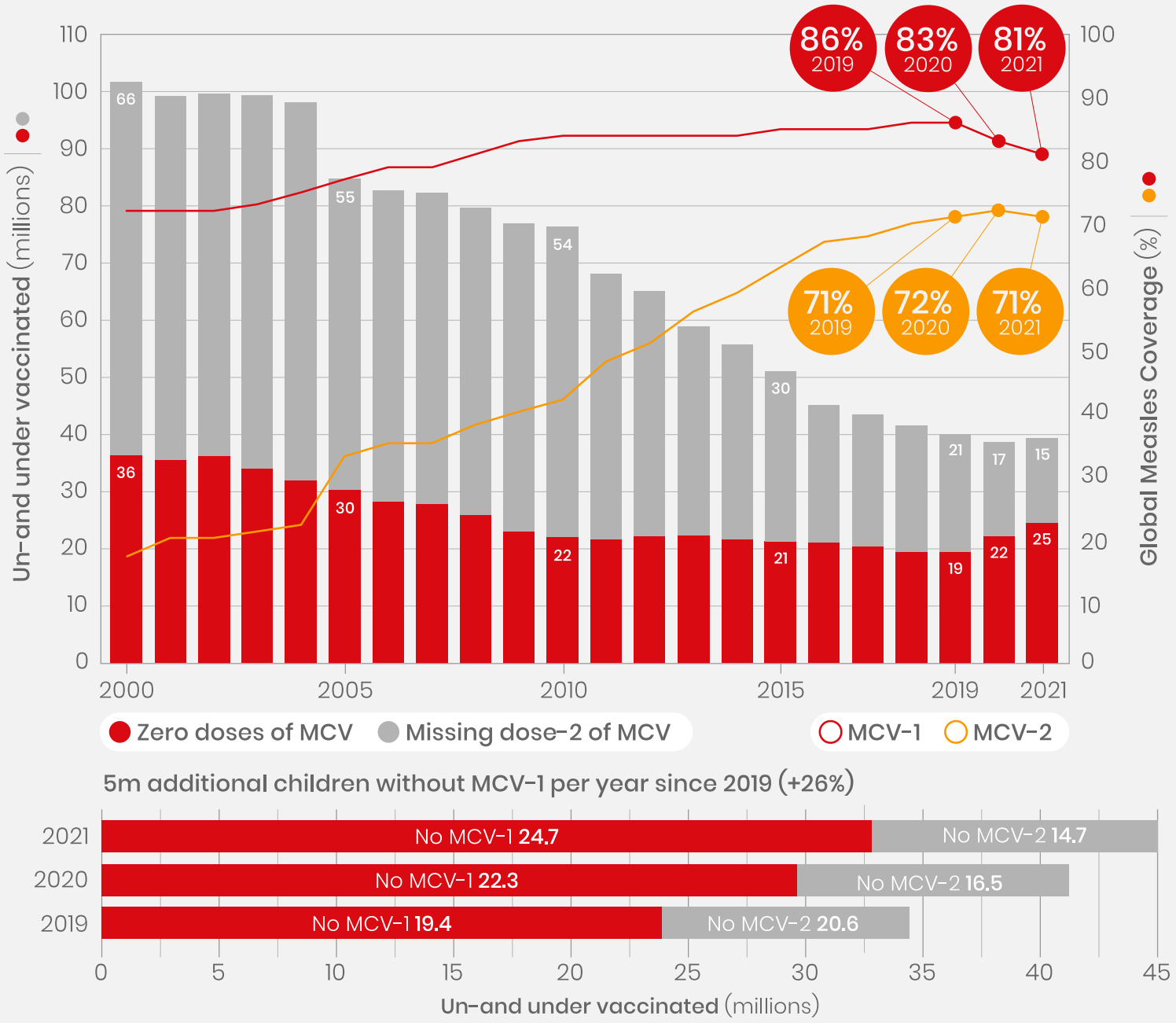
Coverage of the first dose of measles-containing vaccine (MCV-1) dropped to 81% in 2021, the lowest level since 2008.

This leaves 25 million children vulnerable. An additional 15 million children received only a first dose, but not a needed second dose through regular public health services.

Supplemental Immunization Activities (including campaigns) continue to be required to ensure that all children receive the 2 doses that will protect them from measles.

This data is collected through the Joint Reporting Format (JRF) reported annually by MOH to WHO and UNICEF for VPD case aggregates and vaccine coverage.

World Health Organization unicef



Different VPD syndromes are surveilled according to end objectives of program and historical evolution of programs

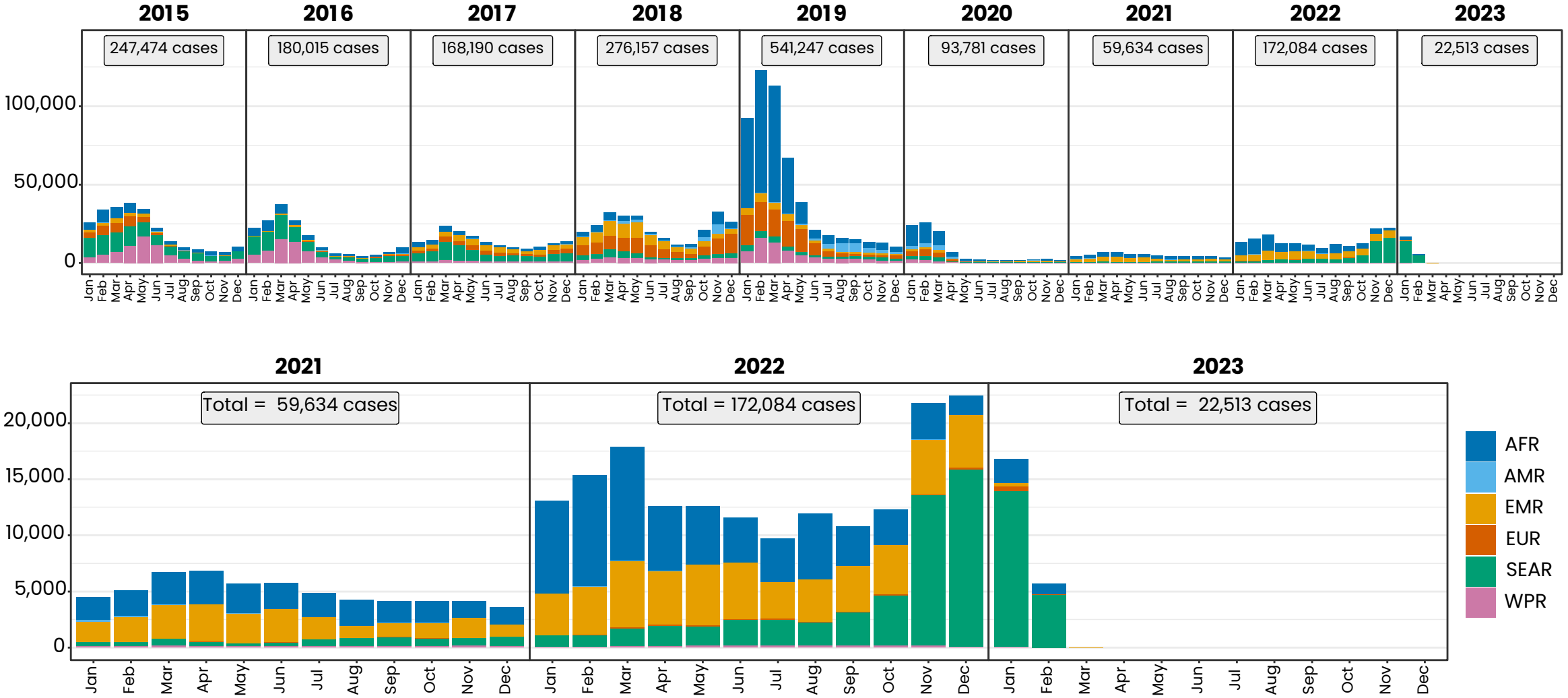
SOME EXAMPLES

Global case-based surveillance on total population for regional measles elimination goals

Immunization Analysis and Insights (who.int)

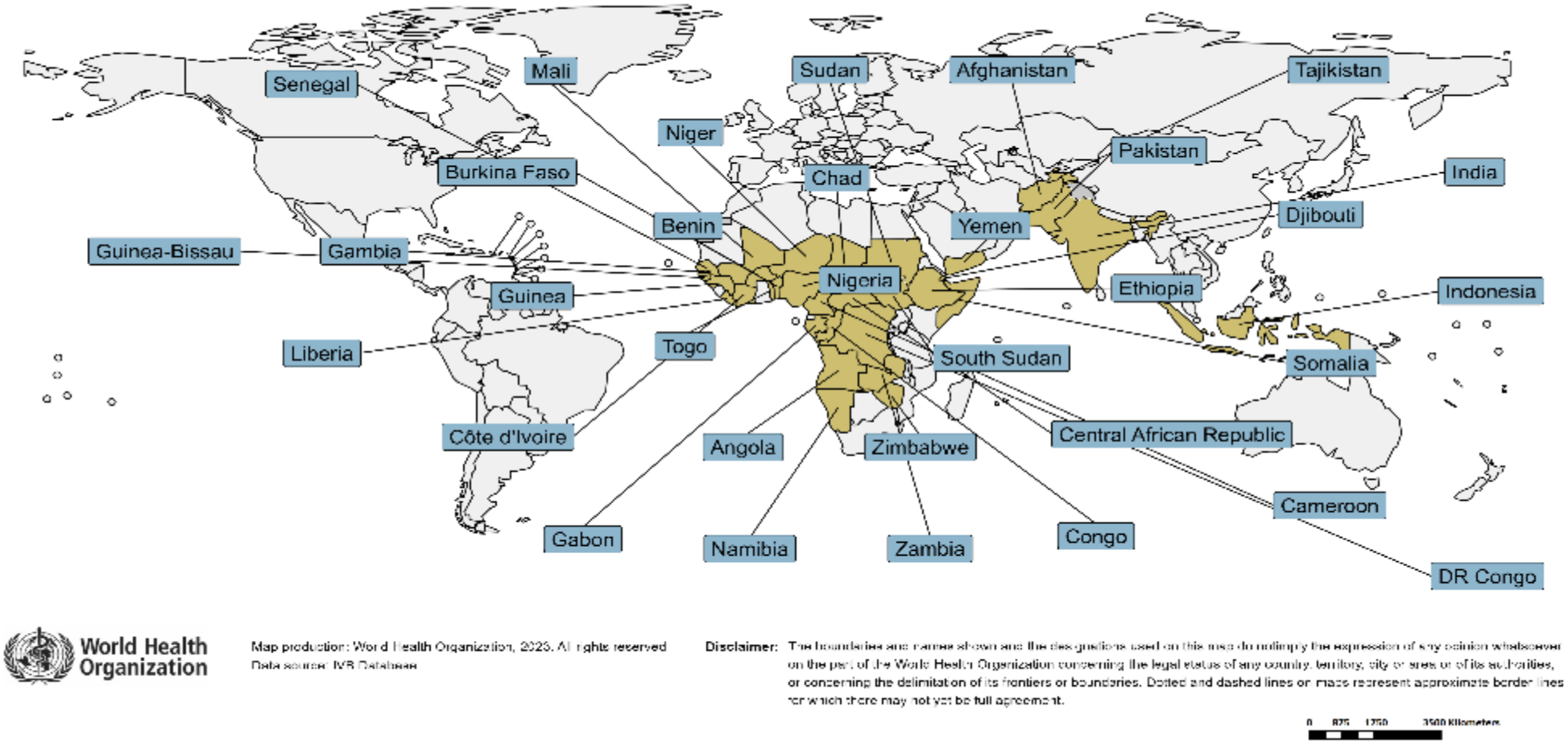
MEASLES /RUBELLA SURVEILLANCE - IVB

Measles case distribution by month and WHO Region (2015-2023)



Notes: Based on data received 2023-03 - Data Source: IVB Database - This is surveillance data, hence for the last month(s), the data may be incomplete.

Large or disruptive outbreaks (last 12 months)



In the frame of tracking progress towards the goals of Immunization Agenda 2030 (IA2030), an indicator has been developed by a working group in order to represent large and disruptive measles outbreaks. This indicator is defined as an incidence equal or greater than 20 reported measles cases per million population over a period of 12 months. It is important to note that measles outbreak definitions vary between countries and regions according to local context and level of progress towards regional elimination goals. This definition of large and disruptive outbreaks aims to complement and not replace the national and regional definitions, while also providing a degree of global standardization and permitting tracking of progress against a common metric.

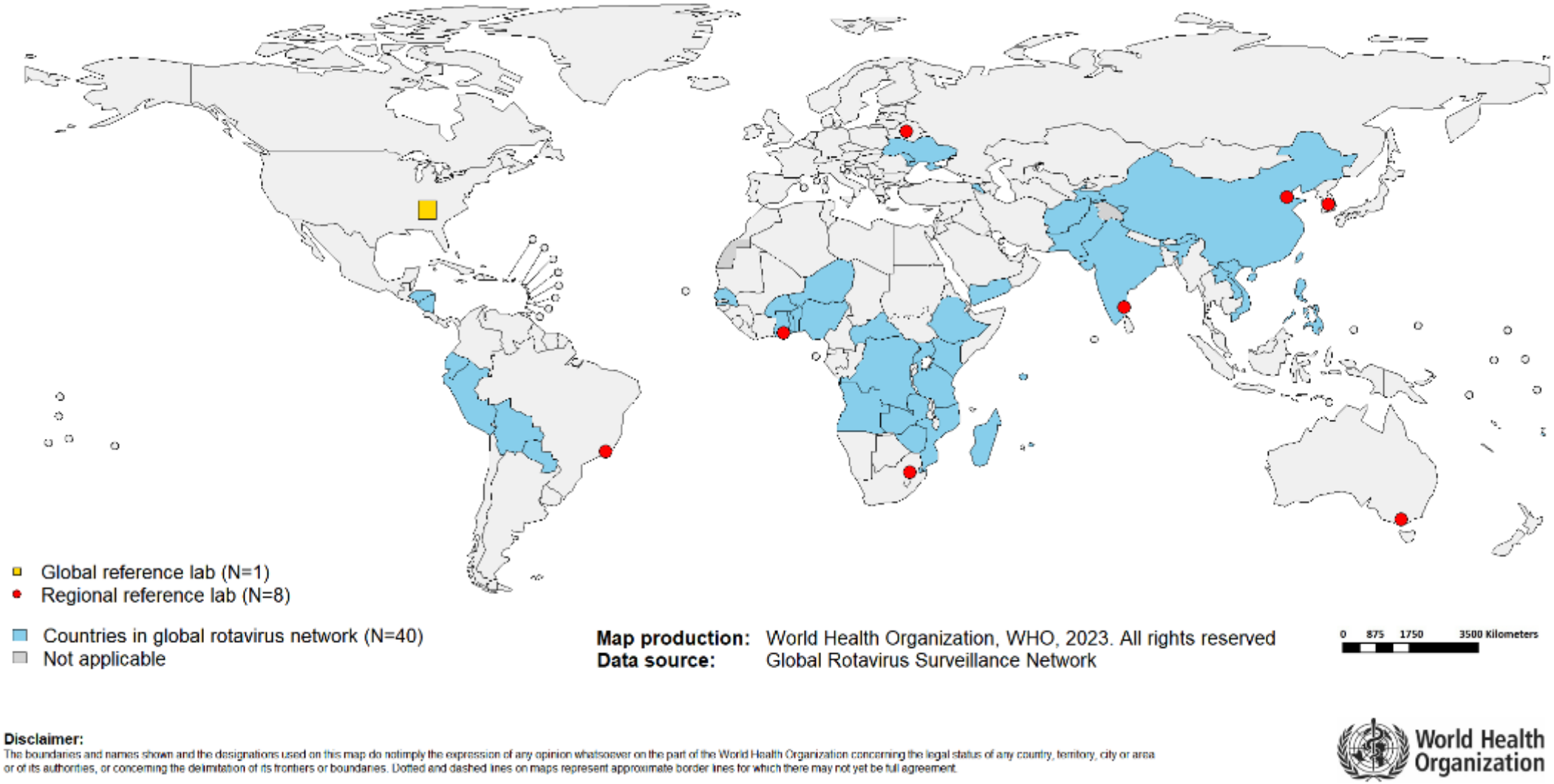
Country	Cases	Rate/M
Liberia	5,240	988.18
Somalia	15,825	899.27
Yemen	20,556	610.03
Gabon	1,249	522.81
Zimbabwe	5,139	314.88
Djibouti	189	168.62
South Sudan	1,762	161.46
Afghanistan	4,698	114.23
Cameroon	3,050	109.26
Angola	3,373	94.78
Nigeria	16,328	74.71
Togo	643	72.67
Guinea-Bissau	141	66.97
Ethiopia	7,454	60.42
Tajikistan	509	51.14
Congo	297	49.75
Côte d'Ivoire	1,392	49.43
Gambia	132	48.78
Mali	1,027	45.46
DR Congo	4,238	42.80
Burkina Faso	939	41.41
Niger	1,079	41.17
India	55,852	39.41
Senegal	637	36.79
Zambia	690	34.47
Benin	441	33.03
Pakistan	7,177	30.43
Central African Republic	164	29.40
Sudan	1,275	27.20
Guinea	367	26.48
Chad	468	26.41
Namibia	64	24.93
Indonesia	6,549	23.77

Notes: Based on data received 2023-03 and covering the period between 2022-02 and 2023-01 - Incidence: Number of cases / 1M population - Population Data: World population prospects, 2019 revision

Sentinel site surveillance in selected countries

ROTAVIRUS AND OTHER PEDIATRIC DIARRHEA SURVEILLANCE - IVB

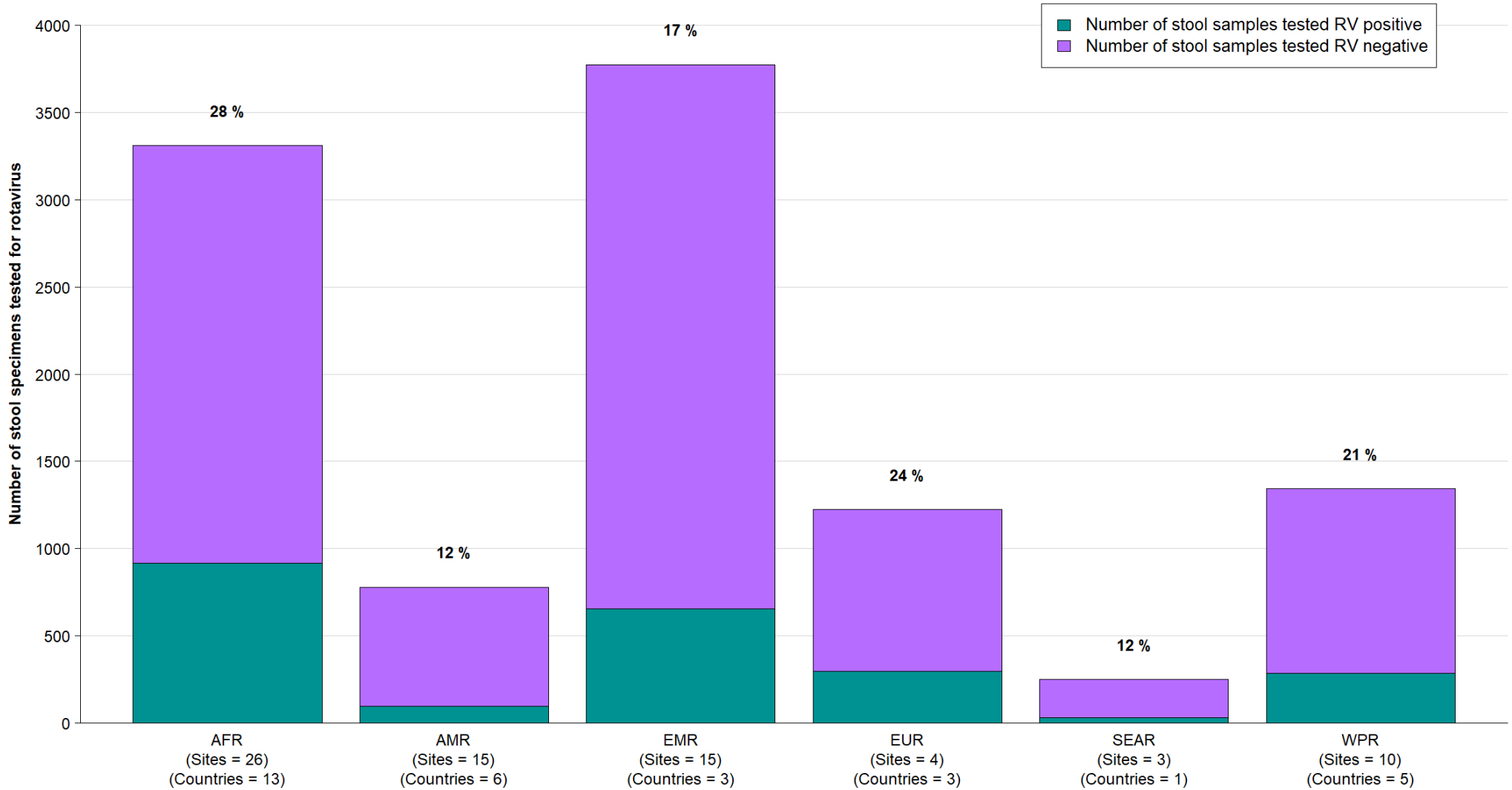
Countries reporting data to the Global Rotavirus Surveillance Network, 2021



Disclaimer:
The boundaries and names shown and the designations used on this map do notimply 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 or 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

Rotavirus positivity rate in GRSN by WHO Region, 2021



Note: limited to surveillance sites with cases reported in at least 10 of 12 months and at least 80 cases reported per year (except in sites where rotavirus vaccine has been introduced)

Pathogen-specific attributable fractions of hospitalised diarrhoea in children less than 5 years of age in 2017–2018 in Global Pediatric Diarrhea Surveillance both overall and by geographic region to by rotavirus vaccination introduction status as of 2017

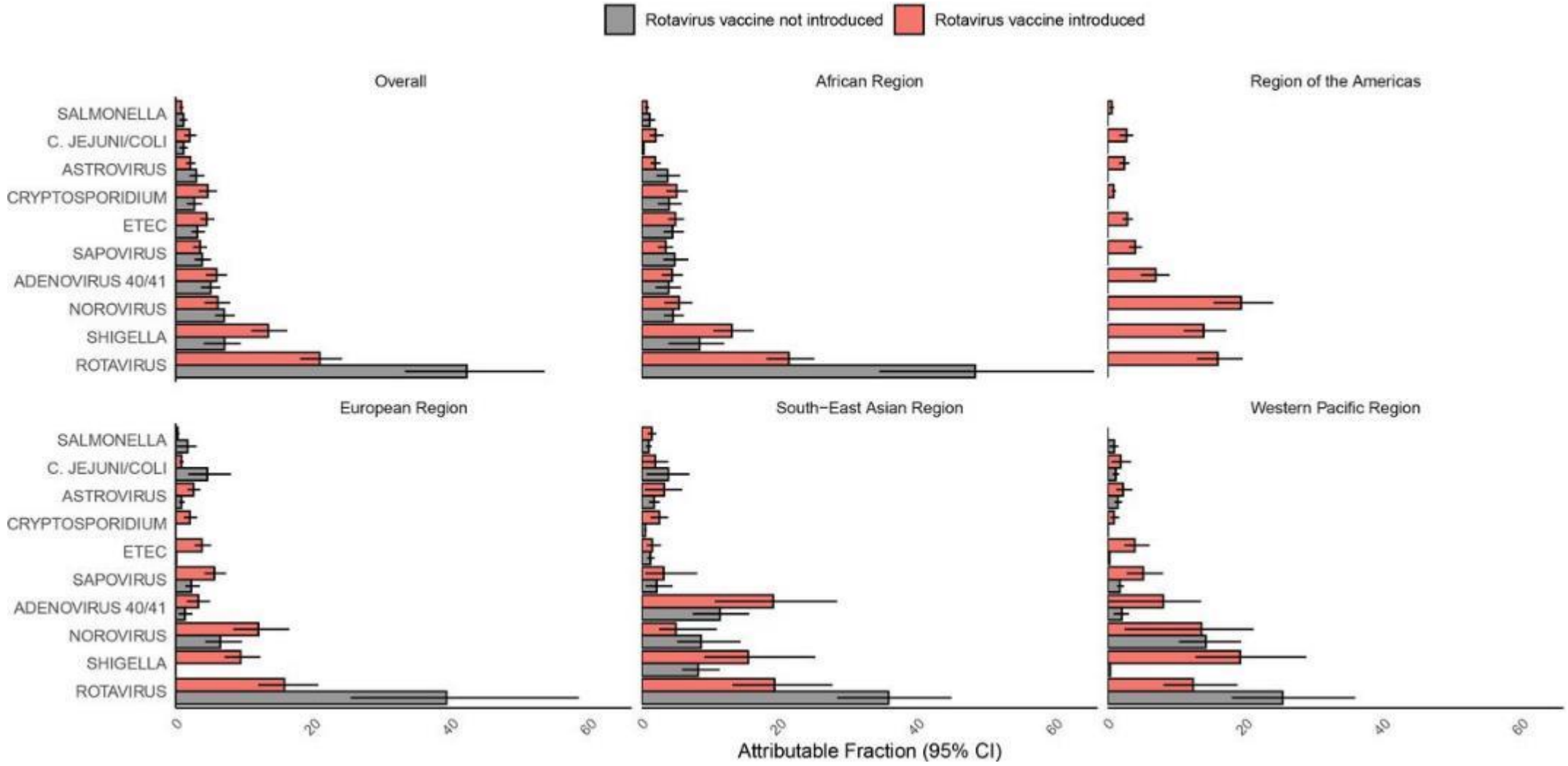


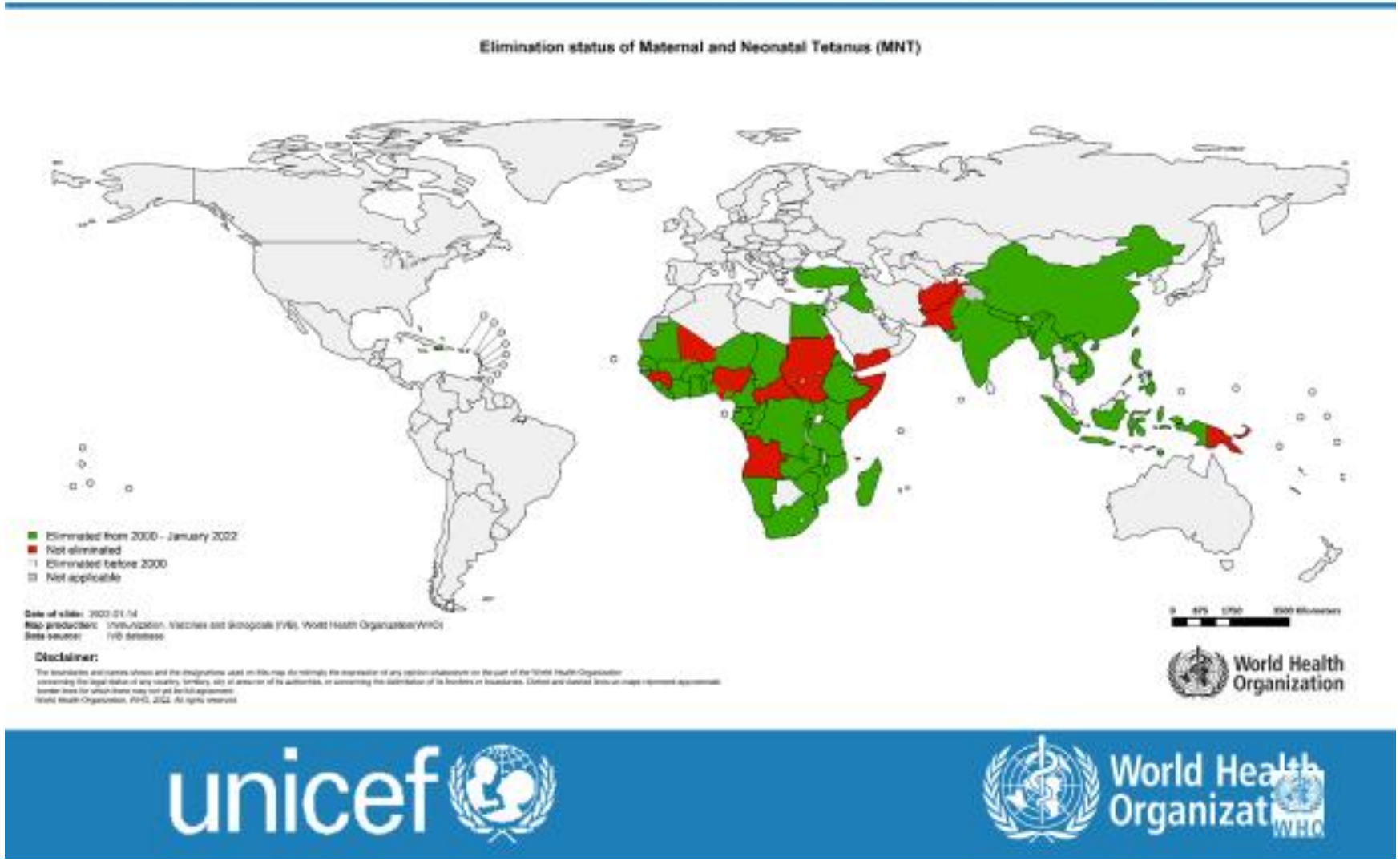
Figure from: https://gh.bmj.com/content/7/9/e009548

Population wide surveillance with initial validation by a sample survey (no lab component)

NEONATAL TETANUS SURVEILLANCE - IVB

47/59 (80%) Countries eliminated MNT between 2000 & Dec 2022

*(Plus Punjab province of Pakistan; southern regions of Mali and southern zones of Nigeria)



unicef

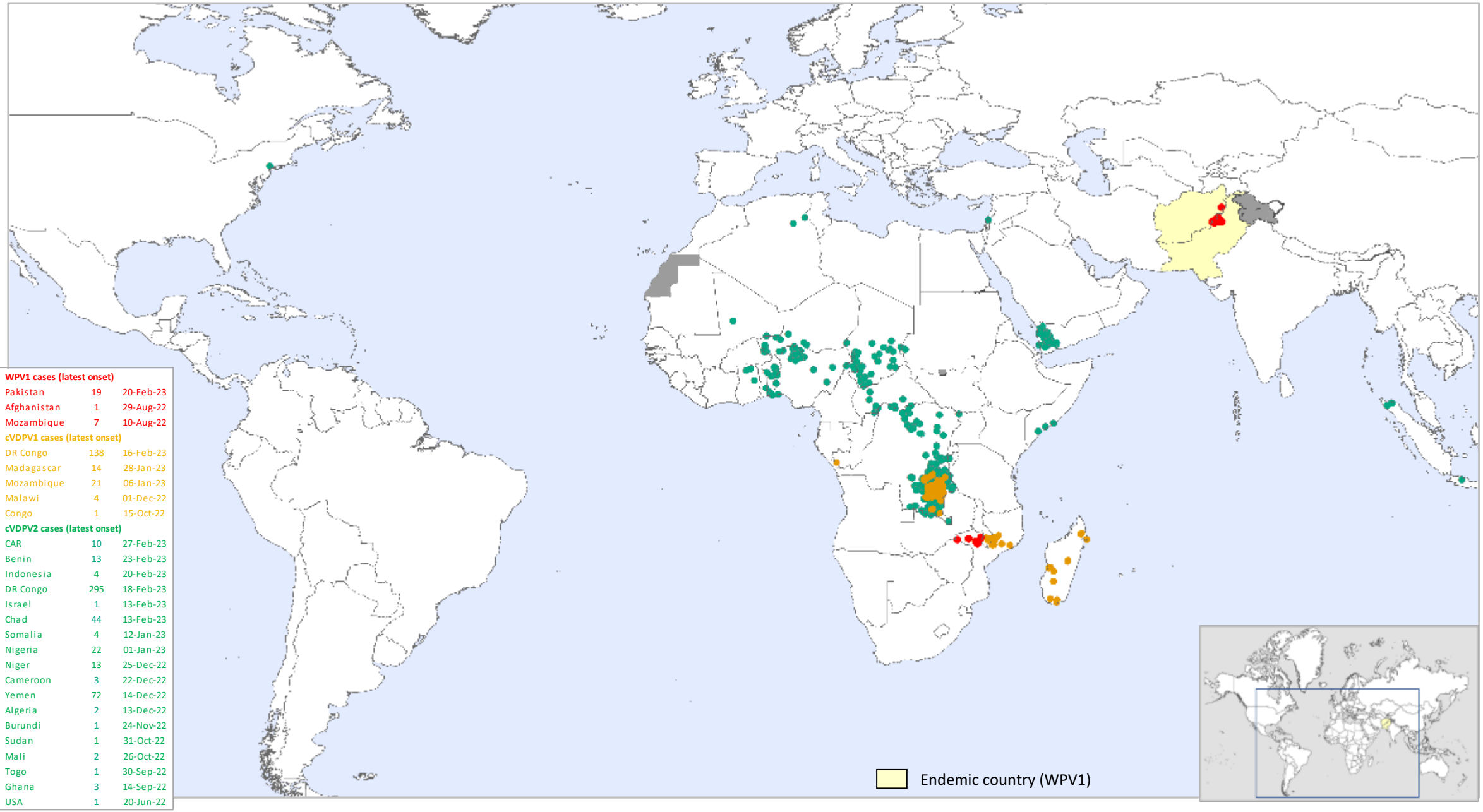
World Health Organization

Global case-based surveillance with eradication objective – mainly population <15 years old

POLIO (ACUTE FLACCID PARALYSIS) SURVEILLANCE – POLIO ERADICATION

Global WPV1 & cVDPV Cases[1], Previous 12 Months[2]

World Health Organization



WPV1 cases (latest onset)		
Pakistan	19	20-Feb-23
Afghanistan	1	29-Aug-22
Mozambique	7	10-Aug-22
cVDPV1 cases (latest onset)		
DR Congo	138	16-Feb-23
Madagascar	14	28-Jan-23
Mozambique	21	06-Jan-23
Malawi	4	01-Dec-22
Congo	1	15-Oct-22
cVDPV2 cases (latest onset)		
CAR	10	27-Feb-23
Benin	13	23-Feb-23
Indonesia	4	20-Feb-23
DR Congo	295	18-Feb-23
Israel	1	13-Feb-23
Chad	44	13-Feb-23
Somalia	4	12-Jan-23
Nigeria	22	01-Jan-23
Niger	13	25-Dec-22
Cameroon	3	22-Dec-22
Yemen	72	14-Dec-22
Algeria	2	13-Dec-22
Burundi	1	24-Nov-22
Sudan	1	31-Oct-22
Mali	2	26-Oct-22
Togo	1	30-Sep-22
Ghana	3	14-Sep-22
USA	1	20-Jun-22

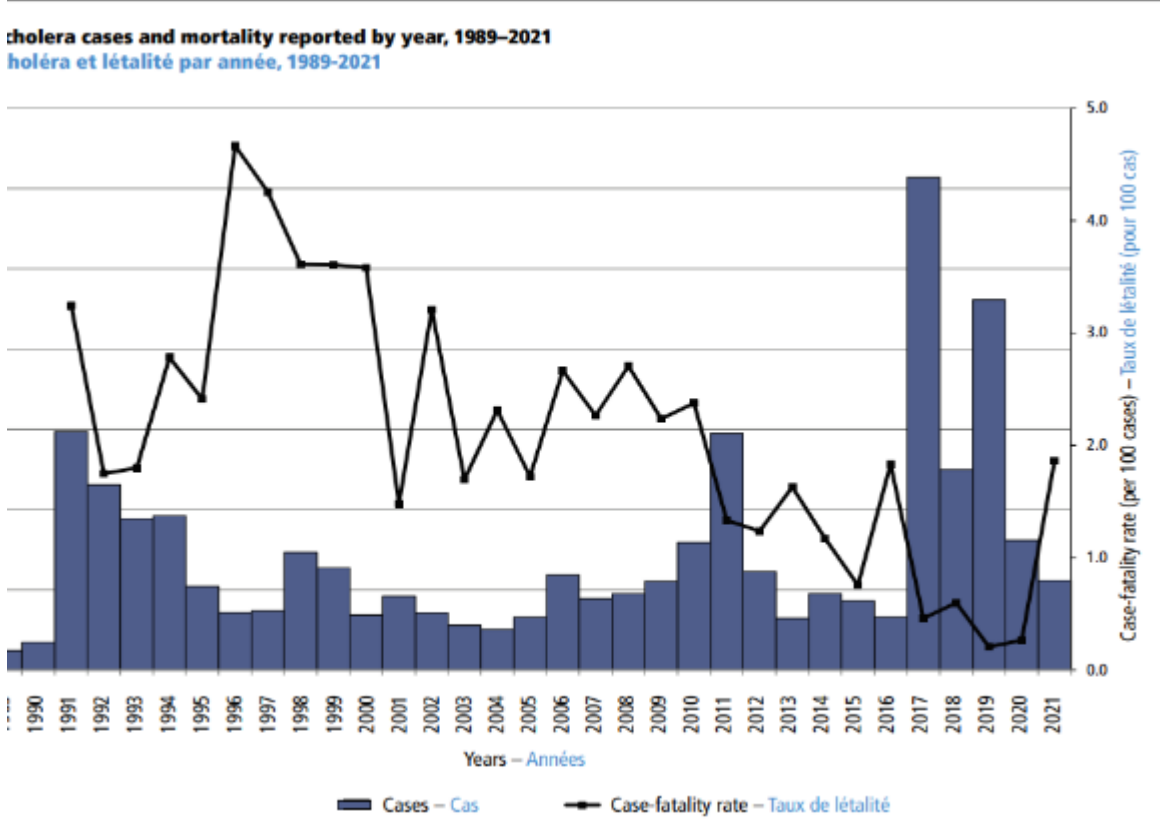
[1]Excludes viruses detected from environmental surveillance; [2]Onset of paralysis: 12 Apr. 2022 to 11 Apr. 2023

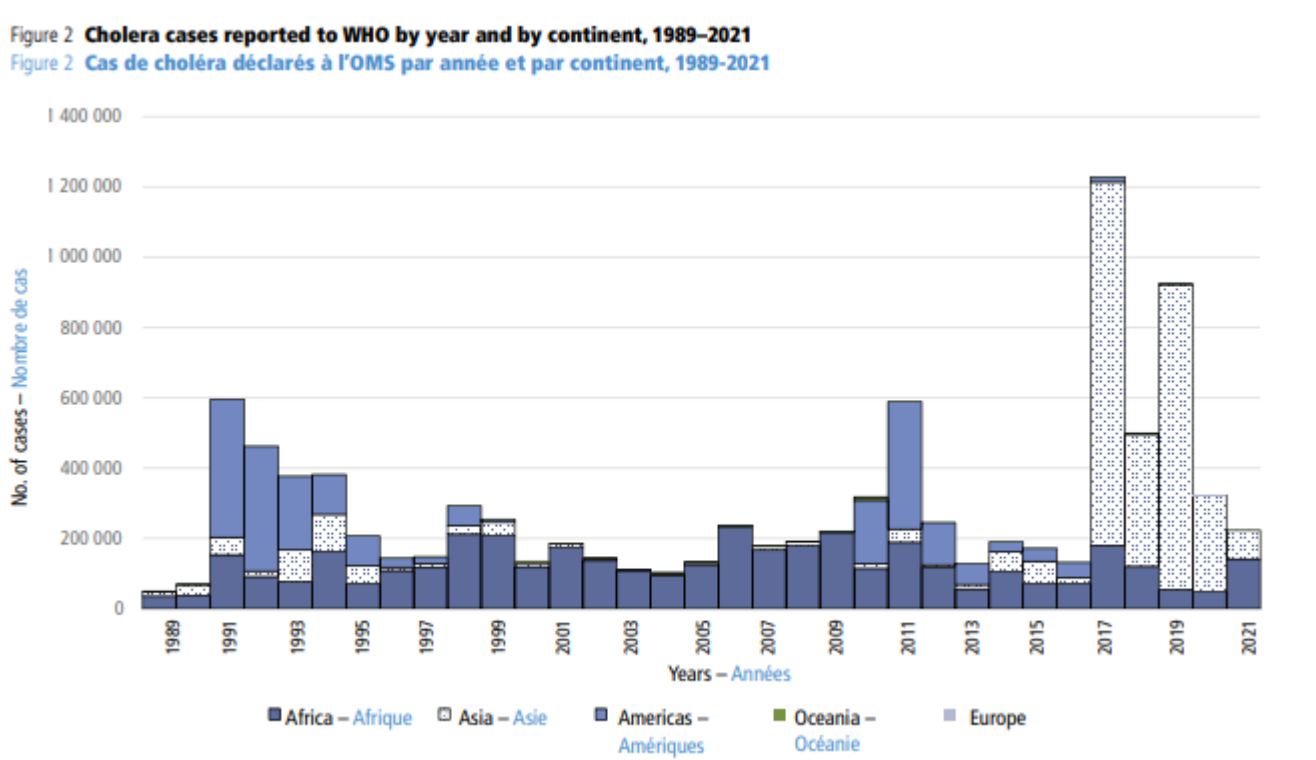
Data in WHO HQ as of 11 Apr. 2023

Health facility-based, community-based and event-based surveillance for detecting and responding to outbreaks

CHOLERA – WHO EMERGENCIES PROGRAM (WHE)

TRENDS OF OFFICIAL ANNUAL REPORTING TO WHO BY MEMBER STATES





Weekly epidemiological record
16 SEPTEMBER 2022, 97th YEAR
No 37, 2022, 97, 453–464 http://www.who.int/wer

[WER9737-453-464-eng-fre.pdf (who.int)]

MORE RESOURCES EXAMPLES

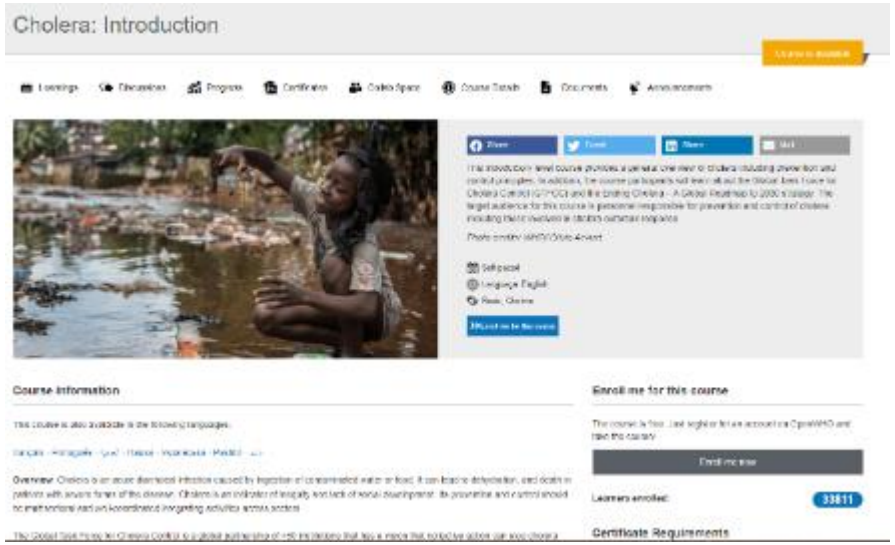
Open WHO online courses:

https://openwho.org/courses/cholera-introduction-en

https://openwho.org/courses/cholera-eprep

GTFCC Resources:

https://www.gtfcc.org/resources/



CASE MANAGEMENT
✓ *Technical guidance*
Interim technical note on the treatment of cholera in pregnant women
Download

CASE MANAGEMENT WASH
✓ *Technical guidance*
Technical note on water, sanitation and hygiene and infection prevention and control in Cholera treatment structures
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SURVEILLANCE
✓ *Technical guidance*
GTFCC interim cholera regional & global reporting technical recommendations
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Guidance and tool for countries to identify priority areas for intervention
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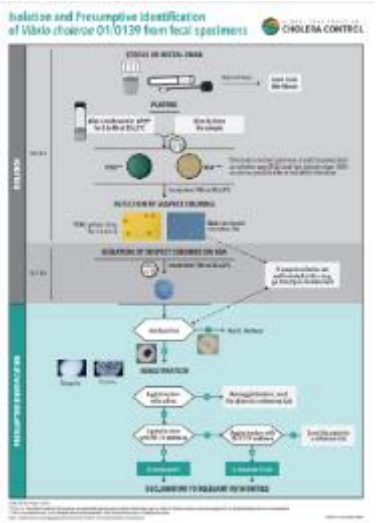
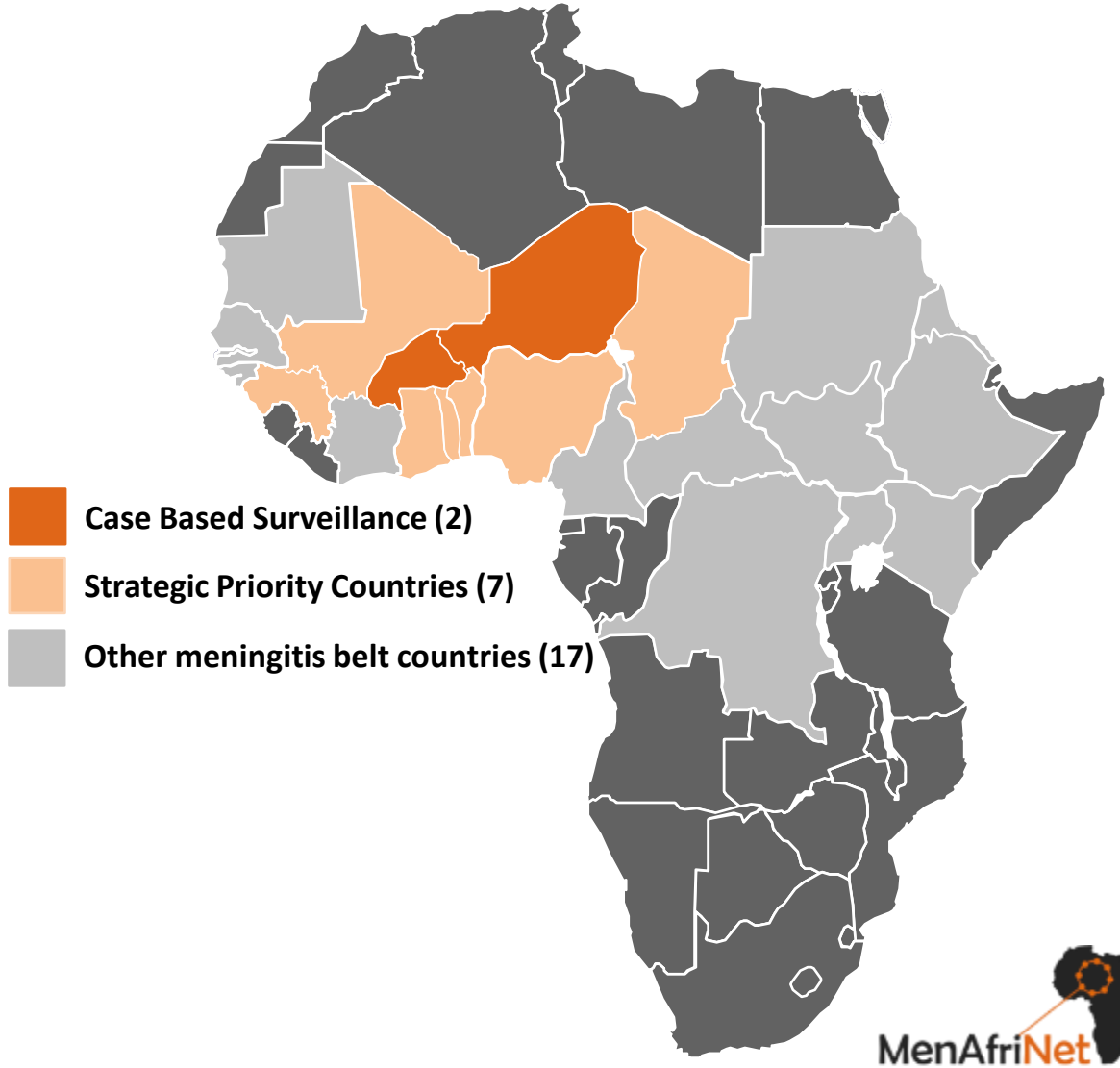


Combination of case based and aggregate surveillance in different countries of Africa meningitis belt

MENINGITIS SURVEILLANCE – WHE (WITH SOME LAB SUPPORT FROM IVB)

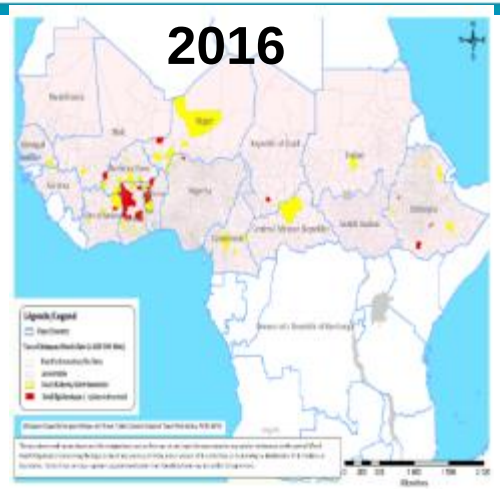
MenAfriNet II 2019-2023 — 4 pillars

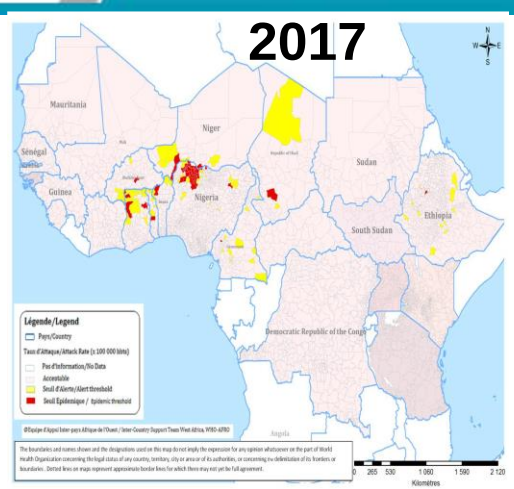
1. **MenAfriNet Consortium**
   - Framework for partner collaboration to promote surveillance best practices in the meningitis belt
2. **Case Based Surveillance**
   - Improved data efficiency/timeliness, >80% specimen collection, transport, confirmation testing
3. **Strategic Priority Countries**
   - Ensure a minimum package of surveillance & lab confirmation in priority countries at high risk for epidemics
   - MenAfriNet Toolkit of standardized surveillance and laboratory materials to guide targeted assistance
4. **Research & Evaluation**
   - Monitor epidemiologic trends and emerging non-A strains
   - Evaluate the effectiveness of existing bacterial meningitis vaccine programs
   - Measure the impact of future multivalent meningococcal conjugate vaccines on disease and carriage

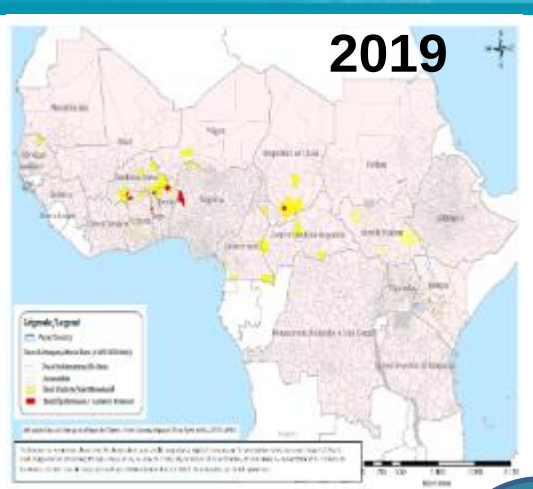


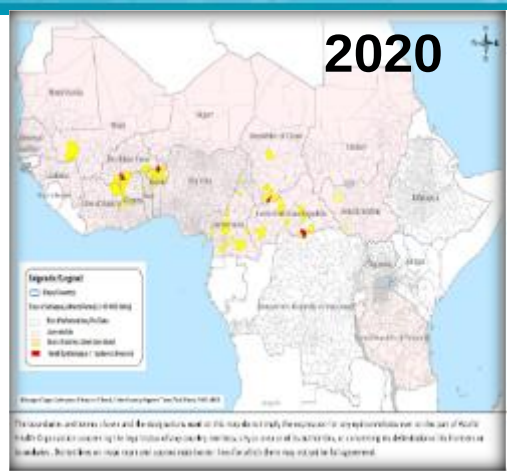
MenAfriNet

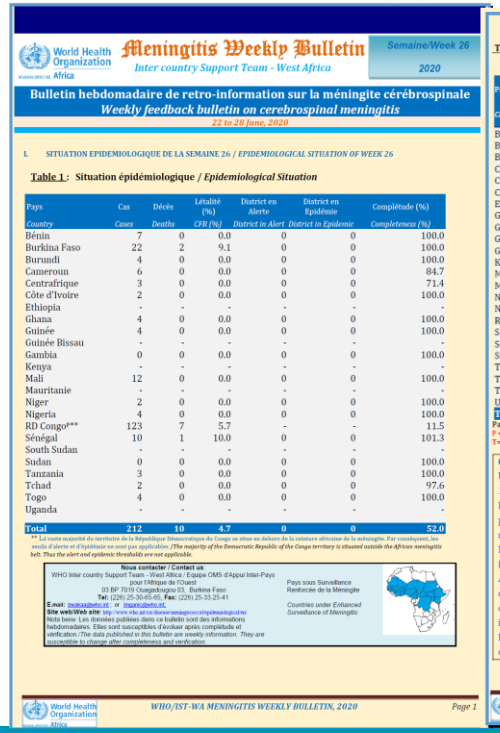
Meningitis Enhanced surveillance and weekly Bulletin











World Health Organization Africa

Meningitis Weekly Bulletin

Inter country Support Team - West Africa

Semaine/Week 26

2020

Bulletin hebdomadaire de retro-information sur la méningite cérébrospinale

Weekly feedback bulletin on cerebrospinal meningitis

22 to 28 June, 2020

I. SITUATION EPIDEMIOLOGIQUE DE LA SEMAINE 26 / *EPIDEMIOLOGICAL SITUATION OF WEEK 26*

Table 1 : Situation épidémiologique / *Epidemiological Situation*

Pays / *Country*	Cas / *Cases*	Décès / *Deaths*	Létalité (%) / *CFR (%)*	District en Alerte / *District in Alert*	District en Epidémie / *District in Epidemic*	Complétude (%) / *Completeness (%)*
Bénin	7	0	0.0	0	0	100.0
Burkina Faso	22	2	9.1	0	0	100.0
Burundi	4	0	0.0	0	0	100.0
Cameroun	6	0	0.0	0	0	84.7
Centrafrique	3	0	0.0	0	0	71.4
Côte d'Ivoire	2	0	0.0	0	0	100.0
Ethiopia	-	-	-	-	-	-
Ghana	4	0	0.0	0	0	100.0
Guinée	4	0	0.0	0	0	100.0
Guinée Bissau	-	-	-	-	-	-
Gambia	0	0	0.0	0	0	100.0
Kenya	-	-	-	-	-	-
Mali	12	0	0.0	0	0	100.0
Mauritanie	-	-	-	-	-	-
Niger	2	0	0.0	0	0	100.0
Nigeria	4	0	0.0	0	0	100.0
RD Congo***	123	7	5.7	-	-	11.5
Sénégal	10	1	10.0	0	0	101.3
South Sudan	-	-	-	-	-	-
Sudan	0	0	0.0	0	0	100.0
Tanzania	3	0	0.0	0	0	100.0
Tchad	2	0	0.0	0	0	97.6
Togo	4	0	0.0	0	0	100.0
Uganda	-	-	-	-	-	-
Total	**212**	**10**	**4.7**	**0**	**0**	**52.0**

** La toute majorité du territoire de la République Démocratique du Congo se situe en dehors de la ceinture africaine de la méningite. Par conséquent, les résultats d'alerte et d'épidémie ne sont pas applicables / *The majority of the Democratic Republic of the Congo territory is situated outside the African meningitis belt. Thus the alert and epidemic thresholds are not applicable.*

Nous contacter / Contact us

WHO Inter country Support Team - West Africa / Equipe OMS d'Appui Inter-Pays pour l'Afrique de l'Ouest

03 BP 7019 Ouagadougou 03, Burkina Faso

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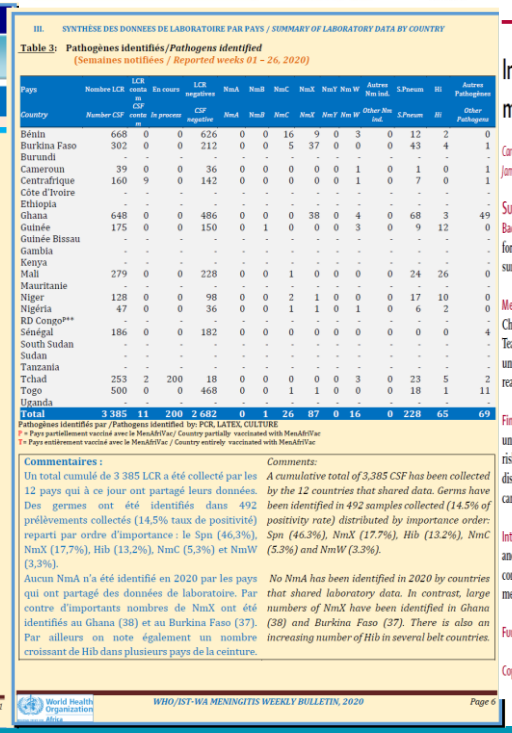
E-mail: bwaa@who.int or inisgre@who.int

Site web/Web site: http://www.who.int/csr/disease/senegal/en/cerebralmeningitis/en/

Nota bene: Les données publiées dans ce bulletin sont des informations hebdomadaires. Elles sont susceptibles d'évoluer après complétude et vérification / *The data published in this bulletin are weekly information. They are susceptible to change after completeness and verification.*

Pays sous Surveillance Renforcée de la Méningite

Countries under Enhanced Surveillance of Meningitis



III. SYNTHÈSE DES DONNEES DE LABORATOIRE PAR PAYS / *SUMMARY OF LABORATORY DATA BY COUNTRY*

Table 3: Pathogènes identifiés/*Pathogens identified*

(Semaines notifiées / *Reported weeks 01 – 26, 2020)*

Pays / *Country*	Nombre LCR / *Number CSF*	LCR costa m / *CSF conta m*	LCR En cours / *In process*	LCR negatives / *CSF negative*	NmA / *NmA*	NmB / *NmB*	NmC / *NmC*	NmX / *NmX*	NmT / *NmT*	Nm W / *Nm W*	Autres Nm ind. / *Other Nm Ind.*	S.Pneum / *S.Pneum*	Hi / *Hi*	Autres Pathogènes / *Other Pathogens*
Bénin	668	0	0	626	0	0	16	9	0	3	0	12	2	0
Burkina Faso	302	0	0	212	0	0	5	37	0	0	0	43	4	1
Burundi	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cameroun	39	0	0	36	0	0	0	0	0	1	0	1	0	1
Centrafrique	160	9	0	142	0	0	0	0	0	1	0	7	0	1
Côte d'Ivoire	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ethiopia	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ghana	648	0	0	486	0	0	0	38	0	4	0	68	3	49
Guinée	175	0	0	150	0	1	0	0	0	3	0	9	12	0
Guinée Bissau	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Gambia	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Kenya	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Mali	279	0	0	228	0	0	1	0	0	0	0	24	26	0
Mauritanie	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Niger	128	0	0	98	0	0	2	1	0	0	0	17	10	0
Nigéria	47	0	0	36	0	0	1	1	0	1	0	6	2	0
RD Congo***	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sénégal	186	0	0	182	0	0	0	0	0	0	0	0	0	4
South Sudan	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sudan	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tanzania	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tchad	253	2	200	18	0	0	0	0	0	3	0	23	5	2
Togo	500	0	0	468	0	0	1	1	0	0	0	18	1	11
Uganda	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total	**3 385**	**11**	**200**	**2 682**	**0**	**1**	**26**	**87**	**0**	**16**	**0**	**228**	**65**	**69**

Pathogènes identifiés par /Pathogens identified by: PCR, LATEX, CULTURE

? = Pays partiellement vaccinés avec le MenAfriVac/ Country partialy vaccinated with MenAfriVac

T= Pays entièrement vaccinés avec le MenAfriVac / Country entirely vaccinated with MenAfriVac

Commentaires :

Un total cumulé de 3 385 LCR a été collecté par les 12 pays qui à ce jour ont partagé leurs données. Des germes ont été identifiés dans 492 prélèvements collectés (14,5% taux de positivité) reparti par ordre d'importance : le Spn (46,3%), NmX (17,7%), Hib (13,2%), NmC (5,3%) et NmW (3,3%).

Aucun NmA n'a été identifié en 2020 par les pays qui ont partagé des données de laboratoire. Par contre d'importants nombres de NmX ont été identifiés au Ghana (38) et au Burkina Faso (37). Par ailleurs on note également un nombre croissant de Hib dans plusieurs pays de la ceinture.

Comments:

A cumulative total of 3,385 CSF has been collected by the 12 countries that shared data. Germs have been identified in 492 samples collected (14.5% of positivity rate) distributed by importance order: Spn (46.3%), NmX (17.7%), Hib (13.2%), NmC (5.3%) and NmW (3.3%).

No NmA has been identified in 2020 by countries that shared laboratory data. In contrast, large numbers of NmX have been identified in Ghana (38) and Burkina Faso (37). There is also an increasing number of Hib in several belt countries.

Impact of MenAfriVac in nine countries of the African meningitis belt, 2010–15: an analysis of surveillance data

Caroline L Trotter, Clément Lingani, Katya Fernandez, Laura V Cooper, André Bita, Carol Tevi-Benissan, Olivier Ronveaux, Marie-Pierre Preziosi, James M Stuart

Summary

Background In preparation for the introduction of MenAfriVac, a meningococcal group A conjugate vaccine developed for the African meningitis belt, an enhanced meningitis surveillance network was established. We analysed surveillance data on suspected and confirmed cases of meningitis to quantify vaccine impact.

Methods We compiled and analysed surveillance data for nine countries in the meningitis belt (Benin, Burkina Faso, Chad, Côte d'Ivoire, Ghana, Mali, Niger, Nigeria, and Togo) collected and curated by the WHO Inter-country Support Team between 2005 and 2015. The incidence rate ratios (IRRs) of suspected and confirmed cases in vaccinated and unvaccinated populations were estimated with negative binomial regression models. The relative risk of districts reaching the epidemic threshold of ten per 100 000 per week was estimated according to district vaccination status.

Findings The incidence of suspected meningitis cases declined by 57% (95% CI 55–59) in vaccinated compared with unvaccinated populations, with some heterogeneity observed by country. We observed a similar 59% decline in the risk of a district reaching the epidemic threshold. In fully vaccinated populations, the incidence of confirmed group A disease was reduced by more than 99%. The IRR for non-A serogroups was higher after completion of MenAfriVac campaigns (IRR 2·76, 95% CI 1·21–6·30).

Interpretation MenAfriVac introduction has led to substantial reductions in the incidence of suspected meningitis and epidemic risk, and a substantial effect on confirmed group A meningococcal meningitis. It is important to continue strengthening surveillance to monitor vaccine performance and remain vigilant against threats from other meningococcal serogroups and other pathogens.

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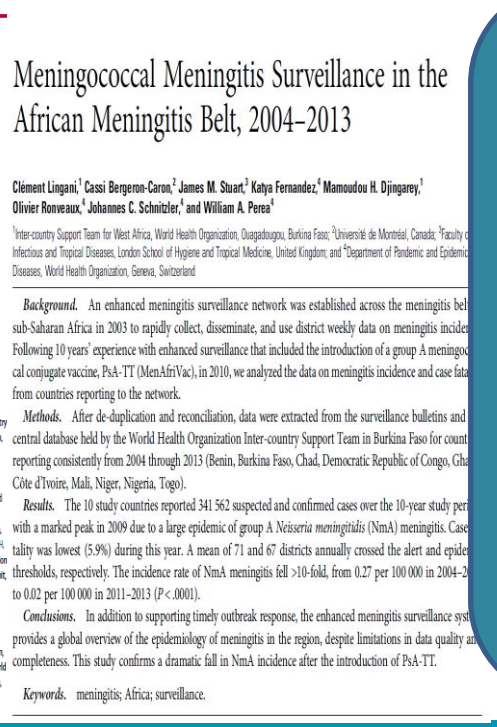

Meningococcal Meningitis Surveillance in the African Meningitis Belt, 2004–2013

Clément Lingani,[1] Cassi Bergeron-Caron,[2] James M. Stuart,[3] Katya Fernandez,[4] Mamoudou H. Djingarey,[1] Olivier Ronveaux,[4] Johannes C. Schnitzler,[4] and William A. Perea[4]

[1]Inter-country Support Team for West Africa, World Health Organization, Ouagadougou, Burkina Faso; [2]Université de Montréal, Canada; [3]Faculty of Infectious and Tropical Diseases, London School of Hygiene and Tropical Medicine, United Kingdom; and [4]Department of Pandemic and Epidemic Diseases, World Health Organization, Geneva, Switzerland

Background. An enhanced meningitis surveillance network was established across the meningitis belt sub-Saharan Africa in 2003 to rapidly collect, disseminate, and use district weekly data on meningitis incidence Following 10 years' experience with enhanced surveillance that included the introduction of a group A meningococcal conjugate vaccine, PsA-TT (MenAfriVac), in 2010, we analyzed the data on meningitis incidence and case fatality from countries reporting to the network.

Methods. After de-duplication and reconciliation, data were extracted from the surveillance bulletins and central database held by the World Health Organization Inter-country Support Team in Burkina Faso for countries reporting consistently from 2004 through 2013 (Benin, Burkina Faso, Chad, Democratic Republic of Congo, Ghana, Côte d'Ivoire, Mali, Niger, Nigeria, Togo).

Results. The 10 study countries reported 341 562 suspected and confirmed cases over the 10-year study period with a marked peak in 2009 due to a large epidemic of group A *Neisseria meningitidis* (NmA) meningitis. Case fatality was lowest (5.9%) during this year. A mean of 71 and 67 districts annually crossed the alert and epidemic thresholds, respectively. The incidence rate of NmA meningitis fell >10-fold, from 0.27 per 100 000 in 2004–2009 to 0.02 per 100 000 in 2011–2013 ($P < .0001$).

Conclusions. In addition to supporting timely outbreak response, the enhanced meningitis surveillance system provides a global overview of the epidemiology of meningitis in the region, despite limitations in data quality and completeness. This study confirms a dramatic fall in NmA incidence after the introduction of PsA-TT.

Keywords. meningitis; Africa; surveillance.

Enhanced meningitis surveillance: data for action

- 24 reporting countries
- weekly aggregated district level data (IDSR-based)
- incidence-based alert and epidemic thresholds
- laboratory results
- compiled and published in AFRO Bulletin (IST-West), since 2003
- https://www.who.int/emergencies/diseases/meningitis/epidemiological/en/

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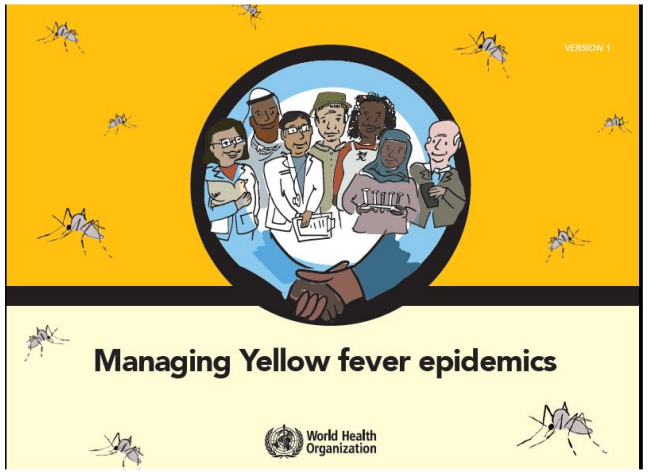
Case based entire population surveillance – Eliminate Yellow Fever Epidemics (EYE)

YELLOW FEVER – WHE WITH LAB SUPPORT FROM IVB

Yellow Fever Surveillance standards

Case-based surveillance is the surveillance standard for Yellow fever disease in humans.

As yellow fever is a vector borne disease, a multi-faceted "One Health" approach is promoted. Surveillance of mosquito vector and non-human primates can provide valuable insight on yellow fever virus circulation.

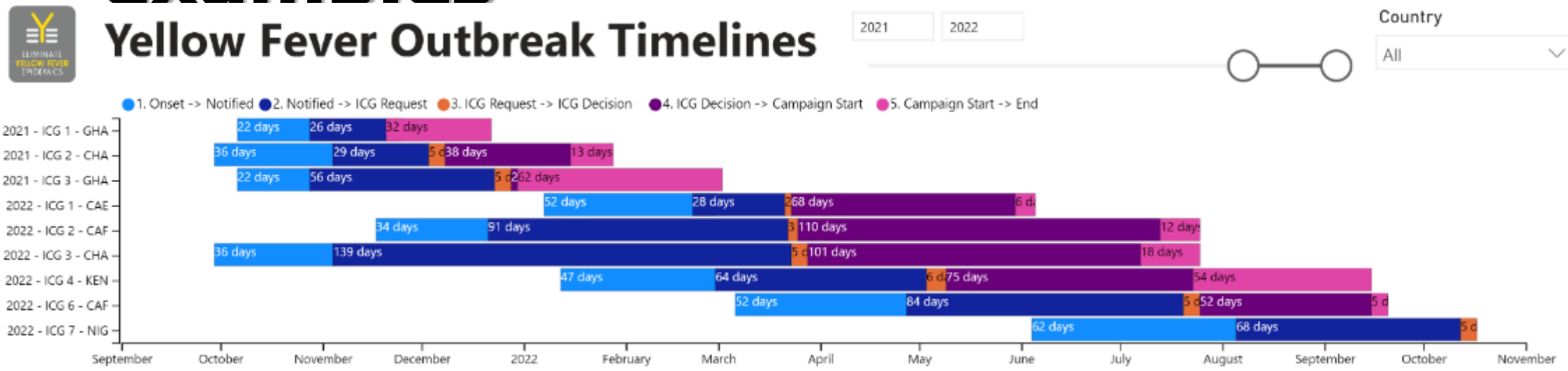


Tools:

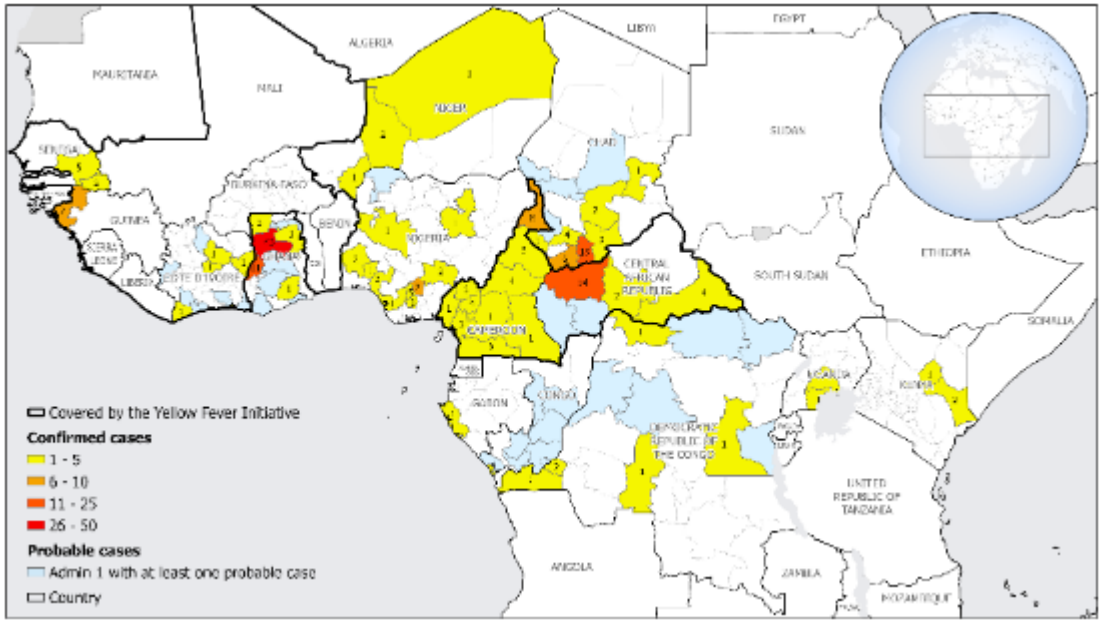
- **VPD Surveillance Standards for Yellow Fever (link here)**
- **EYE Booklet on Managing Yellow Fever Epidemics & Outbreak Toolbox**

Surveillance data outputs - examples

Yellow Fever Outbreak Timelines



YF confirmed cases (1st Jan 2021 – 13th Nov 2022), incl. late 2020 Senegal & Guinea outbreaks



Summary

1. IA 2030 envisions WHO supporting a global system of comprehensive VPD surveillance (VPDS) across Member States
2. Comprehensive VPDS encompasses different surveillance mechanisms for different end objectives of surveillance, but lays down certain minimum standards
3. Historically, VPDS for different syndromes has evolved across different departments in country systems as well as within WHO
4. There is now much stronger collaboration and information sharing (daily for outbreak flags) between WHO departments and similar guidance to countries
5. We work towards a coordinated comprehensive VPDS, to build this complex global “mosaic” of VPD surveillance
6. Ideally, disease surveillance systems in countries and supported by WHO and other partner agencies would seamlessly share and access information.

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- Donors
- Participating communities

Thank you