POLIO GLOBAL ERADICATION INITIATIVE

Global Polio Surveillance Status Report

2019

WHO/POLIO/19.08

Published by the World Health Organization (WHO) on behalf of the Global Polio Eradication Initiative (GPEI)

Suggested citation. Global Polio Surveillance Status Report, 2019.Geneva: World Health Organisation; 2019 (WHO/POLIO/19.08) Licence: CC BY-NC-SA 3.0 IGO.

Cataloguing-in-Publication (CIP) data. CIP data are available at http://apps.who.int/iris.

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Contents

Acronyms and abbreviations

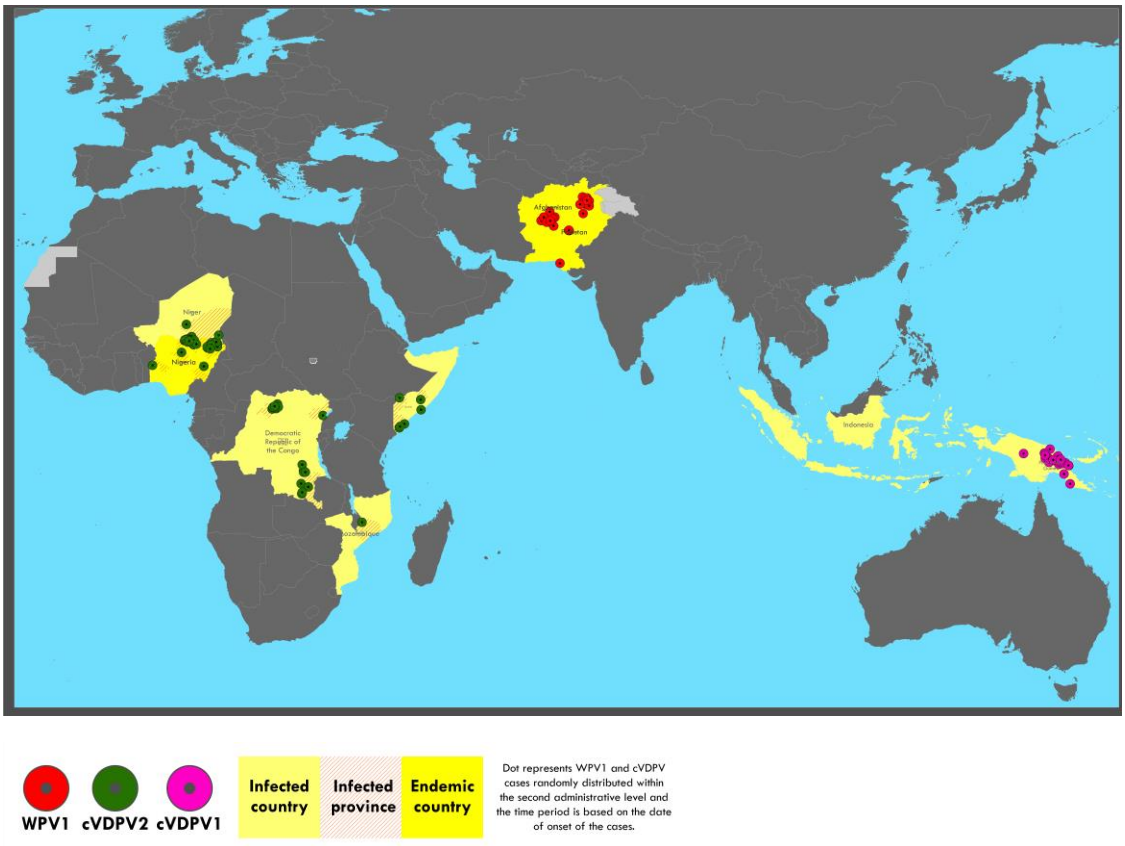
AFP	Acute flaccid paralysis
AFR	African Region
AMR	Region of the Americas
AVADAR	Auto-visual acute flaccid paralysis detection and reporting
bOPV	Bivalent oral poliovirus vaccine
CBS	Community-based surveillance
cVDPV	Circulating vaccine-derived poliovirus
cVDPV2	Circulating vaccine-derived poliovirus type 2
cVDPV3	Circulating vaccine-derived poliovirus type 3
eSurv	Electronic surveillance
EMR	Eastern Mediterranean Region
ES	Environmental surveillance
EUR	European Region
EV	Enterovirus
EWARN	Early Warning Alert and Response Network
GIS	Geographic information system
GPEI	Global Polio Eradication Initiative
GPLN	Global Polio Laboratory Network
GPSAP	Global Polio Surveillance Action Plan
IDP	Internally displaced population
IPV	Inactivated polio vaccine
ISS	Integrated supportive supervision
ITD	Intratypic differentiation
iVDPV	Immunodeficiency-associated vaccine-derived poliovirus
LGA	Local government area
NPAFP	Non-polio acute flaccid paralysis
NPEV	Non-polio enterovirus
OPV	Oral polio vaccine
PEESP	Polio Eradication & Endgame Strategic Plan 2013–2018
PESEP	Polio Environmental Surveillance Expansion Plan
PID	Primary immunodeficiency disorder
POLIS	Polio Information System
RES	Reaching Every Settlement
RIC	Reaching Inaccessible Children
SEAR	South-East Asia Region
SIA	Supplementary immunization activity
SL	Sabin-like virus
tOPV	Trivalent oral poliovirus vaccine
UNICEF	United Nations Children's Fund
VDPV	Vaccine-derived poliovirus
VI	Virus isolation
VII	Virus isolation and ITD
VIIS	Virus isolation, ITD and genomic sequencing
VP1	Viral protein 1
WHO	World Health Organization
WPR	Western Pacific Region
WPV	Wild poliovirus

1 Introduction

1.1 Global epidemiology update

Global efforts to eradicate polio began in 1988 and, to date, four of the six World Health Organization (WHO) regions have achieved polio-free certification. Within the remaining two regions with endemic poliomyelitis (African and Eastern Mediterranean), Nigeria, Afghanistan and Pakistan have experienced uninterrupted transmission of wild poliovirus (WPV). Fig. 1–2 show the distribution of WPV and circulating vaccine-derived poliovirus (cVDPV) cases in 2016–2018. While Afghanistan and Pakistan continuously reported cases in all three years, a WPV case was last reported in Nigeria in August 2016.

Fig. 1. Distribution of wild poliovirus cases and circulating vaccine-derived poliovirus cases, worldwide, 2018

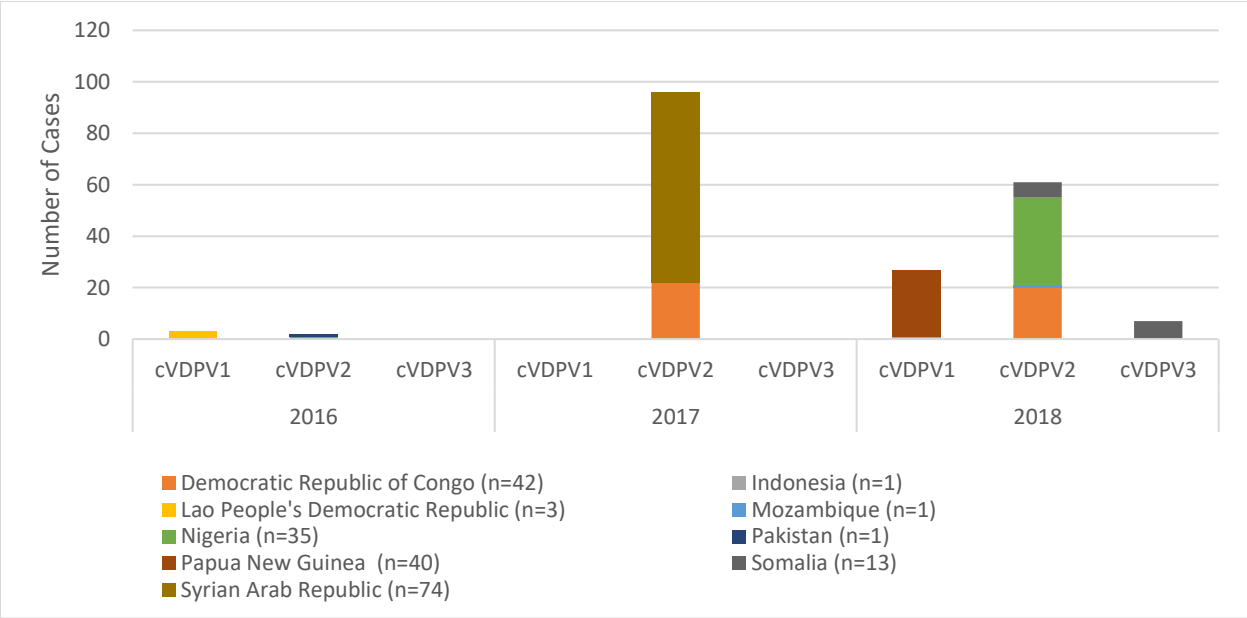


Source: WHO.

From 2016 to 2018, 17 circulating vaccine-derived poliovirus (cVDPV) post-switch outbreaks of all three serotypes (occurring after the switch from the trivalent oral poliovirus vaccine (tOPV) to the bivalent oral poliovirus vaccine (bOPV) in April–May 2016 affected nine countries in four regions. Of the 14 circulating vaccine-derived poliovirus type 2 (cVDPV2) outbreaks occurring post-switch, seven were first detected through environmental surveillance (ES). Ensuring polio surveillance reach is sensitive and expansive enough to identify poliovirus circulation in every region and every country is a priority for the Global Polio Eradication Initiative (GPEI) and a prerequisite for the global certification of the eradication of poliomyelitis.

Polio surveillance is complicated by the inability of the GPEI to maintain adequate sensitivity in all countries, especially in regions that have been polio-free for some time. In selected high-risk countries, insecurity and safety issues are key challenges, resulting in pockets of populations persistently missed by surveillance efforts. Notably, several countries have worked to overcome these challenges and improve surveillance reach into inaccessible areas.

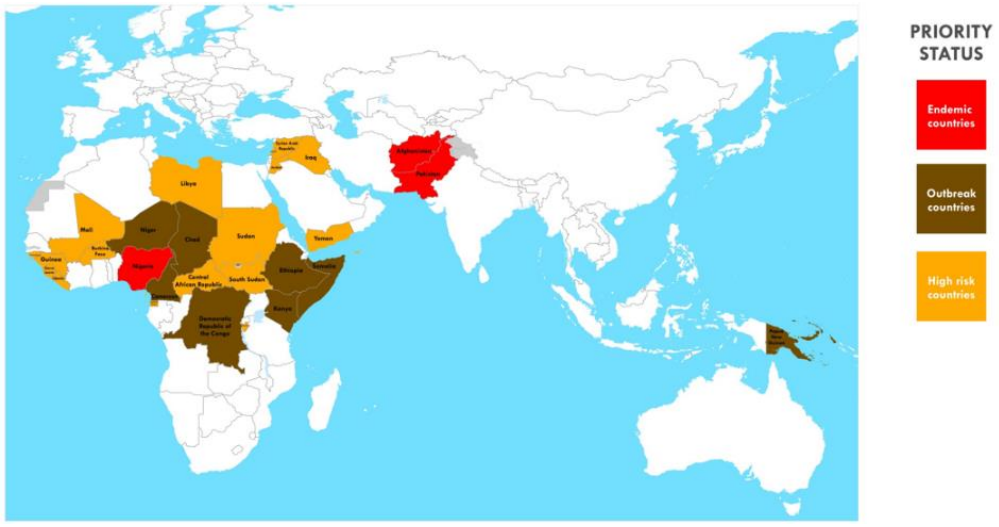
Fig. 2. Distribution of circulating vaccine-derived poliovirus cases, 2016–2018[a]



[a] Al cVDPV cases among patients with acute flaccid paralysis reported were post-switch except for in Lao People's Democratic Republic.
Source: WHO.

To address ongoing challenges, the Global Polio Surveillance Action Plan (GPSAP) 2018–2020 was developed to support countries in evaluating and increasing the sensitivity of their surveillance systems; to share supplemental strategies that may help close the gaps in detecting polioviruses; to strengthen coordination across surveillance field teams, the laboratory and data information systems; and to leverage activities across functional areas to create a more effective, efficient programme and document zero cases worldwide. As part of the GPSAP's implementation, the plan reviews disease risk and surveillance performance and prioritizes countries for targeted support. In 2018, 29 priority countries were identified for surveillance strengthening per the GPSAP, due to the ongoing or high risk of poliovirus transmission and limited country capacity to adequately address those risks; the prioritization targeted areas in the Eastern Mediterranean and African Regions, the two yet to be certified as WPV-free, but included outbreak-affected countries in non-endemic regions (Fig. 3).

Fig. 3. Geographic focus areas for implementation of the Global Polio Surveillance Action Plan, 2018[a]



[a] Outbreaks identified after the printing of the GPSAP are not reflected.
Source: Global Polio Eradication Initiative. GPEI Global Polio Surveillance Action Plan, 2018–2020. Geneva: World Health Organization (http://polioeradication.org/wp-content/uploads/2016/07/GPEI-global-polio-surveillance-action-plan-2018-2020-EN.pdf, accessed 1 October 2019).

This *Global Polio Surveillance Status Report, 2019* reviews the state of poliovirus surveillance for the first year of the GPSAP's implementation, comparing its performance to the preceding two years and taking stock of the challenges faced, innovations advanced and opportunities explored to enhance surveillance especially in priority areas.

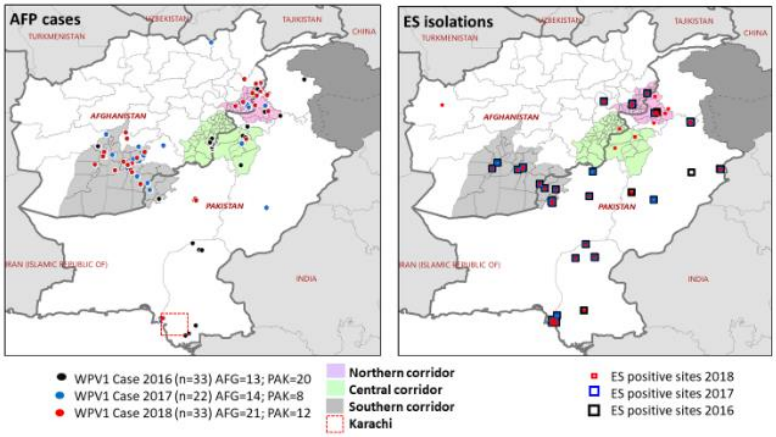
2 Progress on field polio surveillance

2.1 Poliovirus surveillance in the Eastern Mediterranean Region

2.1.1 Overview

The Eastern Mediterranean Region is one of two WHO regions considered endemic for WPV. During 2016–2018, virus transmission was primarily restricted to two cross-border corridors and one megacity (Fig. 4). The first cross-border transmission corridor links eastern Afghanistan with Khyber Pakhtunkhwa province, Pakistan, and the second links southern Afghanistan with Quetta division, Balochistan province, Pakistan. The third transmission hotspot during this period was Karachi, Pakistan. Of the 33 acute flaccid paralysis (AFP) cases reported in 2018, 29 came from these three transmission hotspots. In 2018, twelve cases of paralytic poliomyelitis due to WPV type 1 were reported in Pakistan, compared to eight cases reported in 2017; in Afghanistan, 21 cases were reported, compared with 14 in 2017. In Afghanistan, the increase in the number of cases reported resulted from persistent pockets of children being missed during supplementary immunization activities (SIAs) in high-risk areas of the southern and eastern regions. In 2018, 10 countries in the Eastern Mediterranean Region experienced either a cVDPV outbreak (Somalia and Pakistan) or were considered high-priority countries per the GPSAP (Djibouti, Iraq, Jordan, Lebanon, Libya, Sudan, the Syrian Arab Republic and Yemen).

Fig. 4. Distribution of wild poliovirus cases and environmental surveillance isolations – Afghanistan and Pakistan, 2016–2018



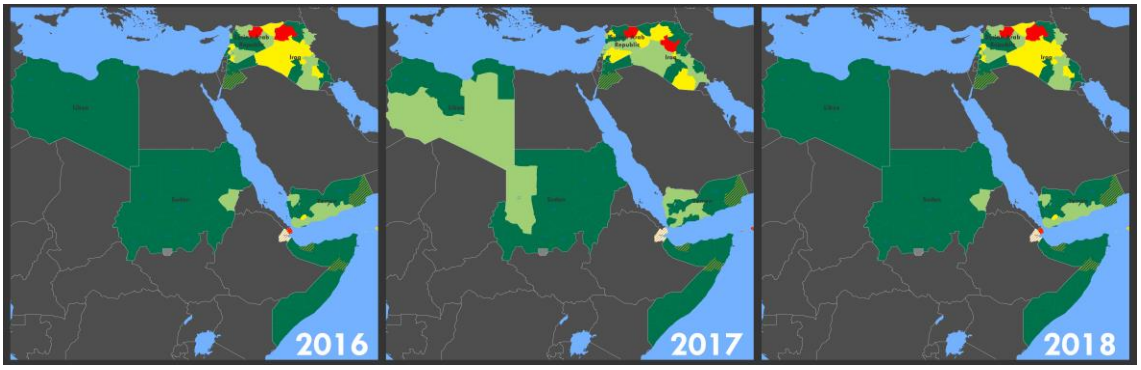
Source: WHO data as of 10 September 2019.
AFP: Acute flaccid paralysis; ES: Environmental surveillance

Of the 22 countries in the region, nine countries (Afghanistan, Egypt, the Islamic Republic of Iran, Jordan, Lebanon, Pakistan, Somalia, Sudan and the Syrian Arab Republic) and one territory (West Bank and Gaza Strip) have established ES to detect AFP cases. ES was established in Pakistan in September 2009 and in Afghanistan in 2013. In outbreak countries, it was established in both Somalia and the Syrian Arab Republic in 2017. In other high-risk countries in the region, ES was initiated in Sudan in September 2018; in Jordan and Lebanon, ES was established in 2016 and 2017, respectively, as a direct response to the refugee movement from the Syrian Arab Republic. Most countries in 2016–2018 achieved overall enterovirus (EV) detection (EV rate ≥50%) annually in at least 50% of ES sites (Fig. 6).

Fig. 5. Surveillance performance (non-polio acute flaccid paralysis [a] and stool adequacy[b]) among endemic, outbreak and high-risk countries – Eastern Mediterranean Region, 2016–2018

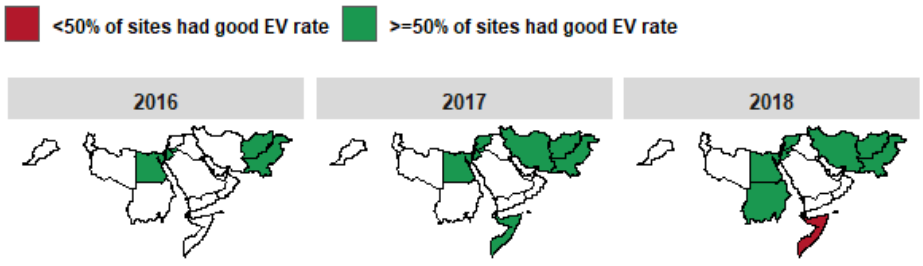
(Fig.5a)

(Fig.5b)



Source: WHO.

Fig. 6. Overall enterovirus detection among environmental surveillance sites by country – Eastern Mediterranean Region, 2016–2018



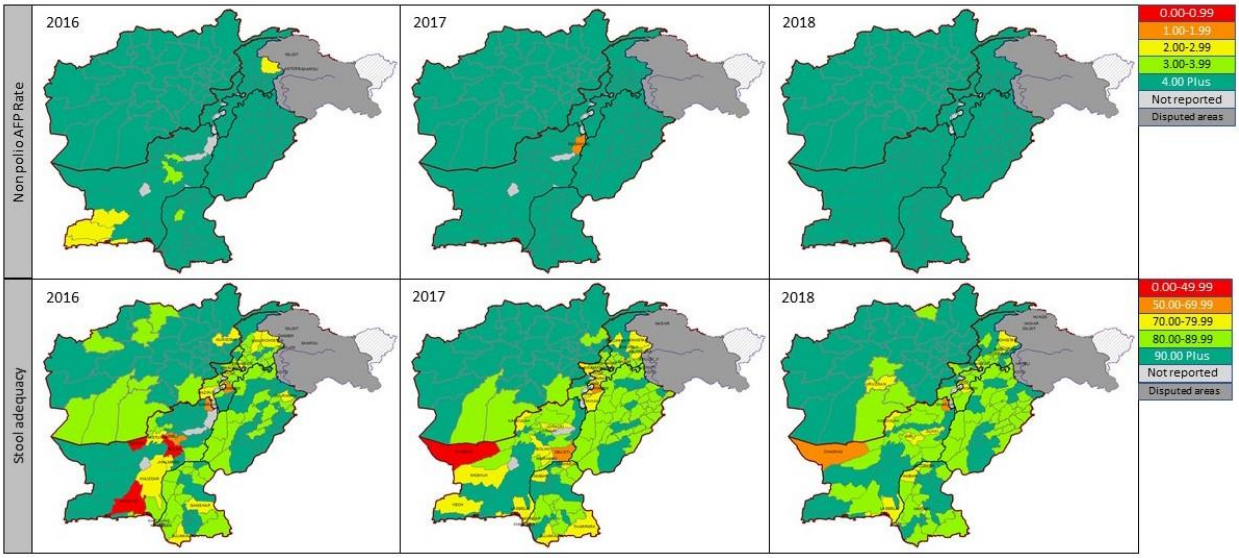
Source: WHO.

2.1.2 Endemic countries: Afghanistan and Pakistan

AFP surveillance performance

Trends in AFP surveillance remained high during 2016–2018 (Fig. 7), but pockets of suboptimal performance were evident in some districts, mainly in the northern and southern corridors.

Fig. 7. Non-polio acute flaccid paralysis and stool adequacy rates (districts/counties) — Afghanistan and Pakistan, 2016–2018



Source: WHO.

Table 1. Acute flaccid paralysis surveillance performance among endemic countries — provincial level, Eastern Mediterranean Region, 2016–2018

Country / Province/state	AFP cases reported			Annualized non-polio AFP rate[1]			AFP cases with adequate specimens (%)[2]		
	2016	2017	2018	2016	2017	2018	2016	2017	2018
AFGHANISTAN	**2 902**	**3 092**	**3 378**	**20**	**20**	**21.6**	**92.2**	**93.6**	**93.8**
BADAKHSHAN	56	65	68	9.8	10.9	11.4	98	95	96
BADGHIS	84	72	81	24	20.2	22.7	88	97	98
BAGHLAN	105	172	169	15.6	26.4	25.9	91	90	96
BALKH	111	136	125	12	14.4	13.3	88	91	93
BAMYAN	57	44	68	19	20.2	31.2	98	98	99
DAYKUNDI	25	34	38	7.1	10.5	11.7	96	91	87
FARAH	70	97	137	16.3	22.1	31.2	91	93	94
FARYAB	88	75	95	12.7	11.3	14.3	93	91	93
GHAZNI	73	65	89	9.3	8.1	11.1	92	98	96
GHOR	86	113	107	18	24.7	23.3	95	96	98
HILMAND	141	181	224	9.3	11.7	14.4	83	89	92

	HIRAT	230	264	267	16.1	18.1	18.3	97	95	95
	JAWZJAN	43	50	48	11.9	14.6	14.1	95	98	94
	KABUL	223	259	286	8.5	9.7	10.7	96	98	97
	KANDAHAR	292	231	249	26	19.6	21	85	86	85
	KAPISA	49	39	37	15	11.7	11.1	92	90	97
	KHOST	71	73	93	14.8	14.9	18.9	97	99	96
	KUNAR	77	63	93	22	18.6	26.6	97	95	95
	KUNDUZ	80	115	100	11	15.4	13.5	93	98	86
	LAGHMAN	53	39	50	16.4	11.8	15.1	98	92	92
	LOGAR	42	35	39	16	12	13.3	98	100	98
	NANGARHAR	260	246	243	20.9	19.1	18.9	95	94	95
	NIMROZ	42	42	35	24.4	23.9	20	86	90	91
	NURISTAN	19	18	20	20.2	18.7	19.8	79	89	95
	PAKTIKA	72	63	72	19.2	18.5	21.1	86	89	97
	PAKTYA	53	49	45	13.9	12.6	11.6	91	94	98
	PANJSHER	10	15	13	15.7	24	20.8	100	100	100
	PARWAN	54	59	73	16	16.7	20.7	100	98	97
	SAMANGAN	42	41	45	18.3	17.5	19.2	95	95	96
	SAR-E-PUL	35	43	42	11.2	13.4	13.1	83	95	90
	TAKHAR	98	135	167	11.4	15.36	19	94	90	96
	URUZGAN	56	56	53	17.2	16.9	15.4	88	93	79
	WARDAK	47	60	61	13.3	17.3	17.6	100	100	98
	ZABUL	58	43	46	14.1	13.1	14.4	90	91	85
PAKISTAN		**7 843**	**10 315**	**12 257**	**12.6**	**15**	**17.6**	**87.1**	**85.8**	**87.2**
	AJK	76	179	266	3.6	8.4	14.3	89	82	88
	BALOCHISTAN	305	531	580	7.6	12.9	9.9	86	83	87
	GILGIT BALTISTAN	17	59	112	2.7	8.8	16.6	71	93	85
	ISLAMABAD	62	107	145	9.2	15.5	15.2	94	87	79
	KHYBER PAKHTOON	1 484	2 103	2 593	11.3	15.7	18.2	83	82	84
	KPTD	482	513	622	22.7	28.1	26.7	85	87	91
	PUNJAB	3 937	4 546	5 510	8.9	10.5	10.9	88	87	88
	SINDH	1 482	2 188	2 441	7.8	11.3	11.1	89	87	88

[1] Annualized non-poliomyelitis AFP rate for 100 000 population aged <15 years. UNDP population data is used to calculate the non-polio AFP rate

[2] Defined as 2 stool specimens collected within 14 days of onset of paralysis, 24–48 hours apart, except for the Region of the Americas, where only 1 specimen is collected

Source: WHO EMRO.

Environmental surveillance performance

ES in Afghanistan and Pakistan has contributed to the understanding of the epidemiology of WPV. As of December 2018, 58 ES sites were operational in Pakistan, a change from 61 sites in 2016; the proportion

of sites detecting WPV at least once in any given year was 44% in 2016, 54% in 2017 and 64% in 2018. In Afghanistan, 20 ES sites were operational as of December 2018 (covering all major urban hubs), an increase from 15 sites in 2016; the proportion of sites detecting WPV at least once in any given year was 13% in 2016, 65% in 2017 and 75% in 2018. Table 2 shows the number of sites reporting at least one WPV or one vaccine-derived poliovirus (VDPV) and the proportion meeting the 50% EV rate benchmark for good-quality ES sites in both countries in 2018.

Table 2. Environmental surveillance performance among endemic countries – Eastern Mediterranean Region, 2018

Country	2018		
	No. of sites*	Sites with ≥50% EV rate (%)	Sites detecting WPV or VDPV (%)
AFGHANISTAN	20	100	75
PAKISTAN	58	100	64

* Must have had at least one specimen collected during the time frame. Enterovirus (EV) = WPV, VDPV, SL, or NPEV; WPV: Wild poliovirus; VDPV: Vaccine-derived poliovirus; SL: Sabin-like virus; NPEV: Non-polio enterovirus

Source: WHO.

As part of ensuring that the quality of ES remains high, the Pakistan and Afghanistan programmes review sites in accordance with their National Emergency Action Plan, which requires that all sites be reviewed annually; between 20% and 30% of sites are reviewed on a quarterly basis. In Pakistan, the country team has either closed or shifted the locations of sites that were operational at one time or another over the course of three years.

Surveillance issues

High population movement between Afghanistan and Pakistan, mainly in the eastern region, affects the GPEI's ability to maintain accurate denominator information, particularly among travellers within the corridors, nomads, returning refugees and populations that straddle the borders. While surveillance remains generally strong, immunization efforts in both Afghanistan and Pakistan are focusing on identifying missed children, determining the reasons why they have been missed and implementing operational plans to overcome these challenges. Emphasis continues to be placed on reaching high-risk mobile population groups travelling internally within both countries and across the border. Compared with Pakistan, Afghanistan is not using mobile technologies for active surveillance visits, but security issues may prevent the country from doing so.

Surveillance strengthening activities

a. Improvements in AFP case detection among high-risk populations

In Afghanistan and Pakistan, the surveillance network includes government and private health facilities, shrines, informal health-care providers (e.g. traditional healers), community leaders and approximately 35 000 volunteers. Following desk and field reviews in Afghanistan, silent districts (no reported AFP cases in a 12-month period) previously identified in 2017 reported AFP cases in 2018. Mobile populations at high risk in Afghanistan have been mapped and will be tracked through the engagement of nomad elders

as focal points for surveillance and immunization activities. In areas where children are inaccessible for immunization activities and the suspicion of virus circulation and pockets of under-immunized children is high, some limited surveillance activities have taken place via local volunteers and community-based surveillance (CBS). Quarterly sampling of healthy children takes place in chronically inaccessible areas in the south, south-east and east of Afghanistan. Surveillance performance is also analysed comparing accessible and inaccessible area data, and feedback is routinely provided to all staff, to guide intervention.

In Pakistan, CBS is strengthened in areas with scattered populations with inadequate access to health facilities, particularly in districts in Khyber Pakhtunkhwa and Balochistan province. The system brings on board faith healers, religious clerics, taxi drivers and community health workers who are oriented on AFP and provided contacts to report cases. In 2018, 1452 AFP cases were reported through CBS as compared to 1267 in 2017 across Pakistan.

b. Improvements in information management

To strengthen data collection efforts and streamline processes, regional and provincial teams will be consulted on feasibility, usefulness and workload before introducing any new (or changing existing) data streams or formats.

In Pakistan, the use of the open data kit and the Infectious Diseases Management Information System has allowed real-time uploads of zero reports from health facilities and reports on active surveillance, further strengthening the monitoring of the AFP surveillance network. The introduction of the electronic Information for Action online platforms allows real-time uploading of all information on AFP cases and eases data analysis at the national and subnational levels.

2.1.3 Outbreak and other high-risk countries

AFP surveillance performance

In 2018, 10 countries in the Eastern Mediterranean Region experienced either a cVDPV outbreak (Somalia and Pakistan) or were considered high-priority countries per the GPSAP (Djibouti, Iraq, Jordan, Lebanon, Libya, Sudan, the Syrian Arab Republic and Yemen). During 2016–2018, high-risk countries such as Iraq, Libya and Yemen consistently achieved NPAFP rates exceeding the global standard; AFP cases reported in Iraq increased in 2018 (n=1023) compared with 699 cases in 2017.

Table 3. Acute flaccid paralysis surveillance performance among outbreak or high-risk countries — Eastern Mediterranean Region, 2018

WHO country	No. of AFP cases (all ages)	National NPAFP rate[1]	Subnational areas with NPAFP rate ≥2 (%)	National AFP cases with adequate specimens (%)[2]	Subnational areas with ≥80% adequate specimens (%)	No. of confirmed WPV cases	No. of confirmed cVDPV cases
AFGHANISTAN	3 378	21.6	100	93.8	100	21	0
DJIBOUTI	0	0	ND	ND	ND	0	0
IRAQ	1 023	6.5	100	89.9	95	0	0

JORDAN	114	3.3	100	100	100	0	0
LEBANON	89	6.5	100	96.6	83	0	0
LIBYA	122	6.8	100	96.7	100	0	0
PAKISTAN	12 257	17.6	100	87.2	100	12	0
SOMALIA	353	4.9	100	97.7	100	0	13*
SUDAN	577	3.4	100	97.2	100	0	0
SYRIAN ARAB REPUBLIC	362	5.5	93	87.3	86	0	0
YEMEN	729	6.4	100	91.6	100	0	0

[a] Endemic countries are shaded; ND: not determined. Subnational areas (Admin 1)

* One cVDPV2 and cVDPV3 isolated from one child.

[1] Annualized non-poliomyelitis AFP rate for 100 000 population aged <15 years. UNDP population data is used to calculate the non-polio AFP rate

[2] Defined as 2 stool specimens collected within 14 days of onset of paralysis, 24–48 hours apart, except for the Region of the Americas, where only 1 specimen is collected

Source: WHO.

Environmental surveillance performance

ES in high-priority or outbreak countries has played a critical role in monitoring cVDPV2 transmission and Sabin-like type 2 virus isolation from the monovalent oral poliovirus vaccine responses in the Eastern Mediterranean Region. Table 4 shows the number of sites reporting at least one WPV or one VDPV among outbreak or high-risk countries and the proportion meeting the 50% EV rate benchmark for good-quality ES sites in 2018. To ensure the quality of ES remains high, programmes continue to actively review and manage their ES network. In Somalia, the country team has closed one site and identified a new site location further upstream targeting the same catchment population. Furthermore, in 2018, Somalia undertook an effort to map existing ES sites in Mogadishu and to identify potential new ES sites in Hargeisa, Garowe, Baidoa and Kismayo, but no suitable additional sites have been identified so far.

Table 4. Environmental surveillance performance among outbreak or high-risk countries – Eastern Mediterranean Region, 2018

Country	2018		
	No. of sites*	Sites with ≥50% EV rate (%)	Sites detecting WPV or VDPV (%)
JORDAN	3	100	0
LEBANON	4	100	0
SOMALIA	5	40	60
SUDAN	4	100	0
SYRIAN ARAB REPUBLIC	14	86	0

* Must have had at least one specimen collected during the time frame. Enterovirus (EV) = WPV, VDPV, SL, or NPEV; WPV: Wild poliovirus; VDPV: Vaccine-derived poliovirus; SL: Sabin-like virus; NPEV: Non-polio enterovirus

Source: WHO.

Surveillance issues

Areas that are difficult or impossible to access represent significant surveillance challenges in this region. Conflicts within countries have prevented or hindered surveillance efforts, either through lack of access or through population movement (effectively blinding the polio programme to the true situation in some areas). For example, due to insecurity and conflict, delays in the transportation of specimens within and outside of Yemen have resulted in a large number of AFP cases pending final classification for more than 90 days. Efforts have been made to mitigate these transport challenges; however, downstream the backlog of specimens has affected laboratory processing timeliness and completion. Despite these challenges, Yemen has achieved a national NPAFP rate of less than 5 per 100 000 and a stool adequacy rate of greater than 90% during 2016–2018. Furthermore, the expansion of ES to Yemen and Libya is still of interest despite ongoing issues of insecurity that have thus far hindered efforts. Among other high-risk countries in the region, Djibouti did not report any AFP cases between April 2017 and December 2018.

Surveillance strengthening activities

a. Improvements in AFP case detection

To strengthen the country's surveillance network, the Somalia polio programme conducted an audit and prioritization of health facilities. Active surveillance was reinitiated in these facilities, as well as within the community, including the collection of community samples in silent areas, and among hot cases (priority cases of AFP that are more likely than other cases to be true polio). Approximately 80% of the 933 active AFP reporting sites across Somalia are health facilities operated by partners (nongovernmental organizations and private institutions). To boost the search for AFP cases, efforts to map all AFP cases with geocodes are under way (the target for geocoding is 100% of AFP cases); furthermore, the zero-reporting system was assessed in 2018 and is being revamped by the programme in 2019.

CBS was established in Raqqa and Deir Ez-Zor governorates in the Syrian Arab Republic in January 2018, comprising more than 400 community informants, and it has been used for disease reporting in emergencies through the Early Warning Alert and Response Network (EWARN). In Somalia, approximately 535 village polio volunteers support the polio programme, most of which are located in inaccessible areas. While efforts have improved case detection in hard-to-reach areas, approximately 544 820 children aged under 15 years continue to be inaccessible in areas that lack village polio volunteers, which poses a risk of missing circulation.

Investigations into reasons for the non-reporting of AFP in silent districts (in 2018) were completed in Somalia.

b. Improvements in programme accountability through electronic data collection

The Somalia programme developed a mobile reporting application using Open Data Kits in 1168 (68%) of 1726 accessible areas, to track active surveillance and monitoring activities at health facilities in real time.

c. Improvements in AFP surveillance strengthening in high-risk populations

To understand the risk posed by high-risk populations, the Somalia programme has undertaken efforts to strengthen surveillance in high-risk populations using a standardized classification and definition system, including:

- mapping internally displaced population (IDP) camps

- appointing focal persons for AFP surveillance in each IDP camp
- mapping extensive settlements, including along international borders with Kenya and Ethiopia to identify areas of population movement and potential pockets of missed settlements for surveillance and immunization.

Furthermore, in 2018, a survey of healthy children in Somalia yielded 426 samples, among which approximately 55% originated from inaccessible areas; two specimens yielded VDPV.

d. Surveillance in high-risk and under-performing areas

The use of log tags to assess the quality of the reverse cold chain and to better understand stool temperatures during transportation was implemented in Yemen, Sudan and Somalia.

An important component to strengthen surveillance activities lies in the regular and systematic analysis of data. While Lebanon, Jordan and Libya routinely analyse surveillance data by location, gender and oral polio vaccine (OPV)/inactivated polio vaccine (IPV) status, in Somalia, Iraq, Sudan and Yemen, surveillance data are also routinely analysed by accessibility and lifestyle (e.g. nomadic, urban, rural).

e. Other activities to enhance surveillance

See Annex 4. Reviews of surveillance performance) and Annex 5. Trainings and sensitizations) for additional information.

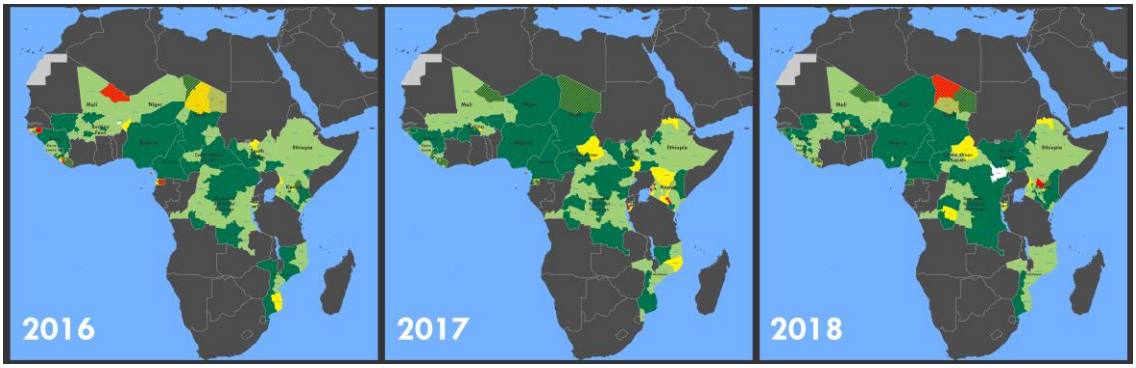
2.2 Poliovirus surveillance in the African Region

2.2.1 Overview

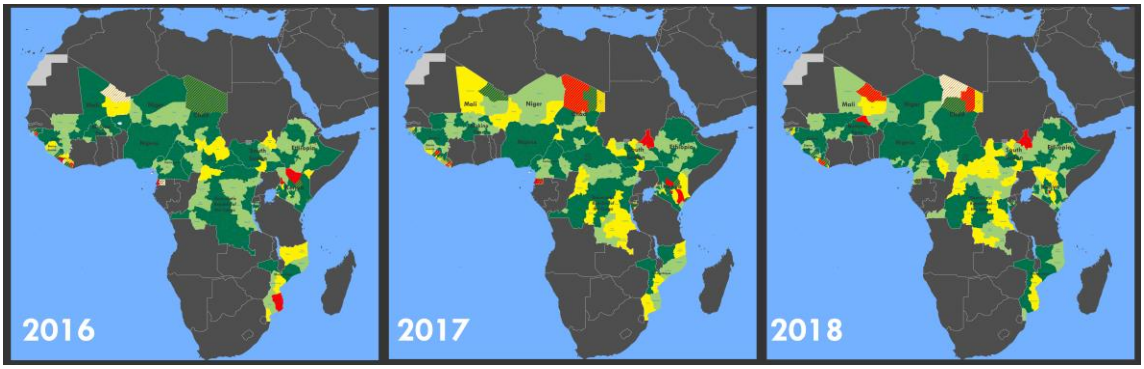
The African Region is one of two WHO regions considered endemic for WPV; the last case of poliomyelitis due to WPV type 1 was reported in Nigeria on 21 August 2016. No new evidence of circulation of WPV from any source has been observed since the detection of virus in a healthy child from Borno State on 27 September 2016. From 2016 to 2018, outbreaks of cVDPVs have affected Nigeria as well as the Democratic Republic of the Congo, Kenya and Ethiopia; Ethiopia had no cases of cVDPV but was included in outbreak response activities. At the national level, surveillance indicators have generally met global standards, however challenges still remain at the subnational level (Fig. 8).

Fig. 8. Surveillance performance (non-polio acute flaccid paralysis [a] and stool adequacy[b]) among endemic, outbreak and high-risk countries – African Region, 2016–2018

(Fig. 8a)



(Fig. 8b)



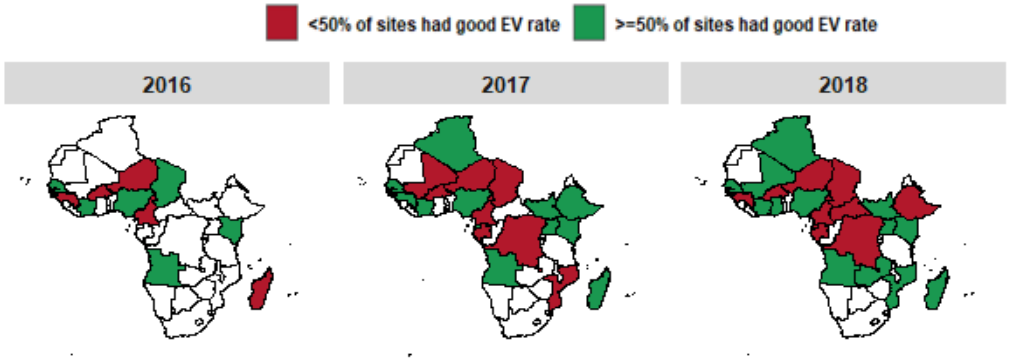
Source: WHO.

As of December 2018, ES was operational in 23 countries in the region with 250 sites located in 249 districts, compared to 12 countries with 203 sites in 103 districts in 2016. In 2018, the African Regional Environmental Surveillance Working Group was created to assist in strengthening ES implementation in

the region, monitor ES quality through on-site assessments and develop a regional ES workplan. The group conducted on-site visits to nine of the 23 countries with ES in 2018, resulting in the closure of sites with poor performance, the initiation of new sites and recommendations for operational improvements to supervision, and specimen collection and financing. Improvements in virus (i.e. EV) yield was seen in some countries.

Fig. 9 shows the proportion of countries with ES sites that achieved at least a 50% EV rate (isolation of any non-polio EV, Sabin-like virus, vaccine-derived poliovirus or wild poliovirus) by country. Of the 23 countries with ES, 12 have maintained high-quality ES sites. While sites in Angola maintained an EV detection rate of 50% in 2018, the rate declined from 88% in 2017.

Fig. 9. Overall enterovirus detection among environmental surveillance sites by country – African Region, 2016–2018



Enterovirus (EV) = WPV, VDPV, SL, or NPEV; WPV: Wild poliovirus; VDPV: Vaccine-derived poliovirus; SL: Sabin-like virus; NPEV: Non-polio enterovirus
Source: WHO.

2.2.2 Endemic countries: Nigeria

AFP surveillance performance

Nigeria is one of three countries worldwide that had not interrupted WPV circulation by 2018. After a period of two years without reported WPV, four cases were reported in the north-eastern state of Borno, an area that has been severely affected by insurgency-related insecurity. During 2016–2018, key surveillance enhancement activities were implemented, including the expansion of active surveillance sites, use of new surveillance technology, community informants from inaccessible areas, auto-visual AFP detection and reporting (AVADAR), several special interventions coupled with surveillance resulting in significant improvements in AFP surveillance. AFP surveillance performance indicators were met by all provinces/states (Table 5). Declines in AFP case detection, NPAFP rates and stool adequacy rates were noted (although an external review of outbreak response activities attributed the decline in surveillance quality; achieved by the systematic AFP verification by trained verifiers, biannual surveillance "peer reviews" of AFP cases for states with very high surveillance core indicators.

Table 5. Acute flaccid paralysis surveillance performance in Nigeria (provinces/states) — African Region, 2016–2018

Country	Province/state	AFP cases reported			Annualized non-polio AFP rate[1]			AFP cases with adequate specimens (%)[2]		
		2016	2017	2018	2016	2017	2018	2016	2017	2018
NIGERIA		17 836	16 441	9 407	21.2	19.6	10.9	98.8	98.3	95.4
	ABIA	222	212	119	15.2	14.6	6.4	99.5	99.5	82.4
	ADAMAWA	542	588	257	32.8	35.7	12.1	98.5	98.1	95.7
	AKWA IBOM	447	340	125	21.4	16.3	4.5	99.8	100	98.4
	ANAMBRA	239	228	109	11	10.6	3.9	100	97.8	85.3
	BAUCHI	660	618	465	26.5	24.8	13.9	98.6	98.1	96.3
	BAYELSA	168	152	109	18.9	17.2	9.5	100	99.3	99.1
	BENUE	574	436	354	26	19.8	12.3	99.8	99.1	96.6
	BORNO	627	716	732	27.3	31.6	24.5	93.6	90.6	85.2
	CROSS RIVER	221	262	125	14.7	17.5	6.5	100	99.6	99.2
	DELTA	475	324	126	21.9	15	4.4	99.2	98.5	89.7
	EBONYI	230	204	124	20.3	18.1	8.6	97	94.1	94.4
	EDO	548	518	227	33	31.2	10.8	98.7	99	99.6
	EKITI	331	380	238	26.4	30.4	14.5	100	99.5	97.5
	ENUGU	337	371	255	19.7	21.8	11.4	98.2	97	96.5
	FCT, ABUJA	484	490	151	48.8	49.6	7.8	98.8	98.6	90.7
	GOMBE	455	419	262	36.6	33.8	16	99.8	97.9	93.9
	IMO	276	379	113	13.3	18.3	4.1	100	99.5	97.3
	JIGAWA	788	838	477	34.8	37.1	16.1	99.5	98.7	96.2
	KADUNA	1 042	540	255	32.8	17.1	6.2	98.7	99.4	96.5
	KANO	1 829	1 385	626	36.6	27.8	9.5	96.6	97.2	95.2
	KATSINA	974	773	411	32	25.6	10	99	98.2	98.1
	KEBBI	1 130	796	477	66.4	46.9	21.5	100	99.7	95.2
	KOGI	238	257	214	13.8	15	9.6	99.6	99.6	97.7
	KWARA	120	150	108	9.7	12.1	6.6	99.2	99.3	97.2
	LAGOS	383	435	270	8	9.2	4.3	99.2	98.6	94.8
	NASARAWA	309	325	197	31.7	33.4	15.6	98.1	99.1	97.5
	NIGER	294	346	204	14	16.5	7.3	100	100	94.6
	OGUN	297	384	186	14.5	18.8	7.1	99	99.7	96.8
	ONDO	368	372	135	20.4	20.7	5.8	100	98.9	96.3
	OSUN	211	279	164	11.7	15.5	6.9	100	99.3	98.2
	OYO	247	325	254	8.3	10.9	6.4	99.6	100	98.8
	PLATEAU	502	577	297	30.6	35.3	14.3	99	99.3	98.3
	RIVERS	381	393	323	13.8	14.2	8.8	99.7	99.7	99.1
	SOKOTO	628	473	289	32.4	24.5	11.5	100	99.6	98.3
	TARABA	361	358	227	30.3	30.2	14.8	98.9	97.8	96.9

YOBE	428	473	222	34.3	38.1	13	98.4	96.2	96.4
ZAMFARA	470	325	180	27.3	18.9	7.9	99.8	100	98.3

[1] Annualized non-poliomyelitis AFP rate for 100 000 population aged <15 years. UNDP population data is used to calculate the non-polio AFP rate

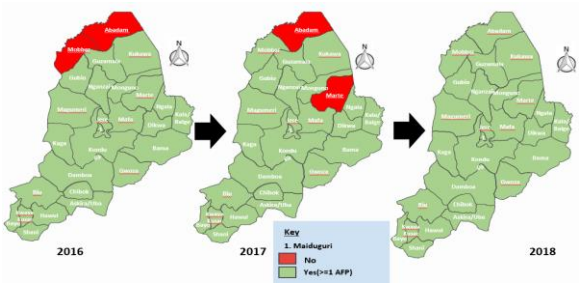
[2] Defined as 2 stool specimens collected within 14 days of onset of paralysis, 24–48 hours apart, except for the Region of the Americas, where only 1 specimen is collected

Source: WHO.

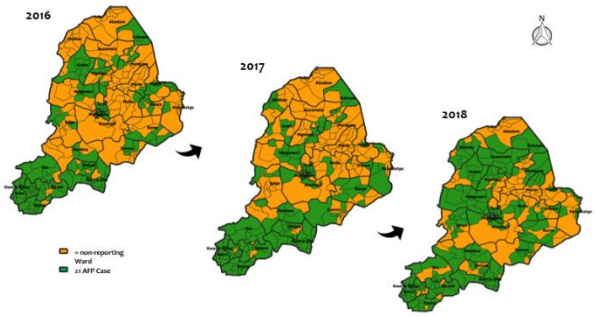
During 2016–2018, the number of non-reporting local government areas (LGAs) and wards in Borno State decreased and fewer AFP cases were missed (Fig. 10). Furthermore, data analyses improved by mapping areas with accessibility challenges and grouping areas by operational cluster of epidemiologic relevance.

Fig. 10. Non-reporting local government areas (a) and wards (b) for acute flaccid paralysis surveillance — Borno state, 2016–2018

(Fig. 10 a)



(Fig. 10 b)



Source: Borno emergency operations centre.

Environmental surveillance performance

ES was initiated in 2011 in Kano State, Nigeria. Following implementation in additional states, silent WPV transmission was confirmed in Lagos, Sokoto and Kaduna (poliovirus was detected from sewage specimens collected from ES in the absence of detection of any cases in humans). By the end of 2018, ES was conducted in 21 states in Nigeria, with a total of 103 sampling sites, nine of which were located in Borno State (Table 6). By end of December 2018, two ES laboratories serve the country; one located in Ibadan and a second in Maiduguri conducting parallel testing. No WPV has been detected in ES. As part of ensuring that the quality of ES remains high, the programme continues to actively review and manage the ES network. In Nigeria, the country team has either closed or shifted the locations of ES sites that were operational at one time or another over the last three years.

The main challenges encountered in selecting ES sites have been the absence of well-designed closed sewage systems in many of the highest priority states. Security challenges exist in the north-east zone that threatens safe sample collection and transportation. Reliance on erratic public transportation to get the samples to the Ibadan laboratory with delayed delivery, and a fragile infrastructure caused by power outages that threaten the capacity to keep samples cold. The lack of local environmental protection legislation allows local industry to pollute drainage channels and sampling sites with chemical effluent

discharges, and water flow is blocked by refuse, road construction activities, irrigation and mining activities.

Table 6. Environmental surveillance performance in Nigeria (districts) — African Region, 2018

Country	2018			
	No. of districts with ES	No. of sites*	Sites with ≥50% EV rate (%)	Sites detecting WPV or VDPV (%)
NIGERIA	67	103	79	23

* Must have had at least one specimen collected during the time frame. Enterovirus (EV) = WPV, VDPV, SL, or NPEV; WPV: Wild poliovirus; VDPV: Vaccine-derived poliovirus; SL: Sabin-like virus; NPEV: Non-polio enterovirus

Source: WHO.

Surveillance issues

While extensive efforts have improved surveillance reach in Borno State, the volatile security situation has prevented both routine immunization and SIAs from reaching unsafe areas. The lack of access and inability to conduct high-quality surveillance remain in some areas of Borno State and continue to challenge the polio programme.

Surveillance strengthening activities

Following confirmation of WPV in 2016, Borno State and partners commenced a host of innovative strategies to enhance AFP detection, including intensified AFP case search by house-to-house teams during immunization plus days and systematic contact sampling of all AFP cases reported. Of the 732 AFP cases reported in Borno State in 2018, 127 (17.3%) were from inaccessible areas thanks to the efforts of community informants from inaccessible areas.

a. Surveillance improvements in inaccessible or security-compromised settlements

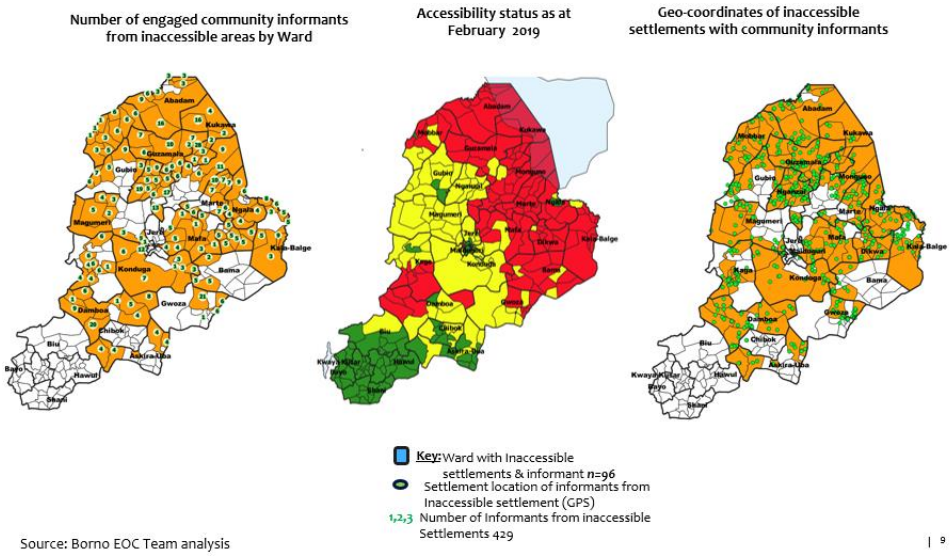
Community informants from inaccessible settlements use their "circle" of influence to engage others with regular contact in secure areas and link them with LGA community informant focal persons. Informants include persons such as hunters, drivers, fishermen and informal health-care providers. In 2018, 127 (17.3%) of the 732 AFP cases reported in Borno State came from security compromised areas, including six cases from the Lake Chad islands. About half of all cVDPV2 AFP cases detected in Borno State were reported by community informants from inaccessible settlements (Fig. 11). Furthermore, use of electronic tools to facilitate identification and investigation of AFP cases and AVADAR and e-Surv were successfully introduced; additional information can be found in the next section.

During routine immunization activity strategies, such as Reaching Every Settlement (RES) and Reaching Inaccessible Children (RIC), all personnel are engaged and trained on AFP surveillance. A focal person is responsible for searching for AFP cases, sensitizing households on AFP identification and reporting, identifying community informants and, where applicable, collecting stool samples from healthy children. For any AFP case identified, the index case and three contacts are evacuated to safe areas to complete the case investigation.

Hard-to-reach mobile teams provide key health services in underserved populations across Borno state, such as routine immunization, the treatment of minor ailments, antenatal services, and surveillance for AFP and other priority diseases. All personnel are trained regularly on AFP surveillance. Hard-to-reach

session plans have been integrated with strategies for engaging informants from insecure areas, by providing services at strategic locations for persons from insecure areas seeking services in secure areas. Currently, 58 hard-to-reach mobile health teams cover 1621 settlements in 25 LGAs; from 2016 to 2018, for each year, respectively, 6%, 8.5% and 5% of all AFP cases were reported by hard-to-reach mobile teams in Borno state.

Fig. 11. Community-based surveillance and accessibility — Borno state, 2016–2018



Source: Borno emergency operations centre team analysis.

b. AFP surveillance in IDPs camps

Internally displaced persons represent the highest-risk population for poliovirus transmission. The last four cases of WPV reported in Nigeria were in IDPs. In Borno, IDP camp clinics are considered the highest priority for AFP surveillance and undergo at least two active surveillance visits per week. All clinics in IDP camps have been incorporated into the disease surveillance network with a designated surveillance focal person. During 2016–2018, over 100 AFP cases were reported each year among IDPs. Based on this experience in Nigeria a fourth level of prioritization of surveillance sites (highest priority) has been adopted in the Africa Region).

c. AFP surveillance supported by special intervention teams

Following the WPV outbreak in 2016, special intervention teams were deployed across the state to engage in specific strategies and at strategic locations to target special or underserved populations with OPV across Borno state. All personnel were trained on AFP surveillance and each team had a designated focal person primarily responsible for AFP surveillance. In 2018, 16 AFP cases were reported by special intervention teams, compared to 14 cases in 2017.

d. Improvements in community informant performance

A system to track zero reports from community informants was introduced to remind them to search and report the status of AFP in their community, including zero reports. The supervision of informants is the collective responsibility of all surveillance personnel in Borno State. All informants in the state are mapped to a specific supervisor using a standard template, and supportive supervision is conducted by field

volunteers using checklists. Supervisory findings are documented in a Zero Report booklet or Call Logs booklet with the weekly submission of active case search data (including zero reports). In the fourth quarter of 2018, 92% of community informants' reports were received.

e. Identification of community circulation among high-risk and mobile populations

Four strategies for healthy children stool sampling are implemented in Borno state:

1. Healthy children stool sampling from inaccessible areas: collecting stool samples from healthy children and their contacts from these areas.
2. Healthy children stool sampling from new arrivals in IDPs: collecting one stool specimen each from 10% of children aged under 10 years in a cluster of IDPs within seven days of their arrival in a secure area.
3. Nomadic healthy children stool sampling: collecting one stool specimen from a maximum of five nomadic children aged under 10 years in a group of nomads within seven days of their arrival in an LGA. No additional specimens are collected as long as they stay in the LGA, even if they change locations within it.
4. Healthy children stool sampling in RES/RIC strategies: Sampling in RES – collecting one stool specimen each from a maximum of five children aged under 10 years in an AFP non-reporting ward implementing RES. No additional specimens are collected once the maximum number of five specimens is reached, even if additional RES rounds are implemented in the ward; Sampling in RIC – targeting three healthy children stool specimens per settlement implementing RIC (not yet implemented). In 2018, 723 stool samples were collected and tested from healthy children.

f. Enhancement of environmental surveillance

To enhance routine ES in Borno state, the number of routine ES sites was expanded during 2016–2018, with increased frequency of specimen collection. In 2017 and 2018, two ES sweeps were conducted in security compromised areas. They involved a one-time collection of 1 litre of wastewater contaminated by sewage from each validated ES sweep site located in security compromised LGAs. In addition, ad hoc ES with monthly specimen collection was implemented for six months (January to June 2018) in relatively secure areas of Borno State where routine ES was not implemented.

2.2.3 Outbreak and other high-risk countries

AFP surveillance performance

During 2016–2018, 17 countries in the African Region experienced either a cVDPV outbreak (Cameroon, Chad, Democratic Republic of the Congo, Ethiopia, Kenya, Niger and Nigeria) or were considered high priority for surveillance strengthening (Burkina Faso, Burundi, Central African Republic, Equatorial Guinea, Guinea, Guinea-Bissau, Liberia, Mali, Sierra Leone and South Sudan). Subnational AFP indicators remained concerning in some areas, with pockets of inaccessibility affecting surveillance efforts throughout the region.

Table 7. Acute flaccid paralysis surveillance performance among outbreak or high-risk countries — African Region, 2018

WHO country	No. of AFP cases (all ages)	National NPAFP rate[1]	Subnational areas with NPAFP rate ≥2 (%)	National AFP cases with adequate specimens (%)[2]	Subnational areas with ≥80% adequate specimens (%)	No. of confirmed WPV cases	No. of confirmed cVDPV cases
BURKINA FASO	360	4	100	88.9	92	0	0
BURUNDI	123	2.4	53	91.1	81	0	0
CAMEROON	760	7.2	100	87.8	100	0	0
CENTRAL AFRICAN REPUBLIC	134	6.6	86	82.8	86	0	0
CHAD	649	9	96	95.8	91	0	0
DEMOCRATIC REP. OF THE CONGO	2 642	6.6	92	84.1	65	0	20
EQUATORIAL GUINEA	30	6.2	86	93.3	83	0	0
ETHIOPIA	1 078	2.5	73	92.1	100	0	0
GUINEA	231	4.2	100	96.1	100	0	0
GUINEA-BISSAU	95	12	100	87.4	67	0	0
KENYA	672	3.3	85	88.2	85	0	1
LIBERIA	72	3.6	100	90.3	73	0	0
MALI	291	3.2	100	88.7	78	0	0
MOZAMBIQUE	461	3.4	91	88.3	80	0	1
NIGER	973	8.6	100	89.1	100	0	10
NIGERIA	9 407	10.9	100	89.1	100	0	34
SIERRA LEONE	121	3.8	100	95.4	75	0	0
SOUTH SUDAN	445	8.3	100	83.5	60	0	0

[a] Endemic countries are shaded; ND: not determined. Subnational areas (Admin 1)

[1] Annualized non-poliomyelitis AFP rate for 100 000 population aged <15 years. UNDP population data is used to calculate the non-polio AFP rate

[2] Defined as 2 stool specimens collected within 14 days of onset of paralysis, 24–48 hours apart, except for the Region of the Americas, where only 1 specimen is collected

Source: WHO.

Environmental surveillance performance

ES in outbreak or high-risk countries has played a critical role in complementing traditional AFP surveillance and monitoring poliovirus transmission in the African Region. As of December 2018, 15 of the 18 outbreak or high-risk countries in the region had implemented ES. During 2016–2018, VDPV was detected from sewage in Nigeria and Kenya. In Nigeria, the proportion of sites detecting VDPV at least once in any given year increased from 2% in 2016 to 23% in 2018. In Kenya, 11% of sites detected VDPV at least once in 2018. Table 8 shows the number of sites reporting at least one WPV or one VDPV and the proportion meeting the 50% EV rate benchmark for good-quality sites in 2018.

Table 8. Environmental surveillance performance among outbreak or high-risk countries (districts) — African Region, 2018

Country	2018			
	No. of districts with ES	No. of sites*	Sites with ≥50% EV rate (%)	Sites detecting WPV or VDPV (%)
BURKINA FASO	2	4	0	0
CAMEROON	15	31	10	0
CENTRAL AFRICAN REPUBLIC	2	4	0	0
CHAD	2	5	40	0
CÔTE D'IVOIRE	11	15	53	0
DEMOCRATIC REPUBLIC OF THE CONGO	9	11	45	0
EQUATORIAL GUINEA	2	4	0	0
ETHIOPIA	3	4	25	0
GHANA	6	9	78	0
GUINEA	1	7	0	0
KENYA	8	9	100	11
MALI	3	4	100	0
MOZAMBIQUE	1	4	75	0
NIGER	3	8	0	0
SOUTH SUDAN	1	4	60	0

* Must have had at least one specimen collected during the time frame. Enterovirus (EV) = WPV, VDPV, SL, or NPEV; WPV: Wild poliovirus; VDPV: Vaccine-derived poliovirus; SL: Sabin-like virus; NPEV: Non-polio enterovirus

Source: WHO.

As part of ensuring that the quality of ES remains high, programmes continue to actively review and manage their ES network. In Kenya, the country team has either closed or shifted the locations of two sites that were operational at one time or another over the course of three years. Recommendations from external reviews of ES sites in both Ethiopia and Kenya in 2018 focused on improving site performance and expanding ES to high-risk areas in response to an ongoing cVDPV2 outbreak. By December 2018, Kenya successfully initiated ES in eight new sites, effectively increasing their number from nine to 17. In 2018, as part of the ongoing assessment of ES sites in Cote D'Ivoire, the country programme closed eight sites, resulting in seven active sites as of 31 December 2018.

Surveillance issues

Several issues impacting surveillance exist in the region. As in other regions where inaccessibility due to conflict persists, many challenges likewise exist due to difficulty in reaching remote areas or adequately identifying high-risk populations. While strong efforts are being made to improve the supervision of surveillance activities through the use of electronic innovations and engagement with organizations uniquely able to access select areas, the adequate supervision of surveillance activities continues to be a challenge, including in the Democratic Republic of the Congo, South Sudan and in some north-eastern counties of Kenya. Community members, non-local health workers and other public service employees

continue to flee areas following attacks in some areas close to the border with Somalia and eastern Democratic Republic of the Congo. Due to intense population movement across many countries, a further challenge is in estimating population denominators.

Additional expansion of ES in the region is expected in 2019, but lengthy administrative and implementation processes can hinder rapid progress. Furthermore, as ES expands in the region, ensuring adequate laboratory space and human resource capacity to process environmental specimens is critical.

Surveillance strengthening activities

a. Improvements in AFP case detection

To strengthen the surveillance network in outbreak-affected provinces, the Democratic Republic of the Congo and other country polio programmes conducted an audit and prioritization of health facilities; all surveillance sites are reviewed twice a year. E-surv using electronic systems was initiated in the province of Kinshasa (DRC) since 2017 in which all 35 health zones are conducting active searches for AFP cases. Updating of surveillance sites every six months has been streamlined in the Africa Region with the addition of a fourth level of site priority known as "highest" where facilities are visited at least twice weekly.

b. Improvements in programme accountability through electronic data collection

The African Region has implemented eSurv, a mobile reporting application, to track active surveillance and monitoring activities at health facilities in real time. While many countries in the region have started using eSurv, including Ethiopia, Kenya and South Sudan, inconsistency in performance has been noted, such as the lack of active surveillance visits in high-priority sites.

In 2017, the WHO Regional Director for Africa required all WHO country offices to implement the integrated supportive supervision (ISS) mobile application. ISS is a similar tool to eSurv but includes assessments of routine immunization and cold chain as well as vaccine preventable diseases (AFP, Measles, Yellow Fever, and Neonatal Tetanus). The purpose of ISS is to monitor the overall immunization system at a local level whereas eSurv focuses on AFP surveillance.

c. Improvements in surveillance in border areas

Several cross-border activities have been conducted in the Lake Chad Basin countries and for other countries during SIAs. Ethiopia and Kenya, through a partnership with the CORE Group Polio Project, strengthened surveillance in communities that share a border with Somalia. Likewise, CORE Group contributed to strengthening surveillance in South Sudan.

d. Improvements in surveillance in high-risk and under-performing areas

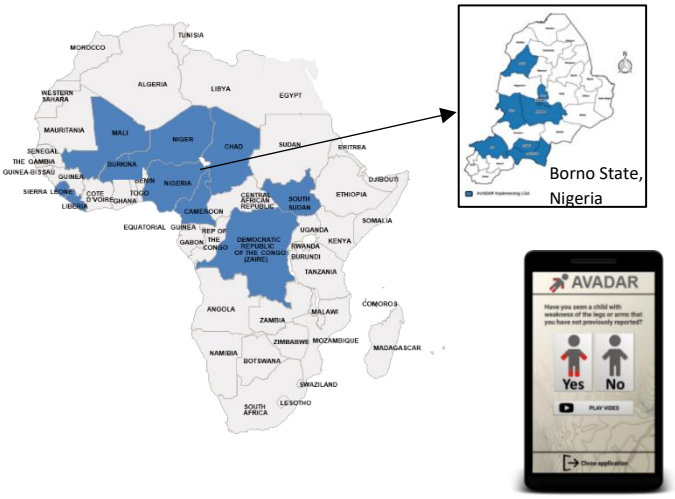
The innovative technology AVADAR (Auto-visual AFP detection and reporting) is an electronic application that has enhanced community reporting by:

- providing informants in high risk areas with smart phones to report AFP cases
- ensuring the availability of real-time data at the subnational level in areas where surveillance is weak
- tracking the geographical coverage of the network of informants and case distribution through geographic information system (GIS) mapping.

Community members are trained to detect and report potential AFP cases, and GIS features in the application allow the programme to geolocate a potential AFP case and the subsequent investigation. This requires cellular network.

As of 2018, AVADAR has been implemented in 30 states or provinces, and 95 districts in 10 countries in the African Region (Burkina Faso, Cameroon, Chad, the Democratic Republic of the Congo, Liberia, Mali, Niger, Nigeria (Borno state), Sierra Leone and South Sudan), (Fig. 12). The estimated population aged under 15 years covered by AVADAR is 9.5 million children.

Fig. 12. Countries with AVADAR implementation in select provinces or districts – African Region, 2018



Source: WHO.

Following AVADAR introduction, documented evidence from January 2017 to October 2018 showed a 42% increase in AFP detection among all countries and a 58% reduction in non-reporting health areas. It also showed that 98% of trained community informants were actively reporting. In 2018, 552 true AFP cases were reported via the traditional system compared with 1102 true AFP cases reported through AVADAR. Initial assessment of AVADAR performance has been positive; however, a full evaluation of AVADAR data quality was planned for all implementing countries during 2019.

e. Surveillance support for high-risk settings

In April 2018, the region mobilized GPEI funds to support key surveillance activities in select countries at high risk of WPV importation and VDPV emergence, or based on declining performance indicators or concerns for surveillance blind spots. Eleven countries were selected for surveillance reinforcement through the Surveillance Strengthening Initiative, and in 2018 GPEI partners provided on-site technical support to Burundi, the Central African Republic, Guinea-Bissau, Liberia, Sierra Leone, South Sudan and Niger; remote support was provided to Burkina Faso, Equatorial Guinea and Mali. Due to delayed implementation, particularly concerning the hiring and procurement of equipment, some activities were carried over into 2019 for completion. Notably, all activities related to the engagement of human resources were completed by the end of 2018. The technical assistance and funds provided for operational activities significantly contributed to the improvement in surveillance indicators particularly in Guinea-Bissau and Equatorial Guinea.

f. Improvements in the selection of environmental surveillance sites

Catchment populations for ES sites can be difficult to quantify in settings that lack a sewer network and must rely on other systems for wastewater flow, such as open canals or water channels. A set of tools has been developed to help streamline the processes to identify areas where potential candidate sites could

be considered. It incorporates GIS technology, hydrology, digital elevation models, population estimates, "blue line" data (synthetic, digital streams and waterways generated by determining flow direction and accumulation) and the exact location and details of potential and existing environmental sites using a smartphone application with detailed GPS location. Since 2013, this tool has been used in Nigeria, resulting in the development of a polio ES site map catalogue, containing over 30 maps and 94 sites. To date, data for 691 ES sites located in 15 countries are available in the Environmental Surveillance Site Catalogue (https://www.es.world/#!/catalog). As part of the planned expansion of ES within the African Region, the WHO Regional Office for Africa is planning to leverage these tools and processes and adapt them for other countries starting in 2019.

g. Other activities to enhance surveillance

See Annex 4 (Reviews of surveillance performance) and Annex 5 (Trainings and sensitizations) for further information.

2.3 Poliovirus surveillance in the Western Pacific Region

2.3.1 Overview

AFP surveillance was established in the Western Pacific Region in 1992, following regional certification of polio-free status in 2000. AFP surveillance has been maintained as the platform to monitor measles, neonatal tetanus and other vaccine-preventable diseases in the region. While polio surveillance remains in place in the majority of Western Pacific Region countries, variability exists among them based on the reporting and investigation of AFP cases. AFP case notification is primarily the responsibility of practitioners or key physicians (i.e. paediatricians) in countries such as Australia, Hong Kong SAR, New Zealand and Singapore. AFP surveillance in large metropolitan areas (e.g. Seoul) is supplemented by sentinel hospital case reporting and national EV surveillance (e.g. Republic of Korea). In Japan, virologic surveillance for EVs including polio is the primary surveillance source. Finally, active, hospital-based AFP surveillance continues in Pacific island countries. In November 2018, all countries in the Western Pacific Region conducted national-level polio risk assessments; select countries conducted polio risk assessments at the subnational level. In 2018, an outbreak of cVDPV type 1 was detected in Papua New Guinea.

Six countries in the Western Pacific Region conduct ES: Australia, China, Japan, Malaysia, Philippines and Papua New Guinea. The site in Australia was temporarily suspended due to the outbreak in Papua New Guinea and lab capacity considerations. Regional ES challenges have been associated with a lack of standardized reporting format and of consistent reporting among countries.

2.3.2 Outbreak and other high-risk countries

AFP surveillance performance

In response, the Papua New Guinea polio programme developed and distributed guidelines for enhanced surveillance (including the initiation of active surveillance and guidance on stool collection and transportation) and elaborated a comprehensive AFP surveillance training package for the country. AFP case detection subsequently increased in Papua New Guinea, with one reported case of NPAFP in 2016, compared with 284 reported cases (NPAFP rate 7.9 per 100 000 children aged under 15 years) in 2018 (Table 9).

Table 9. Acute flaccid paralysis surveillance performance in Papua New Guinea — Western Pacific Region, 2018

WHO country	No. of AFP cases (all ages)	National NPAFP rate[1]	Subnational areas with NPAFP rate ≥2 (%)	National AFP cases with adequate specimens (%)[2]	Subnational areas with ≥80% adequate specimens (%)	No. of confirmed WPV cases	No. of confirmed cVDPV cases
PAPUA NEW GUINEA	284	7.9	95	44.7	14	0	7

*Subnational areas (Admin 1)

[1] Annualized non-poliomyelitis AFP rate for 100 000 population aged <15 years. UNDP population data is used to calculate the non-polio AFP rate

[2] Defined as 2 stool specimens collected within 14 days of onset of paralysis, 24–48 hours apart, except for the Region of the Americas, where only 1 specimen is collected

Source: WHO.

Environmental surveillance

Papua New Guinea is the fourth country in the Western Pacific Region to establish environmental surveillance. As of December 2018, Papua New Guinea had five ES sites located in two cities – Port Moresby and Lae. The presence of cVDPV was detected in seven of the first 27 specimens collected after the initiation of ES in Papua New Guinea, from three different ES sites. Challenges in the collection of ES samples in the country have been due to transportation issues, stock-outs of supplies and inclement weather.

Surveillance issues

Geographically hard-to-reach areas and security issues played a role in limiting timely investigations and stool specimen transport in Papua New Guinea and Indonesia. For example, in Papua New Guinea, genetic sequencing suggested virus circulation approximately one year prior to detection.

Surveillance strengthening activities

In Papua New Guinea, high-level government commitment, including the activation of national and provincial emergency operations centres, and strong human resource support from GPEI partners built capacity in the country to quickly respond to the cVDPV outbreak. Specifically, AFP surveillance training for provincial- and district-level health-care workers and a revitalization of the polio expert review committee took place.

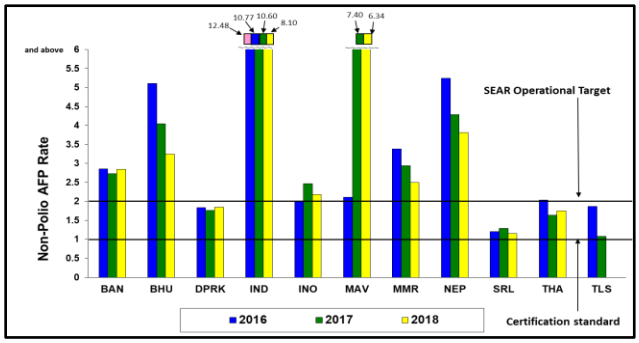
2.4 Poliovirus surveillance in the South-East Asia Region

2.4.1 Overview

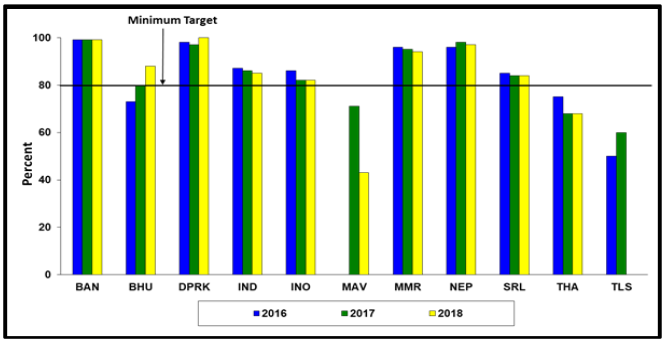
The WHO South-East Asia Region reported the last WPV case from India on 13 January 2011 and the region was certified polio-free on 27 March 2014. The overall NPAFP rate in the region in 2018 was 7.5 per 100 000 population aged under 15 years, which exceeds the globally recommended operational target of 2 per 100 000 (Fig. 13a). In 2018, the timeliness of stool specimen collection among reported AFP cases in the region exceeded the global recommended target of at least 80% (Fig. 13b).

Fig. 13. Non-polio acute flaccid paralysis rate (a) and stool adequacy (b) by country — South-East Asia Region, 2016–2018

(Fig. 13 a)



(Fig. 13 b)

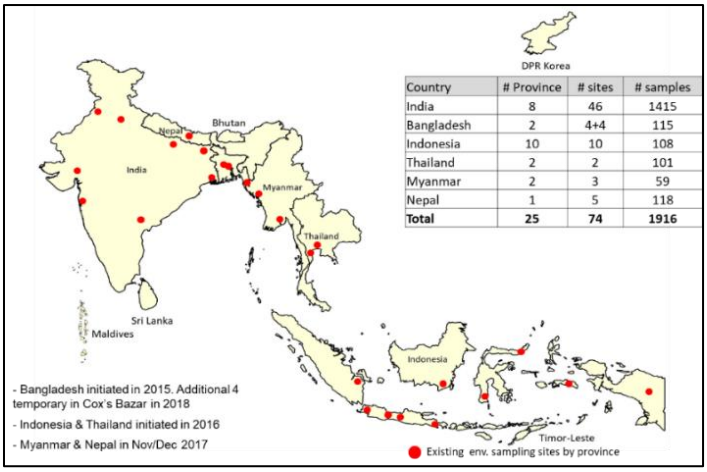


SEAR: South-East Asia Region; BAN: Bangladesh; BHU: Bhutan; DPRK: Democratic People's Republic of Korea; IND: India; INO: Indonesia; MAY: Malaysia; MMR: Myanmar; NEP: Nepal; SRL: Sri Lanka; THA: Thailand; TLS: Timor Leste
Source: WHO Regional Office for South-East Asia. Data as of 01 July 2019

The South-East Asia Region polio laboratory network is composed of 16 laboratories in seven countries (Bangladesh, the Democratic People's Republic of Korea, India, Indonesia, Myanmar, Sri Lanka and Thailand) and includes one global specialized laboratory and two regional reference laboratories. In addition, to enhance ES, three sewage concentration laboratories were established: two in India (Hyderabad, Patna) and one in Nepal. The concentrated samples are shipped to polio laboratories in Mumbai and Thailand, respectively. The network tested over 78 000 stool specimens in 2018 and the timeliness of reporting primary culture results within two weeks of sample receipt was 97.7% (exceeding the global requirement of ≥80%).

Environmental sampling is conducted in six countries (Bangladesh, India, Indonesia, Myanmar, Nepal and Thailand), many of which host large migrant populations.

Fig. 14. Environmental surveillance sites — South-East Asia Region, 2018



Country	# Province	# sites	# samples
India	8	46	1415
Bangladesh	2	4+4	115
Indonesia	10	10	108
Thailand	2	2	101
Myanmar	2	3	59
Nepal	1	5	118
Total	**25**	**74**	**1916**

Source: WHO Regional Office for South-East Asia.

2.4.2 Outbreak and other high-risk countries

AFP surveillance performance

In response to the outbreak in Papua New Guinea, beginning in 2018 Indonesia intensified AFP surveillance by providing human resource surges to Papua and West Papua provinces. Following the successful efforts to strengthen surveillance, a new emergence of VDPV1 was detected in a child from Papua province (Table 10) with paralysis onset in November 2018 and no history of past polio vaccination. Intensified surveillance and response activities were still in progress in December 2018.

Table 10. Acute flaccid paralysis surveillance performance in Indonesia — South-East Asia Region, 2018

WHO country	No. of AFP cases (all ages)	National NPAFP rate[1]	Subnational areas with NPAFP rate ≥2 (%)	National AFP cases with adequate specimens (%)[2]	Subnational areas with ≥80% adequate specimens (%)	No. of confirmed WPV cases	No. of confirmed cVDPV cases
INDONESIA	1 726	2.4	71	81.6	59	0	1

*Subnational areas (Admin 1)

[1] Annualized non-poliomyelitis AFP rate for 100 000 population aged <15 years. UNDP population data is used to calculate the non-polio AFP rate

[2] Defined as 2 stool specimens collected within 14 days of onset of paralysis, 24–48 hours apart, except for the Region of the Americas, where only 1 specimen is collected

Source: WHO.

Environmental surveillance performance

ES was initiated in Jayapura, the provincial capital close to the Papua New Guinean border. Of the 24 ES sites active in 2018, one site met the indicator for detection of EV in at least 50% of specimens.

Surveillance issues

Geographically hard-to-reach areas and security issues played a role in limiting timely investigations and stool specimen transport in Indonesia.

Surveillance strengthening activities

The re-sensitization and training of district-level surveillance officers of Papua province were completed.

2.5 Poliovirus surveillance in the Region of the Americas

2.5.1 Overview

In 1994, the WHO Region of the Americas was certified polio-free by the International Commission for the Certification of Poliomyelitis Eradication from the Americas, with the last endemic case of WPV type 3 occurring in October 1990 in Mexico. In the last five years, three immunodeficiency-associated vaccine-derived poliovirus (iVDPV) cases have been notified in the region: two from Argentina and one from Colombia. In addition, the Pan American Health Organization is planning to set up a working group to discuss how the recently published recommendations on implementing poliovirus surveillance in patients with primary immunodeficiency disorders (PIDs) could be adapted for the Americas.

2.5.2 Surveillance performance summary

AFP surveillance standard indicators are monitored by country and published on a weekly basis since 1987. As part of the global certification process, since 2018 every country in the region is required to submit an *Annual Report on the Documentation of Polio Eradication Status* to the Global Certification Commission to confirm that they remain free from WPV. In 2018, only six countries met all key AFP surveillance indicators for NPAFP detection, stool adequacy and timeliness (Bolivia, Cuba, Mexico, Nicaragua, Panama and Paraguay). However, the quality of AFP surveillance has not been maintained and, in the last 52 weeks, only Mexico and Nicaragua have met all three key indicators.

To supplement AFP surveillance, the region has implemented ES in Haiti and Guatemala. In Haiti, ES started in 2016 and as of 2018 is conducted in four communes with a total of eight collection sites. In Guatemala, ES started in November 2018, in two districts with three collection sites each.

2.6 Polio surveillance in the European Region

2.6.1 Overview

Certification of the WHO European Region occurred in June 2002. Member States are encouraged to provide polio surveillance data from primary sources: AFP surveillance, ES and enterovirus surveillance.

2.6.2 Surveillance performance summary

Given the broad heterogeneity of countries in the region, many of which do not conduct AFP surveillance, the Regional Office for Europe has strongly encouraged the collection of detailed supplementary surveillance data in the form of ES and EV surveillance information. As of 2018, 12 countries conduct AFP surveillance alone, 30 conduct AFP surveillance and supplementary surveillance, 10 conduct supplementary surveillance alone, and one country conducts no polio surveillance. Supplementary surveillance used in the region has had a high probability of detecting polioviruses in the target population but may not be sensitive enough to identify the index case or initial excretor. One challenge facing the region is that most of the data are generated through the laboratories; there is a lack of available epidemiological data from EV and ES systems, particularly for systems that are not directly under the authority of the health ministries.

3 Progress on the expansion of the environmental surveillance network

3.1 Overview

Environmental surveillance for poliovirus is the routine collection and testing of environmental (sewage) specimens from designated locations draining large target populations. Environmental surveillance (ES) supplements AFP surveillance by providing information on the presence and spatial scale of poliovirus transmission.

3.2 Environmental expansion progress

In 2013, the *Polio Eradication & Endgame Strategic Plan 2013–2018* (PEESP) proposed a modest expansion of ES in recognition of its increasing value in detecting poliovirus transmission. At that time, ES existed in a small number of countries funded by the GPEI: Afghanistan, Angola, Kenya, Nigeria and Pakistan. Other countries also had ES with technical support from the GPEI or were wholly self-funded.

In April 2015, the global *Polio Environmental Surveillance Expansion Plan* (PESEP) was published under the PEESP and framed expansion in two phases:

- Phase 1: to monitor both the effectiveness of eradicating WPVs and the emergence and circulation of VDPVs prior to OPV type 2 withdrawal.
- Phase 2: to monitor the effectiveness of poliovirus containment in essential poliovirus laboratories and vaccine manufacturing facilities.

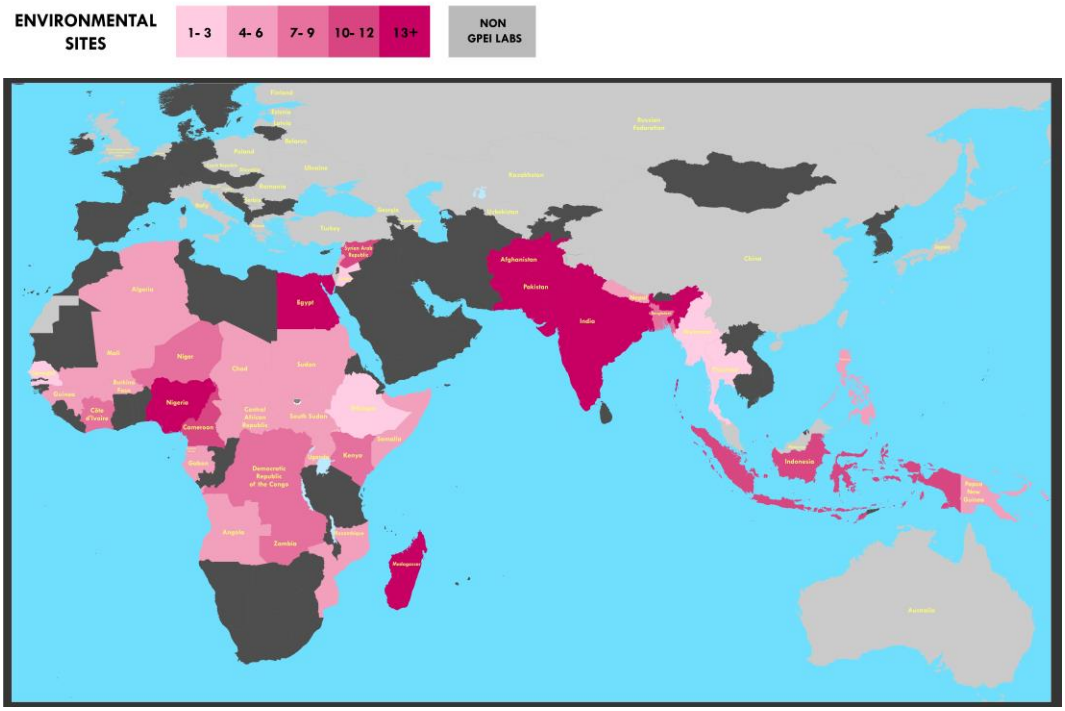
During 2015–2016, new countries that implemented ES were Burkina Faso, Cameroon, Chad and Niger and, in relation to outbreaks, Guinea and Madagascar. Senegal also commenced during this period. Within the endemic countries (Afghanistan, Nigeria and Pakistan) the number of sites also increased. However, not all countries targeted in phase 1 of the plan implemented ES.

Because of concerns about the possible negative effects of undetected cVDPV2 transmission, 34 countries in four WHO regions (the Western Pacific, South-East Asia, Eastern Mediterranean and African Regions) were prioritized for phase 2 expansion between 2017 and 2019 and were categorized by risk or regional priority. As of December 2018, 22 of the 34 countries in the phase 2 plan have commenced ES, nine are pending implementation and three have discontinued ES. Among these countries, 117 new sites have been added.

3.3 Regional priorities and outbreak countries

In addition to the targeted phase 2 planned expansion, 39 sites have been added in six additional countries that started ES during 2017–2018, either due to regional priority (Bangladesh, Ghana, Haiti and Thailand) or outbreaks (Mozambique and Zambia as the neighbour of the Democratic Republic of the Congo).

Fig. 15. Status of environmental surveillance — African Region, Eastern Mediterranean Region, South-East Asia Region and Western Pacific Region, 2018



Source: WHO.

3.4 Quality and sensitivity of existing environmental surveillance network

Considerations for expanding ES must balance resource commitments between AFP surveillance and ES in light of the significant implications for both field and laboratory activities. Expanding ES, particularly to countries without Global Polio Laboratory Network (GPLN) facilities or those facing security issues, presents serious challenges for the surveillance system. The programme depends on both detailed technical information and local knowledge to identify promising sites. Efforts to develop practical guidance for selecting sites, opening and closing them, and monitoring continue.

4 Surveillance to detect polioviruses among patients with primary immunodeficiency disorders

4.1 Overview

Individuals with primary immunodeficiency disorders (PIDs), especially those with disorders affecting the B-cell system, are at increased risk of prolonged replication and excretion of polioviruses and the development of paralytic illness. Continuous replication of the attenuated viruses from OPV increases the risk of vaccine viruses mutating and reacquiring neurovirulence and transmission characteristics similar to WPV. When this occurs, the resultant poliovirus is referred to as iVDPV. This poses an individual risk through the development of paralytic illness among PID patients. There is also a broader risk of establishing community transmission that could seed a polio outbreak in areas with low population immunity; to date no community-wide transmission of iVDPV has been detected. However, the risk of community spread of iVDPVs may change with the reduction of population immunity expected after WPV eradication and the improvement in health care enabling PID patients to survive longer in lower resource settings.

4.2 Current iVDPV case reporting

The WHO maintains a registry of immunodeficient persons known to excrete iVDPV. Prolonged excretion is defined as the presence of iVDPV in stool specimens for more than six months and less than five years; chronic excretion is the presence of iVDPV in stools for five years or more. From 1962 to 2018, 133 PID patients with prolonged/chronic excretion of poliovirus were reported and recorded in the WHO registry. A shift in prevalence of reported cases from high-income countries to middle- and lower-income countries was detected after 2000, though it was in part due to the adoption of IPV in high-income countries and improvement in the survival of PID patients in OPV-using middle-income countries. Among the 29 PID patients excreting poliovirus identified between 2016 and 2018, 79% were prolonged excreters, 31% excreted poliovirus type 2, and the most common PID associated with poliovirus excretion was severe combined immune deficiency.

During 2016–2018, 29 iVDPV cases were reported: nine in 2016, nine in 2017 and 11 in 2018.

Table 11. Patients with primary immunodeficiency disorders with prolonged or chronic excretion of poliovirus reported to the WHO registry — select countries, 2016–2018

Country/territory	2016 (n=9)			2017 (n=9)			2018 (n=11)		
	iVDPV1	iVDPV2	iVDPV3	iVDPV1	iVDPV2	iVDPV3	iVDPV1	iVDPV2	iVDPV3
ARGENTINA	0	1	0	0	0	0	0	0	0
CHINA	0	0	0	0	0	1	0	0	2
COLOMBIA	0	0	0	0	0	0	1	0	0
EGYPT	0	2	0	2	1	1	3	0	2
INDIA	0	1	0	0	0	0	0	0	0
IRAN (ISLAMIC REPUBLIC OF)	0	0	0	0	0	1	3	0	0
IRAQ	0	1	0	0	0	0	0	0	0

NIGERIA	0	1	0	0	0	0	0	0	0
PAKISTAN	0	1	0	0	0	0	0	0	0
SOUTH AFRICA	0	0	0	0	0	1	0	0	0
TUNISIA	0	0	1	0	0	0	0	0	0
TURKEY	0	0	0	0	0	1	0	0	0
WEST BANK AND GAZA STRIP	0	1	0	0	0	1	0	0	0

ND: not determined. PID: primary immunodeficiency disorders; iVDPV: Immunodeficiency-associated vaccine-derived poliovirus
Source: WHO.

4.3 Progress on primary immunodeficiency disorders surveillance guidance and implementation

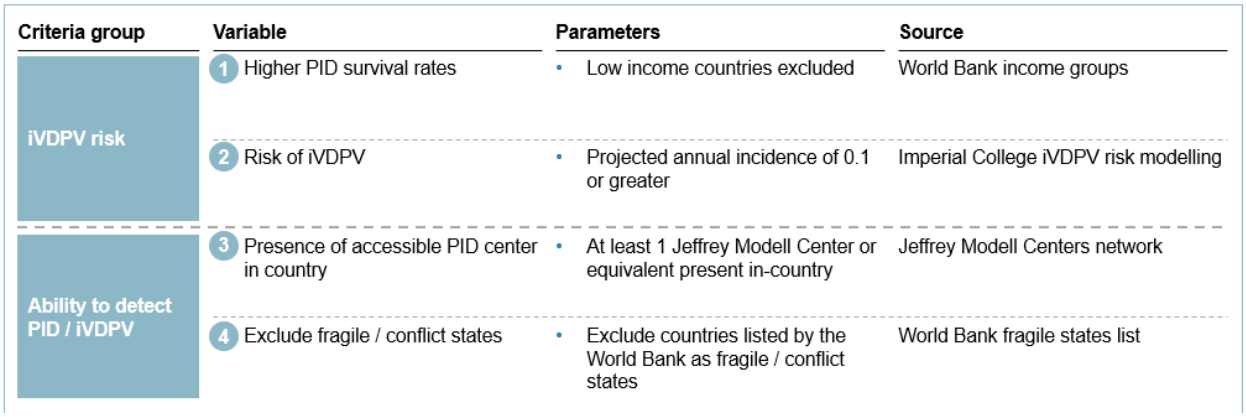
To mitigate the individual and community risks posed by iVDPVs during the polio endgame and the post-eradication era, it is important to identify those PID patients excreting polioviruses and provide the strategies and treatments available to rid both the individual and the community of the risk posed by iVDPVs.

At present, the GPEI is starting to implement routine poliovirus surveillance among PID patients as a new activity in the overall efforts to conduct surveillance for polio. This will complement AFP and ES and ensure the detection of non-paralytic poliovirus excretors, because AFP surveillance cannot detect asymptomatic immunocompromised patients who excrete polioviruses, and environmental surveillance cannot identify the source of an iVDPV.

Guidelines for conducting poliovirus surveillance among PID patients have been developed, providing clear, concrete instructions to introduce and conduct surveillance for poliovirus among patients diagnosed with eligible primary immune deficiencies.

Country prioritization for the implementation of surveillance was completed across all WHO regions. The criteria to identify potential countries to pilot PID surveillance were the following:

Fig. 16. Criteria to identify countries for pilot PID surveillance[a]



[a] Endorsed by the Strategic Advisory Group of Experts on Immunization, April 2019.

PID: primary immunodeficiency disorders; iVDPV: Immunodeficiency-associated vaccine-derived poliovirus; PID primary immunodeficiency disorder
Source: WHO.

In 2018, PID surveillance was introduced in Pakistan and the heads of departments of seven major hospitals in Karachi were trained. At the end of December 2018, one case had been registered.

4.4 Plans for 2019–2020

The guidelines for conducting this surveillance should be fully developed and endorsed for implementation by the Strategic Advisory Group of Experts on Immunization in 2019. To facilitate surveillance activities, the development of appropriate forms, agreement on core variables and indicators, and the development of an information system will follow. Training material will be developed based on the guidelines.

Countries at high and medium risk will be recruited for participation in phase 1 of surveillance implementation during 2019. Preparation for implementation will include selecting sites, customizing the guidelines, training activities and working with regulatory authorities on access to therapy. Initial implementation will be followed by evaluation, and further expansion will take place gradually based on the lessons learned.

5 Maintain the capacity and efficiency of the Global Polio Laboratory Network

5.1 Overview

The Global Polio Laboratory Network (GPLN) consists of 146 polio laboratories in 92 countries across the six WHO regions of the world. These global, regional and national polio laboratories follow WHO-recommended procedures for detecting and characterizing polioviruses from AFP case stool and sewage specimens collected from the environment. This is done through: (1) poliovirus isolation; (2) intratypic differentiation (ITD) of isolated polioviruses; and (3) sequencing of all non-Sabin-like or ITD-discordant polioviruses to determine if they are WPV, Sabin (vaccine) polioviruses or VDPV.

The accuracy and timeliness of testing at GPLN facilities is monitored through an annual accreditation programme of on-site or desk reviews, which includes annual proficiency testing to ensure laboratories have the capacity to detect and characterize poliovirus from unknown samples. In addition to checklists for virus isolation (VI), ITD and sequencing, an accreditation checklist was implemented in 2017 for laboratories testing sewage specimens.

In the last three years, the following areas were specifically emphasized:

- quality assurance (e.g. through improvement in the electronic GPLN management system, technical GPLN guidance papers, generation of laboratory contingency plans and training workshops);
- biorisk management;
- molecular diagnostic capacity improvement (optimization of ITD algorithm and VDPV sequencing and reporting mechanisms);
- molecular diagnostic capacity building (through an increase in laboratories that conduct virus isolation and ITD [VII]); and
- ES capacity increase (through the validation and implementation of methodologies and an increase in the number of ES laboratories worldwide) to support the global *Polio Environmental Surveillance Expansion Plan*.

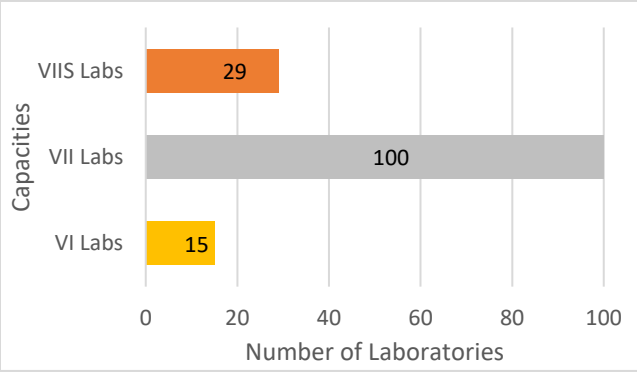
5.2 Update on the Global Polio Laboratory Network

5.2.1 Laboratory network capacity

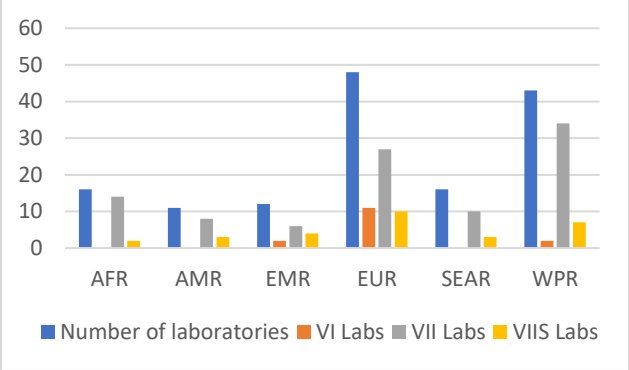
GLPN accountability has been increased through systematic improvement in all aspects of laboratory management and the introduction of real-time laboratory performance tracking. Of the 146 laboratories in the GPLN, 15 conduct VI alone, 100 conduct VII, and 29 conduct virus isolation, ITD and genomic sequencing (VIIS), as of the end of 2018. Two laboratories considered dormant are excluded from this categorization.

Fig. 17. Global Polio Laboratory Network capacity – worldwide (a) and regional (b), 2018

(Fig. 17a)



(Fig. 17b)



VI: virus isolation; VII: virus isolation and intratypic differentiation; VIIS: virus isolation, intratypic differentiation and genomic sequencing. AFR: African Region; AMR: Region of the Americas; EMR: Eastern Mediterranean Region; EUR: European Region; SEAR: South-East Asia Region; WPR: Western Pacific Region

Source: WHO.

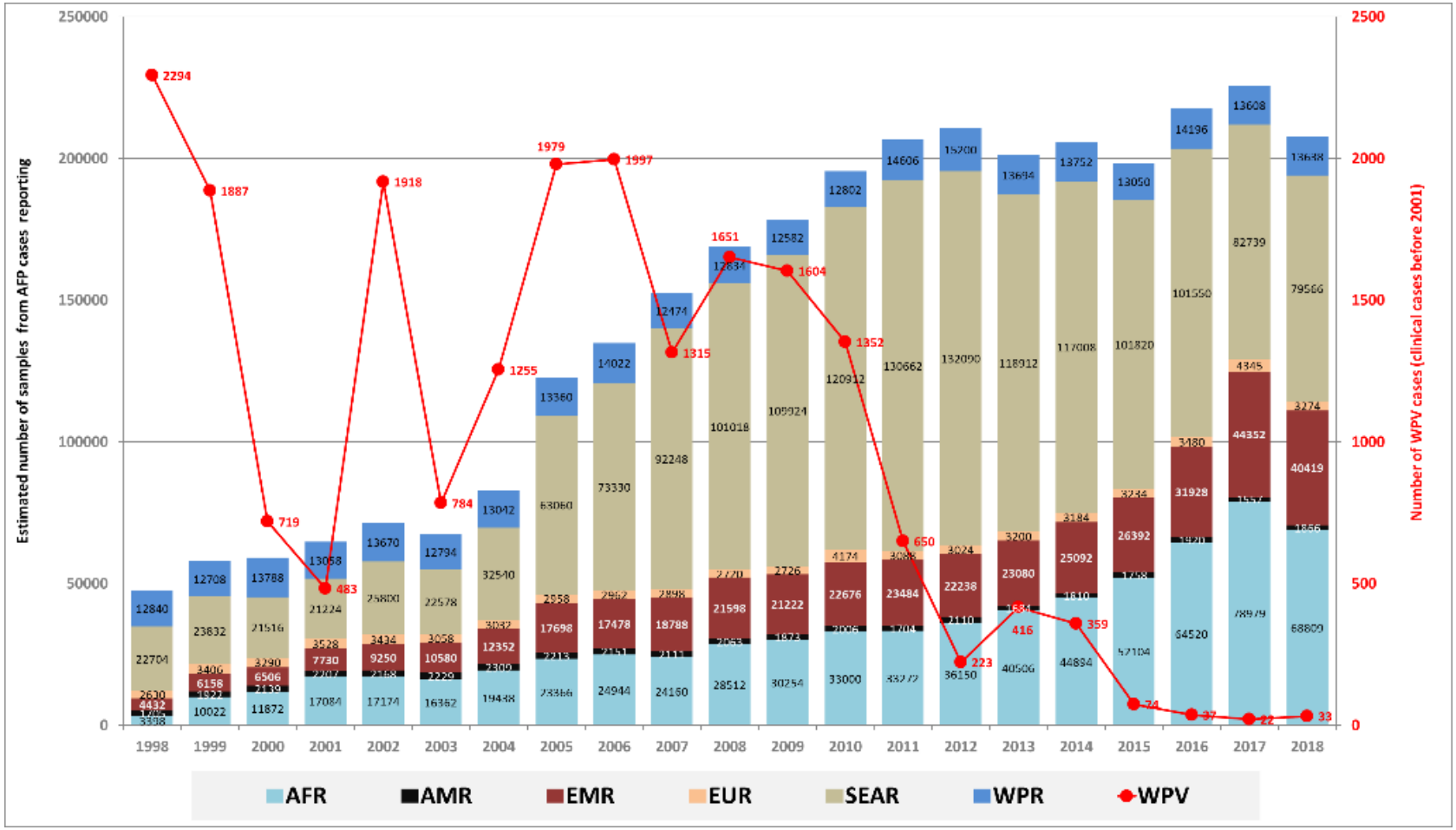
5.2.2 Laboratory expansion to support environmental surveillance

The development and implementation of the ES of poliovirus have been major innovations led by the GPLN in recent years. During 2016–2018, 22 ES laboratories were built (fully equipped, trained and under quality assurance) to support the 34 countries of the Phase 2 ES expansion plan; 10 additional ES labs were built or upgraded to support countries other than the 34 in the plan (seven in India, one in Nigeria and two in Indonesia).

5.3 Workload (specimens processed)

The GPLN processed more than 12 100 sewage specimens and over 210 000 stool specimens from AFP cases and their contacts in 2018, a similar rate overall compared to the previous year. The results of these stool specimens were reported within 14 days of receipt in 95% of cases (the target is 80%). Among the 6800 samples positive for poliovirus, 99% and 95% had ITD results reported within seven days of isolate receipt and within 60 days from onset of paralysis, respectively. As expected, due to broader implementation, a higher proportion of AFP contact (close contact and targeted healthy children stool sampling) specimens were processed in the endemic regions (the African and Eastern Mediterranean Regions) compared to other non-endemic regions.

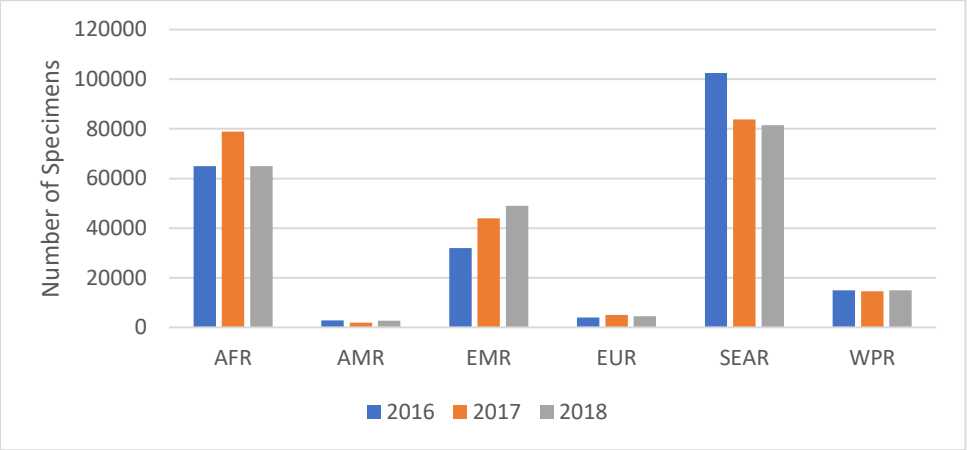
Fig. 18. Evolution of Global Polio Laboratory Network workload (acute flaccid paralysis and contacts samples) — worldwide, 1998–2018



AFR: African Region; AMR: Region of the Americas; EMR: Eastern Mediterranean Region; EUR: European Region; SEAR: South-East Asia Region; WPR: Western Pacific Region

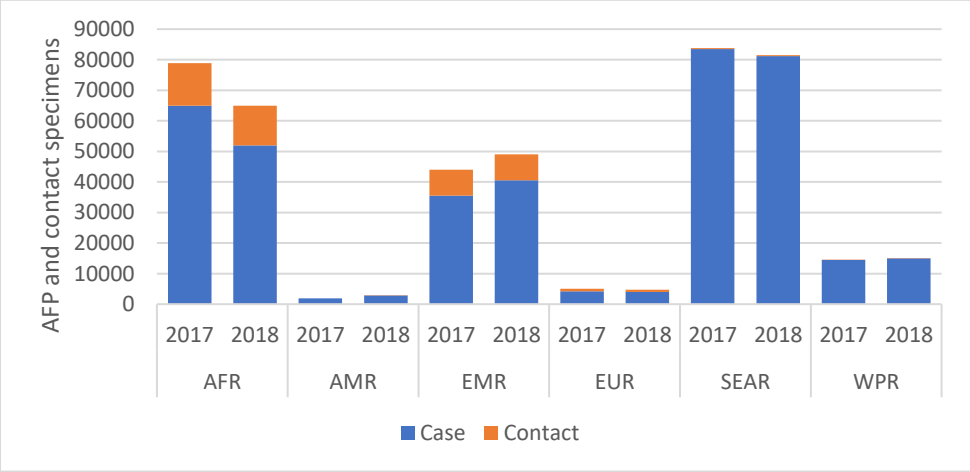
Source: Global Polio Laboratory Network, data as of 4 March 2019.

Fig. 19. Global Polio Laboratory Network workload: Acute flaccid paralysis specimens — by region, 2016–2018



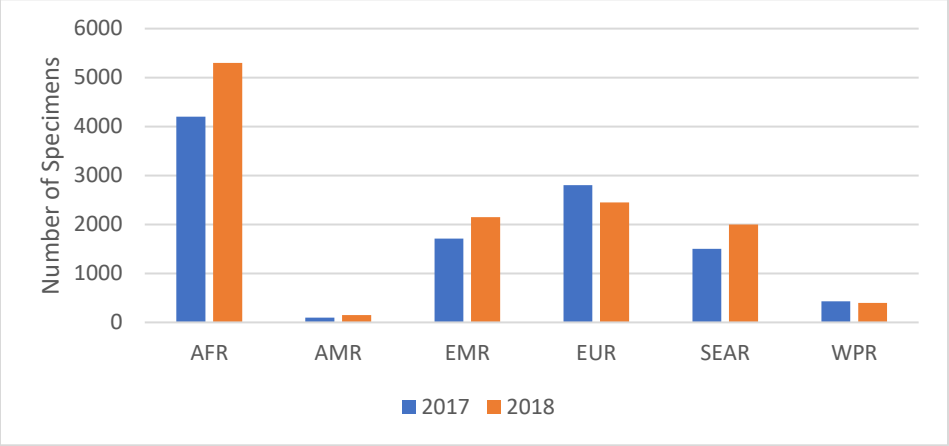
AFR: African Region; AMR: Region of the Americas; EMR: Eastern Mediterranean Region; EUR: European Region; SEAR: South-East Asia Region; WPR: Western Pacific Region
Source: WHO.

Fig. 20. Acute flaccid paralysis and contact* specimens processed by the Global Polio Laboratory Network (acute flaccid paralysis and contacts samples) — by region, 2017 and 2018



* "Contact" refers to both AFP contact sampling (i.e. direct contact sampling, close contact sampling) and targeted healthy children stool sampling (i.e. community sampling, community contact sampling or community stool sampling), data as of 4 March 2019.
AFR: African Region; AMR: Region of the Americas; EMR: Eastern Mediterranean Region; EUR: European Region; SEAR: South-East Asia Region; WPR: Western Pacific Region
Source: WHO.

Fig. 21. Global Polio Laboratory Network workload following the global expansion of environmental surveillance — by region, 2017 and 2018



AFR: African Region; AMR: Region of the Americas; EMR: Eastern Mediterranean Region; EUR: European Region; SEAR: South-East Asia Region; WPR: Western Pacific Region
Source: WHO.

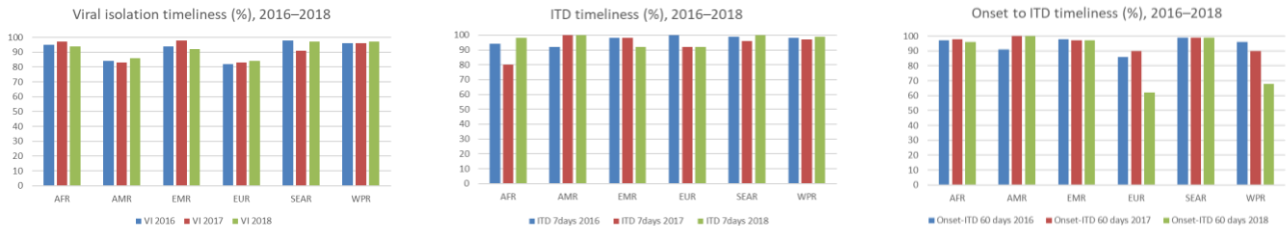
5.4 Laboratory performance

Standard timeliness indicators specify that laboratories should report ≥80% of poliovirus culture results within 14 days of specimen receipt, ≥80% of ITD results within seven days of isolate receipt, and ≥80% of sequencing results within seven days of ITD result. The combined field and laboratory performance indicator is to report ITD results for ≥80% of isolates within 60 days of paralysis onset in AFP cases (the target is within 45 days for the Regional Office for the Eastern Mediterranean). The overall poliovirus isolation rate is 3.7% (range: 1.9% to 5.2%).

Indicators vary slightly for ES specimens in that laboratories should report ≥80% of virus isolation results within 21 days of sewage specimen receipt, ≥80% of ITD results within seven days of isolate receipt, ≥80% of sequencing results within 14 days of isolate receipt and ≥80% of final results sent to national authorities within 42 days of the lab's receipt of samples.

Fig. 22. Timeliness of the viral isolation of environmental specimens — by region, 2016–2018

(Fig. 22a) (Fig. 22b) (Fig. 22c)



AFR: African Region; AMR: Region of the Americas; EMR: Eastern Mediterranean Region; EUR: European Region; SEAR: South-East Asia Region; WPR: Western Pacific Region
Source: Global Polio Laboratory Network, data as of 4 March 2019.

Overall, the GPLN performance remains high, despite continued increase in the workload and batching of specimens before shipment to the laboratory, resulting in periods of high volume mainly in laboratories supporting endemic or outbreak countries or countries facing logistical issues.

6 Progress on increasing the efficiency of polio information systems

6.1 Overview

The *Global Polio Surveillance Status Report, 2019* is based on data collected annually from 244 countries and territories, including all 194 WHO Member States. These data are loaded, cleaned and harmonized in a global poliovirus information system. The GPEI Polio Information System (POLIS) is managed by the Detection and Interruption Unit of the Global Polio Programme, at WHO headquarters.

6.2 Accessing polio data using POLIS

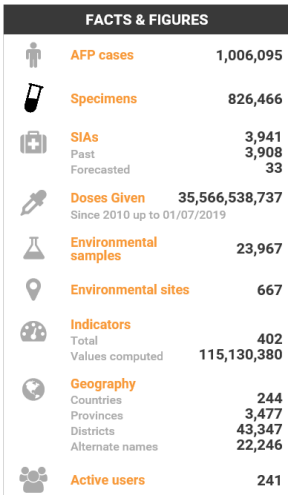
POLIS facilitates the data management of country- and regional-level data sets (AFP cases and related laboratory data, environmental specimens, immunization activity planning and monitoring, as well as campaign quality information).

POLIS provides a central platform that enables data analyses for the GPEI by providing multiple outputs, a visual analysis of results via a dashboard and a search interface for all harmonized data at the most granular level (most at the second administrative subnational level) to generate tables, reports, charts, maps and timelines as well as to export the data. National-level indicators are calculated in POLIS using population data from the United Nations Development Programme and verified with the regional offices; subnational indicators are calculated using population data provided by the countries.

The POLIS platform provides role-based security access to various data sets and features. WHO, UNICEF, the US Centers for Disease Control and Prevention and the Bill & Melinda Gates Foundation, as well as their modelling partners, actively use the platform.

Fig. 23. Example of POLIS platform data

Icon	Type of Data	Description
	Case	A *case* is a potential incidence of the polio virus affecting a human being.
	Environmental Sample	An *environmental sample* is a test performed at a set location, such as a river, to see if the polio virus is present.
	Activity	An *activity* is an intervention to eradicate polio such as a national immunisation campaign.
	Indicator	An *indicator* is any defined metric that allows the world to measure the progress of polio eradication such as the basic case count per month or the number of immunisation campaigns in a country or a technical metric such as the number of stool samples collected that are of adequate quality to assess the presence of polio.



Source: Polio Information System, 7 January 2019.

6.3 Polio information management plans for 2019–2020

The main objective for 2019–2020 will be to increase the reliability and efficiency of collecting, managing, validating and using data for action. For example, not all information received by WHO headquarters are uploaded to POLIS, largely due to the type, format and quantity of data received by regions. Additional details will therefore be incorporated into future releases of POLIS to accommodate the data received. In

addition, processes are under development to enable the direct upload of data (AFP and ES) by all WHO regional offices, allowing for cleaner, more timely data and better alignment with existing processes.

7 Conclusions

While AFP surveillance performance at the national level appears to meet global indicators, at subnational levels, particularly in outbreak or high-risk countries, pockets of low performance are noted, emphasizing the need for the consistent and close monitoring of activities. Activities to supplement AFP surveillance are being implemented in these regions, providing valuable additional confidence in the programme's ability to detect poliovirus. The African and Eastern Mediterranean Regions have gained experience and insight as innovations have impacted programme performance over time, and the lessons learned should be considered a valuable resource to countries globally. Most notably, ES has been effective in identifying virus in the absence of detection through AFP surveillance. Additionally, ES has been useful in identifying Sabin-like virus following outbreak immunization activities, enabling a better understanding of campaign effectiveness while also flagging areas of possible population movement from outbreak areas. Nonetheless, as ES continues to expand globally to support the detection of poliovirus, efforts to maintain a strong AFP surveillance infrastructure should be ensured. Moreover, the strong supervision and monitoring of both AFP and ES activities, the frequent and meaningful analysis of data and the rapid investigation of issues detected should continue. Furthermore, sustained laboratory staff commitment continues to be a linchpin for the GPEI. Overall timeliness and accuracy performance indicators for poliovirus detection and characterization throughout the GPLN remain good in all regions. Additionally, GPLN ES capacity has increased to meet the programme needs and should be continually monitored as ES continues to expand globally. Improvements in polio diagnostic methodologies, quality assurance, communication and coordination should continue. The functionality and reach of POLIS has expanded considerably from 2016 to 2018, allowing for the active engagement of country and regional surveillance programmes. Efforts to increase the reliability and efficiency of the system will continue beyond 2018, with consideration of the evolving needs of the programme.

8 Additional tables

8.1 Acute flaccid paralysis surveillance performance — worldwide, 2016–2018

Region/country	AFP cases reported			Annualized non-polio AFP rate (%)[1]			AFP cases with adequate specimens (%)[2]		
	2016	2017	2018	2016	2017	2018	2016	2017	2018
African Region	31 921	31 242	24 708	8	7.8	6.2	95	94	92
Region of the Americas	2 328	2 010	2 215	1	0.9	0.9	72	78	80
Eastern Mediterranean Region	15 990	1 605	21 884	7.6	1	10.4	90	84	84
European Region	1 770	1 605	1 507	0	1	1	86	84	85
South-East Asia Region	50 706	43 390	40 239	9.4	8.1	7.5	87	87	86
Western Pacific Region	7 030	6 657	6 753	1.9	1.8	1.8	90	90	88
AFGHANISTAN	2 902	3 092	3 378	20	20	21.6	92.2	93.6	93.8
ALBANIA	8	7	2	1.3	1.4	0.4	100	100	100
ALGERIA	578	698	531	4.9	5.8	4.3	85.3	89.8	97.2
ANDORRA	ND	ND	ND	ND	ND	ND	ND	ND	ND
ANGOLA	389	410	328	3.5	2.9	2.3	95.1	97.8	93.3
ARGENTINA	207	205	201	6.2	5.6	5.4	0	0	0
ARMENIA	21	12	16	3.5	2	2.7	90.5	91.7	100
AUSTRALIA	60	59	57	1.3	1.2	1.1	95	37.3	43.9
AUSTRIA	9	1	2	0.7	0.1	0.2	11.1	0	0
AZERBAIJAN	26	24	24	1.2	1	1	92.3	95.8	100
BAHRAIN	14	18	35	4.7	6.1	11.6	100	100	97.1
BANGLADESH	1 437	1 361	1 404	3.1	2.9	3	99.1	98.7	98.9
BELARUS	72	62	35	4.9	3.9	2.2	91.7	87.1	97.1

BELGIUM	0	0	0	0	0	0	ND	ND	ND
BENIN	217	212	209	4.6	4.4	4.3	92.2	93.9	94.7
BHUTAN	10	10	8	4.7	4.7	3.7	72.7	80	87.5
BOLIVIA (PLURINATIONAL STATE OF)	25	14	45	1.3	0.8	2.6	0	0	0
BOSNIA AND HERZEGOVINA	11	5	1	2	1	0.2	81.8	100	100
BOTSWANA	13	14	19	1.8	1.9	2.6	76.9	92.9	100
BRAZIL	500	486	502	2.1	2.1	2.2	0	0	0
BRUNEI DARUSSALAM	1	1	2	1	1	2	100	0	100
BULGARIA	17	5	10	1.7	0.5	1	100	60	90
BURKINA FASO	268	309	360	3.2	3.6	4	92.2	90.3	88.9
BURUNDI	129	143	123	2.5	2.8	2.4	93.8	85.3	91.1
CABO VERDE	5	4	7	3.5	2.4	4.2	100	100	71.4
CAMBODIA	51	57	73	1	1.1	1.4	92.2	91.2	91.8
CAMEROON	793	921	760	7.8	9	7.2	88	88.9	87.8
CANADA	39	19	0	1.3	0.6	0	0	0	0
CAREC*	173	26	21	9.6	1.4	1.2	30	0	1
CENTRAL AFRICAN REPUBLIC	139	163	134	6.9	8	6.6	89.9	90.2	82.8
CHAD	482	702	649	7.2	10	9	93.2	91	95.8
CHILE	75	69	66	4.1	3.8	3.6	0	0	0
CHINA	5 691	5 278	5 293	2.2	2.1	2.1	94.3	93.2	92.4
COLOMBIA	187	156	169	2.8	2.7	2.9	0	0	0
COMOROS	5	41	3	1.5	12.7	0.9	80	92.7	100
CONGO	76	114	164	3.6	5.1	7.2	92.1	95.6	95.7
COSTA RICA	31	27	15	5.5	5.1	2.8	0	0	0
CÔTE D'IVOIRE	371	332	370	4.1	3.2	3.5	94.3	93.4	83.8
CROATIA	0	2	3	0	0.3	0.5	ND	0	66.7
CUBA	19	15	27	2.2	1.6	3	0	0	0
CYPRUS	2	3	1	1	1.5	0.5	100	33.3	100
CZECHIA	11	8	3	0.7	0.5	0.2	72.7	62.5	66.7

DEMOCRATIC PEOPLE'S REPUBLIC OF KOREA	105	104	130	2	2	2.5	98.1	97.1	100
DEMOCRATIC REPUBLIC OF THE CONGO	1 698	2 037	2 642	5.1	5.1	6.6	90	86	84.1
DENMARK	ND	ND	ND	ND	ND	ND	ND	ND	ND
DJIBOUTI	3	4	0	1	1.3	0	33.3	100	ND
DOMINICAN REPUBLIC	33	15	15	1	0.5	0.5	0	0	0
ECUADOR	29	38	57	0.6	0.8	1.2	0	0	0
EGYPT	1 092	1 242	1 245	4.1	3.8	3.8	94.1	94.4	93.3
EL SALVADOR	45	41	42	2.4	2.3	2.4	0	0	0
EQUATORIAL GUINEA	3	12	30	0.6	2.5	6.2	33.3	58.3	93.3
ERITREA	97	112	113	3.2	5.3	5.3	99	97.3	98.2
ESTONIA	1	0	0	0.5	ND	0	ND	ND	ND
ESWATINI	14	15	15	2.9	2.9	2.9	85.7	100	93.3
ETHIOPIA	1 043	1 091	1 078	2.5	2.6	2.5	90.8	92.3	92.1
FINLAND	ND	ND	ND	ND	ND	ND	ND	ND	ND
FRANCE	ND	ND	ND	ND	ND	ND	ND	ND	ND
GABON	42	48	55	6.1	6.6	7.4	95.2	93.8	94.5
GAMBIA	32	30	40	3.4	3.2	4.1	90.6	100	97.5
GEORGIA	16	12	7	1.9	1.6	0.9	93.8	100	100
GERMANY	0	0	0	ND	ND	ND	ND	ND	ND
GHANA	456	552	504	4.1	4.7	4.4	91	91.1	92.3
GREECE	18	10	18	1.1	0.6	1.1	94.4	90	83.3
GUATEMALA	30	45	59	0.5	0.8	1	0	0	0
GUINEA	1 059	451	231	20.1	8.4	4.2	91.4	94	96.1
GUINEA-BISSAU	12	82	95	1.6	10.6	12	75	85.4	87.4
HAITI	14	9	9	0.4	0.2	0.2	0	0	0
HONDURAS	66	48	50	2.3	1.6	1.7	0	0	0
HUNGARY	11	13	12	0.7	0.9	0.9	45.5	76.9	66.7
ICELAND	ND	ND	ND	ND	ND	ND	ND	ND	ND
INDIA	46 500	39 128	35 990	12.7	10.5	9.7	86.9	86.2	85.7

INDONESIA	1 409	1 740	1 726	2	2.4	2.4	86.1	82.2	81.6
IRAN (ISLAMIC REPUBLIC OF)	773	811	887	4	4.2	4.6	95.5	96.7	97
IRAQ	604	698	1023	4.2	4.5	6.5	80.8	86.8	89.9
IRELAND	0	0	0	ND	ND	ND	ND	ND	ND
ISRAEL	17	27	27	0.8	1.2	1.2	64.7	37	25.9
ITALY	68	49	39	0.8	0.6	0.5	63.2	61.2	61.5
JAPAN	ND	ND	ND	ND	ND	ND	ND	ND	ND
JORDAN	106	113	114	4	3.3	3.3	100	100	100
KAZAKHSTAN	95	107	83	2.1	2.1	1.6	100	100	100
KENYA	549	469	672	2.7	2.3	3.3	90.2	87	88.2
KUWAIT	50	69	72	5.5	7.9	8.1	90	92.8	90.3
KYRGYZSTAN	62	71	47	3.4	3.6	2.4	87.1	78.9	91.5
LAO PEOPLE'S DEMOCRATIC REPUBLIC	130	102	94	5.3	4.5	4.2	84.6	72.5	81.9
LATVIA	2	2	4	0.6	0.7	1.3	50	0	75
LEBANON	110	75	89	11.2	5.3	6.5	82.7	80	96.6
LESOTHO	17	8	14	2.2	1	1.8	100	100	85.7
LIBERIA	69	80	72	3.5	4	3.6	75.4	81.3	90.3
LIBYA	69	88	122	3.7	4.9	6.8	97.1	96.6	96.7
LITHUANIA	9	11	24	1.9	2.6	5.6	88.9	90.9	45.8
LUXEMBOURG	ND	ND	ND	ND	ND	ND	ND	ND	ND
MADAGASCAR	788	696	625	7.6	6.6	5.9	86	93.7	94.9
MALAWI	186	304	208	2.1	3.6	2.4	63.4	84.5	88.5
MALAYSIA	143	154	171	1.8	2	2.2	83.9	81.8	80.1
MALDIVES	2	7	7	2	6.9	6.7	0	71.4	42.9
MALI	307	258	291	3.8	2.9	3.2	89.6	87.2	88.7
MALTA	ND	ND	ND	ND	ND	ND	ND	ND	ND
MAURITANIA	52	51	46	3.1	2.9	2.6	96.2	94.1	87
MAURITIUS	7	8	7	3	3.4	3.1	85.7	62.5	100
MEXICO	606	571	708	1.8	1.7	2.1	0	0	0

MONACO	ND	ND	ND	ND	ND	ND	ND	ND	ND
MONGOLIA	7	6	6	0.8	0.7	0.6	71.4	83.3	100
MONTENEGRO	0	2	1	0	1.8	0.9	ND	100	100
MOROCCO	83	139	210	0.9	1.4	2.1	61.4	67.6	78.1
MOZAMBIQUE	424	384	461	3.2	2.8	3.4	82.8	85.4	88.3
MYANMAR	466	396	335	3.6	2.8	2.4	95.9	95.2	94.3
NAMIBIA	22	22	18	2.6	2.3	1.8	90.9	86.4	83.3
NEPAL	455	371	335	4.9	4.1	3.7	95.8	98.4	97
NETHERLANDS	ND	ND	ND	ND	ND	ND	ND	ND	ND
NEW ZEALAND	12	12	10	1.3	1.3	1.1	91.7	50	60
NICARAGUA	26	20	18	1.3	1.1	1	0	0	0
NIGER	363	682	973	3.4	6.2	8.6	88.2	80.5	89.1
NIGERIA	17 836	16 441	9 407	21.2	19.6	10.9	98.8	98.3	95.4
NORWAY	16	13	8	1.7	1.4	0.8	43.8	38.5	37.5
OMAN	40	39	28	4.2	3.9	2.7	95	89.7	92.9
PACIFIC ISLAND COUNTRIES AND AREAS*	20	16	13	2.6	2.1	0	65	63	0
PAKISTAN	7 843	10 315	12 257	12.6	15	17.6	87.1	85.8	87.2
PANAMA	17	22	16	1.5	2	1.4	0	0	0
PAPUA NEW GUINEA	1	28	284	0	0.9	7.9	100	50	44.7
PARAGUAY	30	30	36	1.3	1.5	1.8	0	0	0
PERU	57	51	77	0.7	0.6	0.9	0	0	0
PHILIPPINES	414	458	327	1.2	1.4	1	80.2	69	61.2
POLAND	62	51	39	1.1	0.9	0.7	46.8	51	0
PORTUGAL	9	6	3	0.6	0.4	0.2	66.7	50	33.3
QATAR	9	18	10	2.7	4.9	2.7	100	100	100
REPUBLIC OF KOREA	68	68	67	1	1	1	92.6	94.1	89.6
REPUBLIC OF MOLDOVA	7	2	3	1.2	0.3	0.5	100	50	100
REPUBLIC OF NORTH MACEDONIA	3	3	3	0.9	0.9	0.9	100	100	100
RÉUNION	ND	ND	ND	ND	ND	ND	ND	ND	ND

ROMANIA	17	22	13	0.5	0.7	0.4	100	86.4	92.3
RUSSIAN FEDERATION	384	352	314	1.6	1.4	1.2	93.2	90.1	92
RWANDA	181	136	137	3.4	2.8	2.8	93.4	96.3	92
SAINT HELENA	ND	ND	ND	ND	ND	ND	ND	ND	ND
SAN MARINO	ND	ND	ND	ND	ND	ND	ND	ND	ND
SAO TOME AND PRINCIPE	2	0	0	2.3	0	0	50	ND	ND
SAUDI ARABIA	273	276	242	3.2	3.3	2.9	99.3	98.9	95.9
SENEGAL	175	153	116	2.6	2.3	1.7	88.6	92.2	87.1
SERBIA	10	10	8	0.7	0.7	0.6	90	30	87.5
SEYCHELLES	ND	ND	ND	ND	ND	ND	ND	ND	ND
SIERRA LEONE	68	78	121	2.6	2.5	3.8	76.5	80.8	83.5
SINGAPORE	6	6	13	0.7	0.7	1.5	100	100	76.9
SLOVAKIA	3	3	1	0.4	0.4	0.1	33.3	0	0
SLOVENIA	1	0	0	0.3	0	0	100	ND	ND
SOMALIA	316	345	353	5.9	5	4.9	99.1	99.1	97.7
SOUTH AFRICA	461	466	530	2.9	2.7	3.2	83.5	75.3	76.9
SOUTH SUDAN	323	388	445	6.2	7.3	8.3	92.6	86.9	84.5
SPAIN	51	39	40	0.7	0.6	0.6	51	53.8	65
SRI LANKA	65	70	63	1.2	1.4	1.3	84.6	84.3	92.1
SUDAN	508	570	577	3.1	3.5	3.4	97.6	96.3	97.2
SWEDEN	ND	ND	ND	ND	ND	ND	ND	ND	ND
SWITZERLAND	23	8	14	1.9	0.6	1.1	13	25	35.7
SYRIAN ARAB REPUBLIC	303	363	362	3.9	4.3	5.5	87.8	80.4	87.3
TAJIKISTAN	81	66	83	2.5	2.1	2.6	95.1	98.5	96.4
THAILAND	246	198	241	2.1	1.7	2	74.8	68.2	68
TIMOR-LESTE	10	5	0	1.9	0.9	0	50	60	ND
TOGO	96	118	144	3.1	3.6	4.4	94.8	97.5	90.3
TUNISIA	89	66	67	3.3	2.4	2.4	78.7	74.2	80.6
TURKEY	294	286	312	1.5	1.4	1.6	80.3	79	80.1
TURKMENISTAN	38	35	35	2.5	2	1.9	100	100	100
UGANDA	665	599	697	3.3	2.9	3.3	89.9	88	90.7

UKRAINE	188	155	151	2.8	2.2	2.2	97.9	95.5	98
UNITED ARAB EMIRATES	42	58	40	2.6	4.4	3	100	98.3	97.5
UNITED REPUBLIC OF TANZANIA	969	949	877	4	3.7	3.3	97.8	97.5	98.7
UNITED STATES OF AMERICA	ND	ND	ND	ND	ND	ND	ND	ND	ND
URUGUAY	5	4	6	0.7	0.5	0.8	0	0	0
UZBEKISTAN	141	137	124	1.7	1.5	1.4	100	100	100
VENEZUELA (BOLIVARAN PENINSULA OF)	115	86	85	1.3	0.9	0.9	0	0	0
VIET NAM	376	385	342	1.8	1.7	1.5	97.3	94.8	98.5
WEST BANK AND GAZA STRIP	46	43	44	ND	2.2	2.2	97.8	97.7	90.9
YEMEN	715	713	729	7.1	6.3	6.4	90.9	90.2	91.6
ZAMBIA	230	284	191	3.1	3.7	2.4	89.1	89.8	85.9
ZIMBABWE	210	175	196	3.5	2.5	2.8	96.7	89.1	94.4

ND: not determined. CAREC: Caribbean Epidemiology Centre;*These countries have been grouped together for reporting purposes

[1] Annualized non-poliomyelitis AFP rate for 100 000 population aged <15 years. UNDP population data is used to calculate the non-polio AFP rate

[2] Defined as 2 stool specimens collected within 14 days of onset of paralysis, 24–48 hours apart, except for the Region of the Americas, where only 1 specimen is collected

Source: WHO.

8.2 Acute flaccid paralysis surveillance performance (provinces/states) among outbreak or high-risk countries — African Region, 2016–2018

Country	Province/state	AFP cases reported			Annualized non-polio AFP rate[1]			AFP cases with adequate specimens (%)[2]		
		2016	2017	2018	2016	2017	2018	2016	2017	2018
BURKINA FASO		**268**	**309**	**360**	**3.2**	**3.6**	**4**	**92.2**	**90.3**	**88.9**
	BOUCLE DU MOUHOUN	20	38	25	2.9	5.4	3.6	90	92.1	100
	CASCADES	9	24	13	2.9	7.9	4.3	88.9	91.7	92.3
	CENTRE	41	28	46	33.9	23.2	38.2	90.2	85.7	93.5
	CENTRE-EST	23	16	30	3.5	2.5	4.6	87	93.8	93.3
	CENTRE-NORD	24	27	28	3.4	3.9	4	95.8	88.9	100
	CENTRE-OUEST	19	29	35	2.9	4.4	5.3	100	93.1	97.1
	CENTRE-SUD	11	20	17	3.2	5.7	4.9	90.9	85	100
	EST	18	27	30	2.4	3.6	4	94.4	85.2	90
	HAUTS BASSINS	43	36	36	5.5	4.6	4.6	93	94.4	91.7
	NORD	17	19	24	2.5	2.8	3.4	88.2	89.5	95.8
	PLATEAU CENTRAL	20	8	13	4.7	1.9	3.1	85	87.5	100
	SAHEL	13	23	49	2.3	4.2	8.9	100	91.3	51
	SUD-OUEST	10	14	14	2.9	4.1	4.1	100	92.9	85.7
BURUNDI		**129**	**143**	**123**	**2.5**	**2.8**	**2.4**	**93.8**	**85.3**	**91.1**
	BUBANZA	2	1	3	1.2	0.6	1.9	100	100	66.7
	BUJUMBURA MAIRIE	4	4	6	1.7	1.7	2.5	100	75	83.3
	BUJUMBURA RURAL	17	33	4	6.4	12.4	1.5	94.1	97	100
	BURURI	8	1	4	2.9	0.4	1.5	87.5	100	100
	CANKUZO	5	10	5	4.5	9.1	4.6	100	100	100
	CIBITOKE	9	11	6	3.6	4.5	2.7	88.9	45.5	83.3
	GITEGA	14	12	4	4	3.5	1.2	100	91.7	100
	KARUSI	4	2	3	1.9	1	1.4	100	50	100

	KAYANZA	5	7	8	1.8	2.5	2.9	100	100	100
	KIRUNDO	14	27	37	4.6	9	12.3	100	92.6	100
	MAKAMBA	5	4	7	2.4	1.5	3.4	100	25	100
	MURAMVYA	4	3	0	2.8	2.1	0	100	100	ND
	MUYINGA	12	8	13	4	2.3	4	83.3	62.5	69.2
	MWARO	10	1	6	7.6	0.8	4.6	90	100	100
	NGOZI	7	13	4	2.2	3.8	1.3	85.7	84.6	100
	RUTANA	3	3	4	1.9	1.9	2.5	66.7	66.7	25
	RUYIGI	6	3	2	3.1	1.6	1	100	100	100
CAMEROON		**793**	**921**	**760**	**7.8**	**9**	**7.2**	**88**	**88.9**	**87.8**
	ADAMAOUA	80	61	59	16.2	12.4	10.2	95	96.7	93.2
	CENTRE	151	97	81	8.8	5.7	4.5	80.8	87.6	86.4
	EST	36	62	45	7.8	13.4	9.2	94.4	96.8	91.1
	EXTREME NORD	121	196	243	7.2	11.6	10.8	82.6	77.6	80.7
	LITTORAL	81	83	81	5.8	6	5.9	92.6	96.4	95.1
	NORD	102	173	86	11	18.8	6.6	91.2	92.5	90.7
	NORD OUEST	80	111	40	9.3	12.9	4.2	92.5	90.1	90
	OUEST	63	64	74	7.4	7.5	7.1	82.5	84.4	94.6
	SUD	29	25	36	8.8	7.6	10.8	96.6	88	88.9
	SUD OUEST	50	49	15	7.5	7.4	2.2	88	95.9	80
CENTRAL AFRICAN REPUBLIC		**139**	**163**	**134**	**6.9**	**8**	**6.6**	**89.9**	**90.2**	**82.8**
	RS1	12	29	7	4.2	ND	2.1	83.3	96.6	85.7
	RS2	32	44	49	9.6	ND	12.9	90.6	86.4	79.6
	RS3	15	20	26	3.4	ND	6	86.7	95	84.6
	RS4	22	24	9	8.6	ND	3.2	100	91.7	100
	RS5	7	3	2	6.8	ND	2	71.4	100	100
	RS6	23	9	7	9.8	ND	2.7	91.3	100	71.4
	RS7	28	34	34	8.7	ND	9.2	89.3	82.4	82.4
CHAD		**482**	**702**	**649**	**7.2**	**10**	**9**	**93.2**	**91**	**95.8**
	BARH EL GAZEL	26	22	15	15.6	ND	8.7	96.2	100	100

BATHA	14	18	25	4.4	ND	7.6	100	83.3	92
BORKOU	1	4	2	1.6	ND	3.2	100	50	100
CHARI BAGUIRMI	19	30	30	5.1	ND	7.7	94.7	96.7	90
ENNEDI EST	2	5	4	2.9	ND	5.6	100	60	75
ENNEDI OUEST	1	5	2	2.5L	ND	4.9	100	100	50
GUERA	19	23	23	5.4	ND	6.4	89.5	95.7	100
HADJER LAMIS	41	107	95	11.1	ND	22.2	90.2	80.4	91.6
KANEM	7	12	39	3.2	ND	15.2	85.7	91.7	97.4
LAC	18	33	61	6.4	ND	20.9	88.9	90.9	98.4
LOGONE OCCIDENTAL	24	40	31	5.4	ND	6.7	91.7	97.5	96.8
LOGONE ORIENTAL	27	45	39	5.3	ND	6	100	95.6	100
MANDOUL	50	51	24	12.3	ND	4.9	94	94.1	95.8
MAYO KEBBI EST	36	55	50	7.2	ND	8.7	88.9	96.4	96
MAYO KEBBI OUEST	47	50	50	12.5	ND	12.1	97.9	100	98
MOYEN CHARI	26	53	34	6.8	ND	8.6	76.9	88.7	94.1
N'DJAMENA	26	28	29	4.2	ND	4.5	100	96.4	100
QUADDAI	27	38	24	ND	ND	5	ND	92.1	91.7
SALAMAT	7	13	12	3.6	ND	5.9	100	92.3	100
SILA	9	16	11	3.6	ND	4.2	100	68.8	90.9
TANDJILE	32	30	32	7.4	ND	6.5	87.5	96.7	100
TIBESTI	1	2	0	6	ND	0	100	50	ND
WADI FIRA	22	22	17	6.7	ND	3.4	90.9	95.5	100
DEMOCRATIC REPUBLIC OF THE CONGO	**1 698**	**2 037**	**2 642**	**5.1**	**5.1**	**6.6**	**90**	**86**	**84.1**
BAS UELE	35	28	36	5.8	4.5	5.5	91.4	89.3	75
EQUATEUR	31	39	28	2.6	3.2	2.1	83.9	79.5	67.9
HAUT KATANGA	71	153	317	2.8	6.1	10.9	95.8	79.1	85.8
HAUT LOMAMI	89	135	182	4.4	6.5	9.3	93.3	77	84.6
ITURI	126	95	186	4.5	3.4	6.4	81	84.2	73.7
KASAI	63	56	64	2.9	2.5	2.7	90.5	75	62.5
KASAI CENTRAL	76	74	67	3.4	3.3	2.9	96.1	90.5	91

	KASAI ORIENTAL	71	142	266	3	5.8	11	93	72.5	94
	KINSHASA	93	127	114	2	2.8	2.4	91.4	86.6	84.2
	KONGO CENTRAL	71	76	74	3.8	3.9	3.7	95.8	92.1	82.4
	KWANGO	72	55	54	5.9	4.6	4.5	88.9	100	98.1
	KWILU	53	88	47	2.2	3.5	1.9	94.3	92	93.6
	LOMAMI	54	47	93	2.9	2.4	4.8	96.3	83	94.6
	LUALABA	60	50	55	5.5	4.1	4.1	91.7	84	67.3
	MAI NDOMBE	35	40	29	3.7	4.5	7.5	88.6	92.5	96.6
	MANIEMA	36	56	65	2.9	3.9	4.8	88.9	76.8	75.4
	MONGALA	50	92	85	4.2	7.5	5.6	94	88	87.1
	NORD KIVU	135	161	178	3.4	4.1	4	92.6	96.3	87.1
	NORD UBANGI	28	26	42	3.9	3.6	5.4	64.3	84.6	73.8
	ORIENTAL	42	61	55	4.8	7	ND	92.9	96.7	87.3
	SANKURU	61	47	55	6.4	4.9	5.3	91.8	93.6	94.5
	SUD KIVU	104	131	155	3.2	3.8	10.7	90.4	91.6	91
	SUD UBANGI	44	35	70	3	2.5	11.1	70.5	77.1	67.1
	TANGANIKA	32	77	178	2.2	3.9	27.5	84.4	70.1	71.9
	TSHOPO	119	108	125	7.4	7.1	7.4	85.7	94.4	86.4
	TSHUAPA	47	38	22	4.7	3.6	2.1	95.7	100	100
EQUATORIAL GUINEA		**3**	**12**	**30**	**0.6**	**2.5**	**6.2**	**33.3**	**58.3**	**93.3**
	ANNOBON	ND	ND	ND	ND	ND	ND	ND	ND	ND
	BIOKO-NORTE	2	2	11	1.8	3.7	11.1	50	100	100
	BIOKO-SUR	0	0	1	0	0	8.1	ND	ND	100
	CENTRO-SUR	0	2	6	0	3.7	11.1	ND	50	100
	KIE-NTEM	0	1	2	0	1.5	4.1	ND	100	50
	LITORAL	1	5	6	1.4	6.9	4.7	0	40	83.3
	WELE-NZAS	0	2	4	0	4.4	5.9	ND	50	100
ETHIOPIA		**1 043**	**1 091**	**1 078**	**2.5**	**2.6**	**2.5**	**90.8**	**92.3**	**92.1**
	ADDIS ABABA	18	20	22	1.3	1.5	1.6	94.4	90	90.9
	AFAR	25	20	28	3.4	2.7	3.8	88	95	96.4

	AMHARA	233	228	230	2.6	2.6	2.6	94	94.7	95.2
	BENISHANGUL GUMU	11	28	35	2.7	6.8	8.5	81.8	89.3	85.7
	DIRE DAWA	4	3	4	2.1	1.6	2.1	50	100	100
	GAMBELLA	5	11	15	3.2	7.1	9.7	100	90.9	86.7
	HARARI	2	3	1	2	3	1	50	100	100
	OROMIA	384	418	363	2.5	2.7	2.4	88.8	89	89
	SNNPR	221	233	244	2.6	2.8	2.9	93.7	95.3	97.1
	SOMALI	90	83	91	3.9	3.7	4	92.2	94	91.2
	TIGRAY	50	44	45	2	1.8	1.9	82	93.2	80
GUINEA		**1 059**	**451**	**231**	**20.1**	**8.4**	**4.2**	**91.4**	**94**	**96.1**
	BOKE	132	82	23	24.5	15.2	4.2	93.2	96.3	95.7
	CONAKRY	79	32	32	10.1	4.1	3.8	78.5	90.6	90.6
	FARANAH	178	39	28	44.7	9.8	6.1	91.6	94.9	96.4
	KANKAN	170	58	42	22.5	7.7	3.9	88.8	93.1	95.2
	KINDIA	117	53	33	15.3	6.9	3.8	93.2	92.5	97
	LABE	184	88	29	39.8	19.1	5.5	93.5	94.3	100
	MAMOU	94	48	16	23	11.8	4.4	100	100	100
	N'ZEREKORE	105	51	28	8.5	4.2	3.6	89.5	88.2	96.4
GUINEA-BISSAU		**12**	**82**	**95**	**1.6**	**10.6**	**12**	**75**	**85.4**	**87.4**
	BAFATA	1	12	18	0.9	10.7	16	100	91.7	77.8
	BIOMBO	0	7	5	0	17.6	12.6	ND	85.7	100
	BISSAU	5	14	11	2.6	7.2	5.7	80	85.7	90.9
	BOLAMA	0	5	4	0	101.4	81.2	ND	100	100
	CACHEU	1	6	7	1	6.1	7.1	100	83.3	85.7
	GABU	1	13	24	0.9	12.4	22.8	100	84.6	95.8
	OIO	2	17	14	2.3	19.7	16.2	100	70.6	92.9
	QUINARA	1	4	4	22.7	90.9	90.9	0	100	75
	TOMBALI	1	4	8	2.2	8.7	17.4	0	100	62.5
KENYA		**549**	**469**	**672**	**2.7**	**2.3**	**3.3**	**90.2**	**87**	**88.2**
	BARINGO	6	9	7	2.1	3.2	2.5	100	88.9	85.7

BOMET	6	8	10	2.1	2.8	3.5	100	62.5	100
BUNGOMA	13	16	17	1.9	2.3	2.4	100	87.5	100
BUSIA	12	15	16	3	3.7	4	75	86.7	81.3
ELGEYO MARAKWET	5	4	9	2.6	2.1	4.7	60	100	88.9
EMBU	6	5	11	2.9	1.5	5.4	100	20	54.5
GARISSA	18	15	28	6	4.3	9.3	94.4	60	82.1
HOMA BAY	13	10	11	2.6	2	2.2	100	100	100
ISIOLO	5	2	8	5.4	2.1	8.6	100	100	75
KAJIADO	18	7	21	4.5	1.8	5.3	88.9	100	90.5
KAKAMEGA	33	27	36	3.5	2.9	3.8	93.9	100	97.2
KERICHO	15	17	12	3.3	3.7	2.6	100	82.4	100
KIAMBU	13	13	21	2.4	2.4	3.8	69.2	92.3	85.7
KILIFI	18	17	18	3.6	3.4	3.4	94.4	88.2	83.3
KIRINYAGA	5	6	5	2.6	3.1	2.6	100	100	80
KISII	12	9	14	2.3	1.7	2.6	100	100	100
KISUMU	9	8	12	1.9	1.7	2.6	100	87.5	100
KITUI	20	13	24	3.7	2.2	4.3	80	76.9	79.2
KWALE	7	4	4	3.8	2.2	2.2	100	100	100
LAIKIPIA	5	7	8	2.3	3.2	3.7	80	100	100
LAMU	1	1	5	2	2	10.1	100	100	100
MACHAKOS	13	7	16	3.1	1.7	3.8	92.3	100	87.5
MAKUENI	13	3	9	3.3	0.8	2.3	84.6	100	100
MANDERA	12	9	17	5.8	4.4	8.2	75	88.9	88.2
MARSABIT	7	4	7	3.2	1.9	3.2	42.9	100	71.4
MERU	7	13	23	1.2	2.2	3.9	85.7	92.3	87
MIGORI	8	7	8	1.7	1.5	1.7	75	85.7	75
MOMBASA	17	12	22	4.2	2.9	5.4	88.2	83.3	95.5
MURANG'A	8	13	14	2.3	3.8	4.1	100	100	100
NAIROBI	37	39	63	3.4	3.5	5.7	89.2	87.2	77.8
NAKURU	32	33	46	3.8	3.6	5.5	100	75.8	84.8
NANDI	11	14	13	3.2	4.1	3.8	100	92.9	100

	NAROK	15	15	14	3.6	3.7	3.4	93.3	93.3	85.7
	NYAMIRA	10	9	4	4.2	3.8	1.7	90	100	100
	NYANDARUA	8	5	13	2.3	1.4	3.8	87.5	100	76.9
	NYERI	13	6	7	4.8	2.2	2.6	100	100	100
	SAMBURU	4	2	1	3.1	1.5	0.8	100	50	100
	SIAYA	12	5	9	2.8	0.9	2.1	100	80	88.9
	TAITA TAVETA	11	7	7	10.2	6.5	6.5	90.9	100	85.7
	TANA RIVER	10	3	10	8.5	2.6	8.6	100	33.3	100
	THARAKA-NITHI	4	3	3	2.5	1.9	1.9	100	66.7	100
	TRANS NZOIA	13	4	7	3.2	1	1.7	84.6	50	85.7
	TURKANA	16	5	12	3.6	1.1	2.5	81.3	100	66.7
	UASIN GISHU	10	7	8	2.2	1.5	1.7	60	85.7	100
	VIHIGA	6	7	4	3.4	4	2.3	100	85.7	100
	WAJIR	8	18	33	2.1	4.3	8.9	100	77.8	97
	WEST POKOT	4	6	5	1.4	2.2	1.8	50	100	80
LIBERIA		**69**	**80**	**72**	**3.5**	**4**	**3.6**	**75.4**	**81.3**	**90.3**
	BOMI	4	4	2	9.3	9.3	4.3	100	100	100
	BONG	13	5	5	8.2	3.2	2.7	61.5	100	80
	GBARPOLU	1	2	1	2.5	5	2.2	100	50	100
	GRAND BASSA	2	3	4	1.9	2.8	3.3	50	66.7	75
	GRAND CAPE MOUNT	3	2	3	4.8	3.2	4.3	100	100	100
	GRAND GEDEH	3	4	3	5	6.6	4.3	66.7	100	100
	GRAND KRU	2	1	3	6.8	3.4	9.4	100	0	100
	LOFA	7	10	7	5.4	7.7	4.6	100	90	100
	MARGIBI	5	8	3	4.7	7.5	2.6	100	100	100
	MARYLAND	3	3	4	10.9	11	5.3	33.3	66.7	75
	MONTSERRADO	9	16	25	22.8	40.7	4	44.4	62.5	92
	NIMBA	7	8	7	3.1	3.6	2.7	71.4	100	100
	RIVER GEE	2	3	1	5.5	8.2	2.5	50	33.3	100
	RIVERCESS	0	6	2	0	16.2	5.4	ND	83.3	50
	SINOE	4	5	2	7.9	9.9	3.5	100	80	50

MALI		**307**	**258**	**291**	**3.8**	**2.9**	**3.2**	**89.6**	**87.2**	**88.7**
	BAMAKO	59	30	46	6.3	3.2	4.9	83.1	80	87
	GAO	11	6	8	3.9	2.1	2.9	63.6	83.3	62.5
	KAYES	45	38	42	4.4	3.7	4.1	88.9	92.1	88.1
	KIDAL	0	2	2	0	5.7	5.7	ND	100	50
	KOULIKORO	51	37	43	4.1	3	3.5	88.2	86.5	93
	MOPTI	43	38	42	4.1	3.6	4	95.3	86.8	92.9
	SIKASSO	46	56	53	3.4	4.1	3.9	91.3	87.5	83
	STGOU	40	37	40	3.3	3.1	3.3	100	91.9	97.5
	TOMBOUCTOU	12	10	12	3.4	2.6	3.4	91.7	70	83.3
MOZAMBIQUE		**424**	**384**	**461**	**3.2**	**2.8**	**3.4**	**82.8**	**85.4**	**88.3**
	CABO DELGADO	20	23	28	2.3	0	2.7	70	78.3	82.1
	GAZA	26	24	31	4.4	0	6.3	80.8	79.2	90.3
	INHAMBANE	13	30	21	1.9	0	3	46.2	86.7	71.4
	MANICA	48	48	53	6.4	0	7.9	89.6	91.7	98.1
	MAPUTO CIDADE	34	39	0	5.5	0	0	76.5	74.4	ND
	MAPUTO PROVINCIA	0	0	47	ND	ND	4.2	ND	ND	83
	NAMPULA	75	53	91	3.4	0	3.3	81.3	88.7	87.9
	NIASSA	33	36	32	4.7	0	3.7	78.8	91.7	90.6
	SOFALA	35	34	35	3.6	0	3.5	65.7	76.5	77.1
	TETE	41	38	34	4.3	0	2.7	100	100	94.1
	ZAMBEZIA	99	59	89	4.8	0	3.8	90.9	81.4	92.1
NIGER		**363**	**682**	**973**	**3.4**	**6.2**	**8.6**	**88.2**	**80.5**	**89.1**
	AGADEZ	7	20	22	3.2	6.9	8.1	100	80	90.9
	DIFFA	28	76	111	10.9	18.7	30.6	85.7	77.6	84.7
	DOSSO	18	57	72	1.7	5	5.6	100	78.9	93.1
	MARADI	111	226	247	6.7	10.4	10.4	92.8	86.3	90.3
	NIAMEY	0	23	70	ND	4.5	13.3	ND	73.9	88.6
	TAHOUA	40	67	79	2.5	3.3	3.7	85	74.6	84.8
	TILLABERI	64	72	62	3.5	4.8	3.6	90.6	75	80.6

	ZINDER	95	141	310	6.2	6.1	12.6	80	80.1	91.6
SIERRA LEONE		**68**	**78**	**121**	**2.6**	**2.5**	**3.8**	**76.5**	**80.8**	**83.5**
	EASTERN	20	21	41	3.4	3.5	6.9	85	85.7	82.9
	NORTHERN	23	26	31	2.6	2.9	3.5	65.2	80.8	83.9
	SOUTHERN	12	19	20	2	3.2	3.4	83.3	73.7	95
	WESTERN AREA	13	12	29	2.4	2.2	5.4	76.9	83.3	75.9
SOUTH SUDAN		**323**	**388**	**445**	**6.2**	**7.3**	**8.3**	**92.6**	**86.9**	**84.5**
	CENTRAL EQUATORIA	14	13	27	2	1.9	3.9	78.6	76.9	77.8
	EASTERN EQUATORIA	39	46	39	6.1	7.2	6.1	92.3	100	97.4
	JONGLEI	34	35	44	3.7	3.8	4.8	88.2	88.6	86.4
	LAKES	57	59	58	7.6	7.9	7.8	96.5	96.6	100
	NORTHERN BAHR EL GHAZAL	30	47	48	3.2	5.1	5.1	100	89.4	93.8
	UNITY	12	36	50	1.5	4.2	6.3	91.7	61.1	74
	UPPER NILE	27	31	48	3.4	3.8	5.9	63	48.4	54.2
	WARRAP	47	52	70	3.4	3.8	5.1	100	100	87.1
	WESTERN BAHR EL GHAZAL	17	21	24	8.3	10.3	11.8	94.1	76.2	66.7
	WESTERN EQUATORIA	46	48	37	9.4	9.9	7.6	100	95.8	97.3

ND: not determined.

[1] Annualized non-poliomyelitis AFP rate for 100 000 population aged <15 years. UNDP population data is used to calculate the non-polio AFP rate

[2] Defined as 2 stool specimens collected within 14 days of onset of paralysis, 24–48 hours apart, except for the Region of the Americas, where only 1 specimen is collected

Source: WHO.

8.3 Acute flaccid paralysis surveillance performance (provinces/states) among outbreak or high-risk countries — Eastern Mediterranean Region, 2016–2018

Country Province/state	AFP cases reported			Annualized non-polio AFP rate[1]			AFP cases with adequate specimens (%)[2]		
	2016	2017	2018	2016	2017	2018	2016	2017	2018
DJIBOUTI	**3**	**4**	**0**	**1**	**1.3**	**0**	**33.3**	**100**	**ND**
ALI-SABIEH	0	0	0	ND	ND	ND	ND	ND	ND
ARTA	ND	ND	ND	ND	ND	ND	ND	ND	ND
DIKHIL	0	0	0	0	0	0	ND	ND	ND
DJIBOUTI	2	4	0	13.4	26.8	0	50	100	ND
OBOCK	1	0	0	7.5	0	0	0	ND	ND
TADJOURAH	0	0	0	0	0	0	ND	ND	ND
IRAQ	**604**	**698**	**1023**	**4.2**	**4.5**	**6.5**	**80.8**	**86.8**	**89.9**
ANBAR	12	28	63	1.9	4.3	ND	75	85.7	95.2
BABYLON	33	48	44	4.3	6.2	5.1	69.7	95.8	95.5
BAGHDAD-KARKH	61	52	112	3.9	3.4	ND	68.9	78.8	78.6
BAGHDAD-RESAFA	110	119	137	6.1	6.7	6.9	71.8	88.2	86.9
BASRAH	41	53	61	3.5	4.5	5	90.2	83	91.8
DAHUK	23	28	20	5	6.1	ND	95.7	96.4	90
DIWANIYA	14	27	37	2.8	5.3	6.8	85.7	92.6	94.6
DIYALA	39	45	56	6.3	7.3	ND	79.5	93.3	85.7
ERBIL	23	29	44	3.3	4.2	5.4	91.3	96.6	100
KERBALA	21	21	33	4.7	4.7	6.4	90.5	81	93.9
KIRKUK	36	42	54	6.8	8	7.7	91.7	90.5	94.4
MISSAN	16	23	29	4.1	5.9	6.2	100	95.7	86.2
MUTHANNA	25	10	44	7.8	3.1	ND	88	70	84.1
NAJAF	28	27	35	5.1	4.9	ND	96.4	92.6	97.1
NINEWA	12	22	62	0.9	1.6	6.5	50	68.2	93.5

SALAH AL-DIN	19	25	36	3.4	4.4	7.1	73.7	52	88.9
SULAYMANIYAH	31	41	67	4.2	5.6	6.9	87.1	90.2	95.5
THI-QAR	19	30	39	2.3	3.6	ND	78.9	83.3	92.3
WASSIT	41	28	50	7.9	5.4	8.6	80.5	89.3	84
JORDAN	**106**	**113**	**114**	**4**	**3.3**	**3.3**	**100**	**100**	**100**
AJLOUN	4	5	7	6.9	8.7	10.1	100	100	100
AMMAN	38	34	30	4.5	4	2.9	100	100	100
AQABA	4	4	3	8	8.1	5	100	100	100
BALQA	6	8	11	3.8	5.1	5.8	100	100	100
IRBID	11	12	15	2.6	2.9	3	100	100	100
JARASH	5	7	9	6.5	9.1	9.8	100	100	100
KARAK	9	9	11	9.9	9.9	10.1	100	100	100
MA'AN	5	6	3	10.7	12.9	5.4	100	100	100
MADABA	3	2	5	5	3.3	7	100	100	100
MAFRAQ	7	7	6	5.8	5.9	4.2	100	100	100
TAFIELA	3	4	2	8.1	10.8	4.5	100	100	100
ZARQA	11	15	12	3	4.1	2.8	100	100	100
LEBANON	**110**	**75**	**89**	**11.2**	**5.3**	**6.5**	**82.7**	**80**	**96.6**
BEIRUT	8	8	8	7	7	7.4	75	50	75
BEKAA	19	20	18	13.4	14.2	9	68.4	80	100
MONT LIBA	44	15	23	10.2	3.5	4.1	90.9	80	91.3
NABATIYE	12	9	6	17.4	13.1	5.3	91.7	100	100
NORTH	16	11	14	7	4.8	3	68.8	81.8	85.7
SOUTH	11	12	8	9.1	9.9	3.2	90.9	83.3	100
LIBYA	**69**	**88**	**122**	**3.7**	**4.9**	**6.8**	**97.1**	**96.6**	**96.7**
AL GABAL EL GHARBI	2	0	0	1.3	ND	ND	100	ND	ND
AL JABAL AL AKHDAR	3	9	15	1.5	4.6	6	100	100	100
AL WASTA	0	18	20	ND	4.5	4	ND	100	100
AL ZAWIYAH	7	6	8	4.1	3.6	3.6	100	100	87.5
BENGHAZI	0	14	37	ND	3.4	8.7	ND	92.9	97.3

BENIGHAZI	13	0	0	3.2	ND	ND	92.3	ND	ND
JABAL NAFOSA	0	4	8	ND	2.6	3.9	ND	100	87.5
SABHA	9	7	13	5	3.9	5.6	100	85.7	100
SERT	14	0	0	3.5	ND	ND	100	ND	ND
TARABULUS	21	30	21	3.9	5.6	3.1	95.2	96.7	95.2
SOMALIA	**316**	**345**	**353**	**5.9**	**5**	**4.9**	**99.1**	**99.1**	**97.7**
AWDAL	18	17	23	9.2	8.7	9.4	100	100	95.7
BAKOL	9	10	11	6.1	6.8	6	100	100	100
BANADIR	30	33	32	3.4	3.7	2.8	100	100	100
BARI	24	24	22	16.5	16.5	12.1	100	95.8	100
BAY	19	22	24	4.4	5.1	4.4	100	100	95.8
GALBEED	19	20	21	5.1	5.4	3.8	94.7	100	100
GALGADUD	25	27	23	11.7	12.6	8.6	100	100	95.7
GEDO	21	20	25	8.4	8	7.7	100	100	92
HIRAN	15	21	10	8	11.2	3.8	100	100	100
LOWER JUBA	26	29	30	10.8	12	8.6	96.2	93.1	100
LOWER SHABELLE	24	31	32	3.2	4.1	3.4	100	100	100
MIDDLE JUBA	11	11	13	8.4	8.5	8	90.9	100	100
MIDDLE SHABELLE	19	24	23	6.3	8	5.1	100	100	95.7
MUDUG	14	12	15	9.4	8	8	100	100	100
NUGAL	11	10	9	15.1	13.8	9.9	100	100	100
SAHIL	8	8	7	11.6	11.7	8.1	100	100	100
SANAG	7	6	11	5.8	5	7.3	100	100	81.8
SOOL	5	11	11	5.2	11.4	9.1	100	100	100
TOGDHER	11	9	11	3.9	3.6	3.5	100	100	100
SUDAN	**508**	**570**	**577**	**3.1**	**3.5**	**3.4**	**97.6**	**96.3**	**97.2**
BLUE NILE	20	15	19	4.4	3.5	4.2	100	93.3	100
CENTRAL DARFUR	0	18	12	ND	5.3	3.4	ND	100	91.7
EAST DARFUR	0	15	16	ND	3	3.1	ND	93.3	93.8
GEDARIF	24	28	26	2.7	2.7	2.4	100	100	100
GEZIRA	67	73	71	3.4	3.2	3	98.5	95.9	98.6

KASSALA	29	28	33	3.4	2.9	3.3	89.7	96.4	100
KHARTOUM	74	88	92	3	3	3	98.6	100	96.7
NORTH DARFUR	27	40	37	3	3.9	3.5	100	85	100
NORTH KORDOFAN	27	33	34	2.1	3.4	3.5	100	90.9	94.1
NORTHERN	9	11	9	3.3	3.7	2.3	100	100	100
RED SEA	15	15	18	4.5	3.9	3.4	100	93.3	100
RIVER NILE	19	20	19	4	3.8	3.6	94.7	100	100
SENNAR	29	27	31	3.9	3.2	3.6	93.1	100	93.5
SOUTH DARFUR	54	44	44	3	2.6	2.5	100	100	100
SOUTH KORDOFAN	55	28	19	5.6	3.7	2.6	94.5	92.9	100
WEST DARFUR	34	27	31	3.5	3.6	4	97.1	100	96.8
WEST KORDOFAN	0	29	30	ND	3.8	3.7	ND	100	96.7
WHITE NILE	25	31	36	2.9	3.2	3.6	100	90.3	88.9
SYRIAN ARAB REPUBLIC	**303**	**363**	**362**	**3.9**	**4.3**	**5.5**	**87.8**	**80.4**	**87.3**
ALEPPO	26	26	35	1.2	1.2	3	84.6	92.3	82.9
DAMASCUS	27	22	27	3.8	3.1	4.9	100	86.4	88.9
DARA	20	18	23	4	3.6	4.9	65	94.4	87
DEIR EZ-ZOR	5	106	54	0.8	5.7	12.2	80	71.7	81.5
EDLEB	8	7	1	1.2	1	0.2	100	71.4	0
HAMA	27	26	39	4.7	4.5	4.7	96.3	92.3	87.2
HASAKEH	27	21	21	3.8	3	3	77.8	90.5	90.5
HOMS	21	28	25	2.3	2.9	4.6	100	85.7	96
LATTAKIA	39	23	27	11.2	6.6	7.8	87.2	87	88.9
QUNEITERA	11	5	9	4.9	2.2	8.5	100	60	88.9
RAQQA	4	12	16	0.6	1.5	2.8	25	50	68.8
RURAL DAMASCUS	54	42	50	4.2	3.2	4.7	87	76.2	90
SWIEDA	14	8	8	11.3	6.5	5.1	85.7	62.5	100
TARTOUS	20	19	27	7.4	7	7.8	95	94.7	96.3
YEMEN	**715**	**713**	**729**	**7.1**	**6.3**	**6.4**	**90.9**	**90.2**	**91.6**

ABYAN	17	15	22	7.2	6.4	7.7	88.2	93.3	90.9
ADEN	29	28	26	8.1	8.1	5.7	100	92.9	96.2
ALBAIDAH	15	12	19	5	4	5.3	93.3	83.3	100
ALDHALE	18	12	13	6.6	4.4	3.7	77.8	83.3	84.6
ALHUDAIDAH	79	79	70	6.5	6.5	4.5	91.1	88.6	85.7
ALJAWF	10	19	25	3.9	7.5	8.1	100	89.5	92
ALMAHARA	3	6	6	5.5	10.9	7.8	100	100	100
ALMAHAWEET	17	17	21	6.2	6.2	6.2	88.2	100	90.5
AMRAN	32	33	28	6.2	6.4	4.1	87.5	87.9	96.4
DHAMAR	47	41	42	6	5.3	4.5	95.7	97.6	95.2
HADRAMOAT ALMUKLLAA	16	13	11	ND	ND	2.9	87.5	92.3	90.9
HADRAMOAT SAYEUN	17	15	14	7.4	6.6	4.4	94.1	93.3	100
HAJJAH	57	87	88	6.9	10.6	8.5	87.7	87.4	94.3
IBB	70	57	52	6.1	5	3.8	90	89.5	92.3
LAHAJ	26	39	24	6.6	9.9	5	88.5	89.7	83.3
MARIB	11	8	10	8.3	6	6.1	100	100	100
RIMAH	27	24	21	12.3	10.9	7.6	100	91.7	90.5
SAADAH	17	18	14	4.2	4.5	2.7	100	88.9	85.7
SANAA	51	40	39	10.7	8.4	7	100	97.5	94.9
SANAA CITY	76	67	60	6.7	5.9	3.6	88.2	86.6	95
SHABWAH	14	10	11	5.6	4	3.7	85.7	80	90.9
SOCOTRA	9	2	2	ND	ND	6.6	77.8	50	100
TAIZ	57	71	111	4.4	5.5	7.1	82.5	90.1	86.5

ND: not determined.

[1] Annualized non-poliomyelitis AFP rate for 100 000 population aged <15 years. UNDP population data is used to calculate the non-polio AFP rate

[2] Defined as 2 stool specimens collected within 14 days of onset of paralysis, 24–48 hours apart, except for the Region of the Americas, where only 1 specimen is collected

Source: WHO.

8.4 Acute flaccid paralysis surveillance performance (provinces/states) among outbreak or high-risk countries — South-East Asia and Western Pacific Regions, 2016–2018

Country	Province/state	AFP cases reported			Annualized non-polio AFP rate[1]			AFP cases with adequate specimens (%)[2]		
		2016	2017	2018	2016	2017	2018	2016	2017	2018
INDONESIA		**1 409**	**1 740**	**1 726**	**2**	**2.4**	**2.4**	**86.1**	**82.2**	**81.6**
	BALI	35	24	35	3.3	2.2	3.5	80	79.2	74.3
	BANGKA_BELITUNG	2	8	13	0.5	2.1	3.4	100	25	61.5
	BANTEN	77	86	58	2.3	2.6	1.6	90.9	87.2	93.1
	BENGKULU	7	16	13	1.3	3	2.4	100	93.8	92.3
	DI_ACEH	32	39	34	2.2	2.6	2.3	71.9	66.7	82.4
	DI_YOGYAKARTA	18	33	23	2.3	4.3	3	83.3	93.9	87
	DKI JAKARTA	75	67	79	3.2	2.8	3.4	40	53.7	53.2
	GORONTALO	19	15	10	5.5	4.3	2.9	84.2	66.7	50
	JAMBI	22	22	44	2.2	2.2	4.6	77.3	81.8	93.2
	JAWA BARAT	258	285	276	2	2.2	2.1	88	83.2	84.1
	JAWA TENGAH	173	202	265	2	2.4	3.1	96	92.6	93.6
	JAWA TIMUR	183	324	243	2	3.5	2.6	88	75.3	65.8
	KALIMANTAN BARAT	28	30	31	2	2.1	2.2	96.4	90	93.5
	KALIMANTAN SELATAN	20	29	28	1.8	2.6	2.6	65	69	57.1
	KALIMANTAN TENGAH	16	21	15	2.3	3	2.1	75	71.4	60
	KALIMANTAN TIMUR	15	20	20	1.5	2	2	93.3	70	80
	KALIMANTAN UTARA	1	2	5	0.7	1.3	3.3	100	50	80
	KEPULAUAN RIAU	10	20	16	1.8	3.7	3	40	100	81.3
	LAMPUNG	63	49	49	2.7	2.1	2.1	85.7	77.6	91.8
	MALUKU	2	9	10	0.3	1.5	1.7	50	44.4	20

	MALUKU UTARA	1	0	0	0.3	0	0	0	ND	ND
	NUSA TENGGARA BARAT	32	24	10	2.2	1.7	0.7	87.5	100	100
	NUSA TENGGARA TIMUR	41	37	60	2.3	2	3.3	97.6	97.3	96.7
	PAPUA	9	18	27	0.8	1.6	2.7	66.7	61.1	66.7
	PAPUA BARAT	0	1	3	0	0.4	1.1	ND	0	0
	RIAU	8	37	28	0.4	1.8	1.4	100	62.2	64.3
	SULAWESI BARAT	1	9	9	0.2	2	2	100	88.9	77.8
	SULAWESI SELATAN	40	49	76	1.6	1.9	3	95	93.9	89.5
	SULAWESI TENGAH	20	24	0	2.2	2.6	0	95	100	ND
	SULAWESI TENGGARA	17	13	16	2.1	1.6	2	76.5	76.9	68.8
	SULAWESI UTARA	15	21	16	2.3	3.2	2.5	86.7	90.5	93.8
	SUMATERA BARAT	32	37	46	2	2.3	2.9	93.8	97.3	91.3
	SUMATERA SELATAN	42	68	86	1.8	2.9	3.7	81	79.4	84.9
	SUMATERA UTARA	95	101	82	2.2	2.3	1.9	100	99	96.3
PAPUA NEW GUINEA		**1**	**28**	**284**	**0**	**0.9**	**7.9**	**100**	**50**	**44.7**
	BOUGAINVILLE	0	0	7	ND	ND	5.6	ND	ND	57.1
	CENTRAL	0	0	14	ND	ND	10.1	ND	ND	21.4
	CHIMBU (SIMBU)	0	0	13	ND	ND	9.5	ND	ND	46.2
	EAST NEW BRITAIN	0	1	10	ND	ND	5.8	ND	0	70
	EAST SEPIK	0	0	17	ND	ND	5	ND	ND	52.9
	EASTERN HIGHLANDS	0	2	38	ND	ND	11.1	ND	50	44.7
	ENGA	0	0	17	ND	ND	6.9	ND	ND	52.9
	GULF PROVINCE	0	0	9	ND	ND	4.6	ND	ND	22.2
	HELA	0	0	2	ND	ND	2.5	ND	ND	100
	JIWAKA	0	0	19	ND	ND	11.6	ND	ND	57.9
	MADANG	0	4	23	ND	ND	7.3	ND	50	30.4
	MANUS	0	0	1	ND	ND	3.3	ND	ND	100
	MILNE BAY PROVINCE	0	0	4	ND	ND	3	ND	ND	0

MOROBE	1	4	21	ND	ND	5.5	100	100	47.6
NATIONAL CAPITAL DISTRICT	0	9	32	ND	ND	19.6	ND	33.3	37.5
NEW IRELAND	0	0	3	ND	ND	2.7	ND	ND	33.3
NORTH SOLOMONS	0	2	0	ND	ND	ND	ND	100	ND
NORTHERN	ND	ND	ND	ND	ND	ND	ND	ND	ND
NORTHERN (ORO)	0	0	23	ND	ND	22.3	ND	ND	43.5
SIMBU	0	4	0	ND	ND	ND	ND	25	ND
SOUTHERN HIGHLANDS	0	1	12	ND	ND	5.8	ND	0	33.3
WEST NEW BRITAIN	0	1	5	ND	ND	3.7	ND	100	80
WEST SEPIK	ND	ND	ND	ND	ND	ND	ND	ND	ND
WEST SEPIK (SANDAUN)	0	0	5	ND	ND	4.1	ND	ND	40
WESTERN	0	0	2	ND	ND	2	ND	ND	50
WESTERN HIGHLANDS	0	0	7	ND	ND	5.2	ND	ND	71.4

ND: not determined.

[1] Annualized non-poliomyelitis AFP rate for 100 000 population aged <15 years. UNDP population data is used to calculate the non-polio AFP rate

[2] Defined as 2 stool specimens collected within 14 days of onset of paralysis, 24–48 hours apart, except for the Region of the Americas, where only 1 specimen is collected

Source: WHO.

8.5 Environmental surveillance performance – African and Eastern Mediterranean Regions, 2016–2018

Country	2016			2017			2018		
	No. of sites*	Sites with ≥50% EV rate (%)	Sites detecting WPV or VDPV (%)	No. of sites*	Sites with ≥50% EV rate (%)	Sites detecting WPV or VDPV (%)	No. of sites*	Sites with ≥50% EV rate (%)	Sites detecting WPV or VDPV (%)
ALGERIA	ND	ND	ND	4	100	0	4	75	0
ANGOLA	4	100	0	8	88	0	8	50	0
BURKINA FASO	4	0	0	4	0	0	4	0	0
CAMEROON	28	11	0	33	6	0	31	10	0
CENTRAL AFRICAN REPUBLIC	ND	ND	ND	ND	ND	ND	4	0	0
CHAD	4	75	0	5	0	0	5	40	0
CÔTE D'IVOIRE	3	100	0	3	100	0	15	53	0
DEMOCRATIC REP. OF THE CONGO	ND	ND	ND	6	33	0	11	45	0
EQUATORIAL GUINEA	ND	ND	ND	4	50	0	4	0	0
ETHIOPIA	ND	ND	ND	5	60	0	4	25	0
GABON	ND	ND	ND	5	0	0	6	0	0
GHANA	ND	ND	ND	ND	ND	ND	9	78	0
GUINEA	4	25	0	7	71	0	7	0	0
KENYA	9	78	0	9	100	0	9	100	11
MADAGASCAR	23	43	0	23	61	0	20	75	0
MALI	ND	ND	ND	4	0	0	4	100	0
MOZAMBIQUE	ND	ND	ND	4	25	0	4	75	0
NIGER	9	22	0	9	22	0	8	0	0
NIGERIA	56	84	2	71	76	10	103	79	23
SENEGAL	3	67	0	2	100	0	2	100	0
SOUTH SUDAN	ND	ND	ND	4	50	0	5	60	0

UGANDA	ND	ND	ND	4	100	0	4	100	0
ZAMBIA	ND	ND	ND	ND	ND	ND	8	100	0
AFGHANISTAN	15	100	13	20	100	65	20	100	75
EGYPT	46	100	2	45	96	0	48	100	0
IRAN (ISLAMIC REPUBLIC OF)	ND	ND	ND	2	100	0	6	67	0
JORDAN	2	100	0	3	100	0	3	100	0
LEBANON	2	50	0	3	100	0	4	100	0
PAKISTAN	62	98	44	53	100	54	58	100	64
SOMALIA	ND	ND	ND	4	75	25	5	40	60
SUDAN	ND	ND	ND	ND	ND	ND	4	100	0
SYRIAN ARAB REPUBLIC	ND	ND	ND	3	100	0	14	86	0

Endemic countries are shaded.

* Must have had at least one specimen collected during the time frame; reported in POLIS. Enterovirus (EV) = WPV, VDPV, SL, or NPEV; WPV: Wild poliovirus; VDPV: Vaccine-derived poliovirus; SL: Sabin-like virus; NPEV: Non-polio enterovirus

Endemic countries are shaded. NA = not applicable; Enterovirus (EV) = WPV, VDPV, SL, or NPEV

Source: WHO.

8.6 Number of poliovirus isolates from stool specimens of persons with acute flaccid paralysis and timing of results — worldwide, 2016–2018

WHO region Year	No. of specimens	No. of poliovirus isolates			Poliovirus isolation results within 7 days of receipt at laboratory (%)	ITD results within 7 days of receipt of specimen (%)	ITD results within 60 days of paralysis onset (%)
		Wild[†]	Sabin[§]	cVDPV[¶]			
African							
2016	65 520	4	4 771	4	95	94	97
2017	65 245	0	1 663	22	97	80	98
2018	51 292	0	2 547	65	94	98	96
Americas							
2016	1 920	0	18	0	84	92	91
2017	1 755	0	14	0	83	100	100
2018	1 866	0	47	0	86	100	100
Eastern Mediterranean							
2016	31 928	33	1 612	1	94	98	98
2017	35 602	22	2 521	74	98	99	97
2018	40 419	33	1 749	12	92	99	97
European							
2016	3 606	0	71	0	82	100	86
2017	3 480	0	73	0	83	92	90
2018	3 274	0	71	0	84	92	62
South-East Asia							
2016	101 550	0	5 247	2	98	99	99
2017	82 292	0	2 251	0	91	96	99
2018	79 566	0	1 970	1	97	100	99
Western Pacific							
2016	14 196	0	253	4	96	98	96
2017	13 370	0	140	0	96	97	90
2018	13 638	0	348	26	97	99	68
Total**							
2016	**218 478**	**37**	**11 972**	**11**	**96**	**97**	**98**
2017	**201 546**	**22**	**6 662**	**96**	**94**	**91**	**98**
2018	**190 055**	**33**	**6 732**	**104**	**95**	**99**	**95**

* Data as of 4 March 2019; reviewed 10 September 2019.

† Number of Acute Flaccid Paralysis cases with isolates of wild poliovirus.

§ Either (i) concordant Sabin-like results in intratypic differentiation (ITD) testing and vaccine-derived poliovirus (VDPV) screening, or (ii) ≤1% viral protein 1 (VP1) nucleotide sequence difference compared with Sabin vaccine virus (≤0.6% for type 2).

¶ For poliovirus types 1 and 3, ≥10 VP1 nucleotide differences from the respective poliovirus; for poliovirus type 2, ≥6 VP1 nucleotide differences from Sabin type 2 poliovirus.

** For the last three indicators, the total represents the weighted percent of regional performance.

Source: WHO.

9 Annexes

Annex 1. Global Polio Surveillance Action Plan, 2018–2020 priority countries

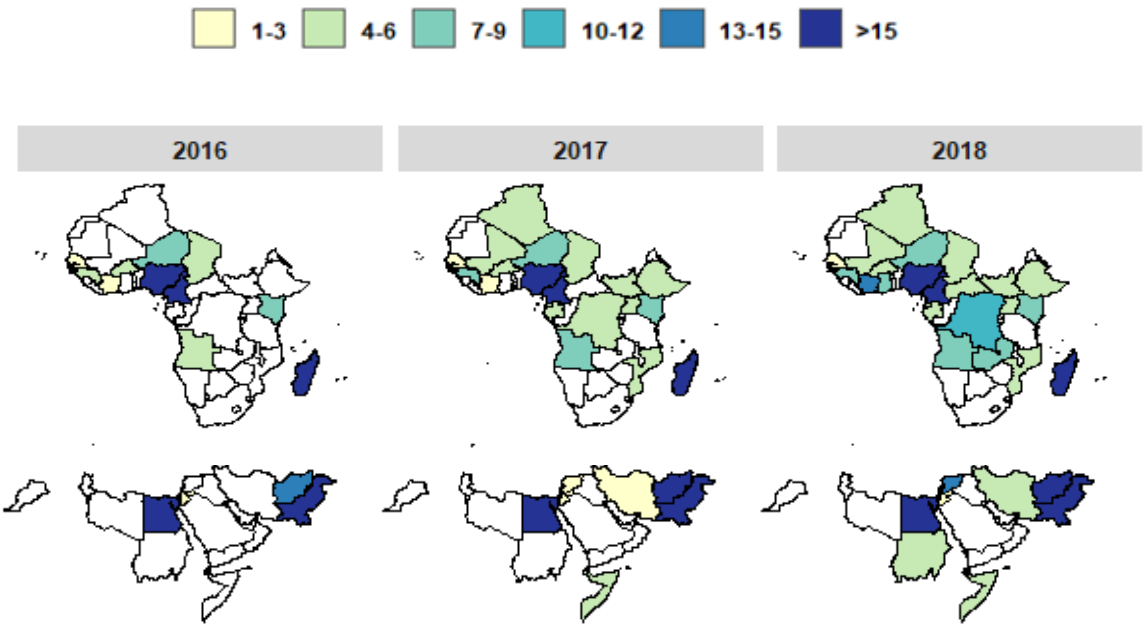
Priority group*	WHO region	Countries
Endemic	African Region	Nigeria
	Eastern Mediterranean Region	Afghanistan, Pakistan
Outbreak**	African Region	**Lake Chad Basin** (Chad, Cameroon, Niger), **Horn of Africa** (Kenya, Ethiopia), Democratic Republic of the Congo
	Eastern Mediterranean Region	**Horn of Africa** (Somalia)
	Western Pacific Region	Papua New Guinea
High-risk	African Region	**West Africa** (Guinea, Sierra Leone, Liberia, Burkina Faso, Mali, Guinea-Bissau), **Central Africa** (Central African Republic, Equatorial Guinea, Burundi), **Horn of Africa** (South Sudan)
	Eastern Mediterranean Region	**Middle East** (Iraq, Jordan, Lebanon, Syria), **Horn of Africa** (Djibouti, Yemen, Sudan), **North Africa** (Libya)

* For the latest priority countries, see the Polio Global Eradication Initiative website at www.polioeradication.org.

** Since the GPSAP was printed, outbreaks were identified in Mozambique and Indonesia in 2018.

Source: WHO.

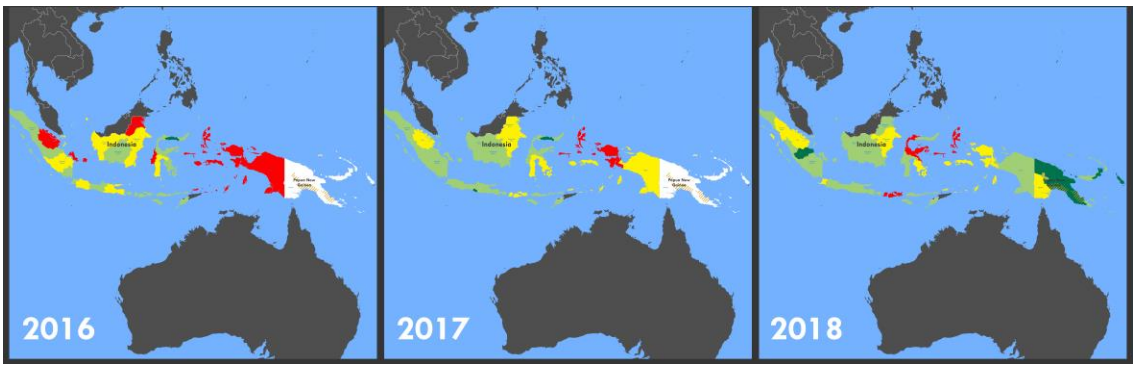
Annex 2. Environmental surveillance expansion, sites per country — African and Eastern Mediterranean Regions, 2016–2018



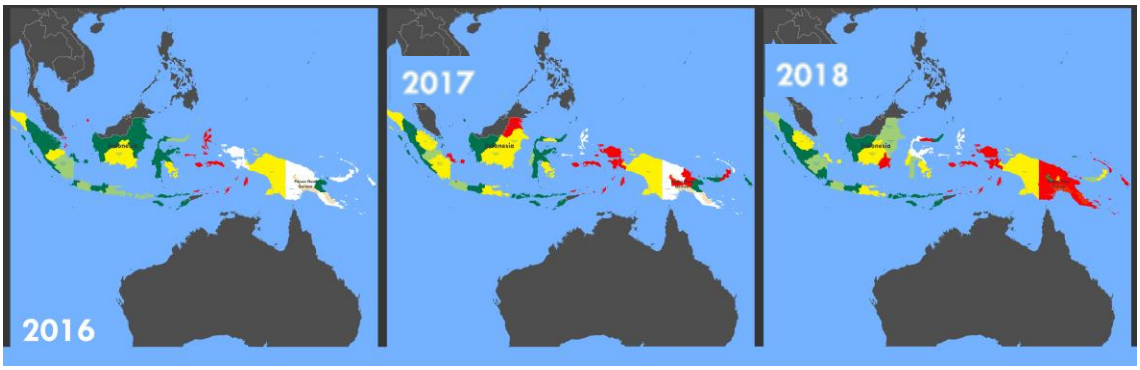
Source: WHO.

Annex 3. Surveillance performance (non-polio acute flaccid paralysis [a] and stool adequacy [b]) among outbreak and high-risk countries – South-East Asia and Western Pacific Regions, 2016–2018

(Annex 3a.)



(Annex 3b.)



Source: WHO.

Annex 4. Reviews of surveillance performance among endemic, outbreak and high-risk countries

Type of review	Eastern Mediterranean Region	African Region
External review of AFP surveillance	Somalia, Sudan, Iraq; Syrian Arab Republic (as part of outbreak response assessments)	Democratic Republic of the Congo; Chad, Cameroon, Central African Republic, Niger (as part of outbreak response assessments)
Internal review of AFP surveillance	Afghanistan (all except the southern region); Somalia, Sudan, Syrian Arab Republic (silent districts)	Ethiopia, Kenya, South Sudan; Cameroon, Central African Republic, Chad, Niger, Nigeria (Lake Chad Coordination)
External review of environmental surveillance	Somalia, Syrian Arab Republic	Ethiopia, Equatorial Guinea, Kenya
Desk review	Somalia, Sudan, Iraq, Yemen	Burundi, Central African Republic, Chad, Democratic Republic of the Congo, Guinea-Bissau, Ethiopia and Kenya

Source: WHO.

Annex 5. Trainings and sensitizations among endemic, outbreak and high-risk countries

Country	Trainings and sensitizations
Democratic Republic of the Congo	(1) Development of a comprehensive surveillance intensification plan from 2017 to 2019 with implementation in the epidemic provinces as highest priority
Kenya	(1) Implementation of a quarterly surveillance review meeting among county and subcounty surveillance officers and health facility AFP focal person in high-risk counties
Libya	(1) AFP and measles surveillance training among 62 surveillance officers (2) Training of 30 paediatricians on AFP case detection (3) Weekly AFP zero reports in EWARN
Pakistan	(1) Training and orientation of 10 275 polio programme staff and community health workers on AFP case detection, stool collection and surveillance (2) Orientation of 87 543 health-care workers, paramedics and doctors on AFP case detection and reporting mechanisms
South Sudan	(1) Organization by Core Group Polio Project South Sudan of a two-day cross-border collaboration meeting in response to the ongoing cVDPV and Ebola virus disease outbreaks in the Democratic Republic of the Congo to enhance preparedness, mitigation and response mechanisms in South Sudan, Uganda and the Democratic Republic of the Congo
Syrian Arab Republic	(1) AFP surveillance training for over 20 expanded programme on immunization staff in newly accessible areas in Raqqa, Deir Ez-Zor, Hama and Homs (2) Training of over 100 nurses and paramedics in university hospitals and the private sector on stool specimen collection (3) Sensitization of approximately 200 health workers, private-sector staff, university staff, nongovernmental organizations and UN partners on outbreak response and surveillance (4) Orientation of more than 300 physicians on AFP surveillance (5) More than 60 supervisory visits to 13 governorates during the first six months of 2018

Annex 6. AFP surveillance performance indicators

Surveillance Indicator *(*Key Indicator)*	Description	Target	Formula	Notes
COMPLETENESS OF REPORTING	Percentage of designated sites reporting AFP data, even in the absence of cases	≥ 80%	Number of sites reporting / number of designated reporting sites for AFP surveillance x 100	For a given time period such as one month, six months, 12 months
TIMELINESS OF REPORTING	Percentage of designated sites reporting AFP data on time, even in the absence of cases	≥ 80%	Number of sites reporting by the deadline / number of designated reporting sites for AFP surveillance x 100	At each level reports should be received on or before the requested date.
SENSITIVITY*	Non-polio AFP (NPAFP) rate	Endemic WHO regions: ≥ 2 NPAFP rate Non-endemic WHO regions: ≥ 1 NPAFP rate Outbreak setting: ≥ 3 NPAFP rate	Number of cases discarded as NPAFP in children < 15 years of age/ number of children aged < 15 years x 100,000 per year	Achieving target NPAFP rate indicates sufficiently sensitive surveillance to detect WPV/ cVDPV cases if poliovirus is circulating.
TIMELINESS OF NOTIFICATION	Percentage of cases reported to public health authorities within a defined time period (typically ≤ 7 days) from onset of paralysis	≥ 80%	Number of cases AFP reported within 7 days of paralysis onset / number of reported AFP cases x 100	

TIMELINESS OF INVESTIGATION	Percentage of cases investigated within 48 hours of notification	≥ 80%	Number of AFP cases investigated within 48 hours of notification / number of AFP cases reported x 100	
ADEQUATE STOOL SPECIMEN COLLECTION	Percentage of AFP cases with two stool specimens collected ≥ 24 hours apart, both within 14 days of paralysis onset, and the arrival of these specimens in good condition at a WHO-accredited laboratory	≥ 80%	Number of AFP cases with two stool specimens collected ≥ 24 hours apart, within 14 days of paralysis onset, and arriving in good condition / number of AFP cases reported x 100	Achieving target stool adequacy percentage indicates ability to detect poliovirus among AFP cases if poliovirus is circulating. Good condition: reverse cold chain maintained and received without leakage or desiccation
TIMELINESS OF STOOL COLLECTION	Percentage of AFP cases with two stool specimens collected within 14 days of paralysis and ≥ 24 hours apart	≥ 80%	Number of AFP cases with two stool specimens collected ≥ 24 hours apart, within 14 days of paralysis onset / number of AFP cases reported x 100	
SPECIMENS IN GOOD CONDITION	Percentage of AFP cases with specimens arriving at a WHO-accredited laboratory in good condition	≥ 80%	Number of AFP cases with two stool specimens arriving in good condition at a WHO-accredited laboratory / number of AFP cases reported x 100	Good condition: reverse cold chain maintained and received without leakage or desiccation
COMPLETENESS OF 60-DAY FOLLOW-UP	Percentage of AFP cases with a follow-up exam for residual paralysis at 60-days after the onset of paralysis	≥ 80%	Number of AFP cases with inadequate specimens that have a 60-day follow-up exam / number of AFP cases with inadequate specimens reported x 100	

TIMELINESS OF STOOL SPECIMEN SHIPMENT	Percentage of specimens arriving at a WHO-accredited laboratory within 3 days of collection	≥ 80%	Number of specimens arriving within 3 days of collection / number of specimens collected x 100	
TIMELINESS OF REPORTING LABORATORY RESULTS	Percentage of stool specimens for which laboratory results are sent to submitting agencies within a defined period	≥ 80%	Number of specimens with results available within a defined period at the submitting agency / number of stool specimens collected x 100	Timely reporting of results: 1. within 14 days of specimen receipt for poliovirus isolation; 2. within 7 days of isolate receipt for intratypic differentiation; and 3. within 7 days of intratypic differentiation for sequencing results

Source. Surveillance standards for vaccine-preventable diseases, second edition. Geneva: World Health Organization; 2018. Licence: CC BY-NC-SA 3.0 IGO.

10 Resources

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every
last
child