# Main objectives of the field guide

This document provides health workers conducting AFP and poliovirus surveillance at all levels of the health system in member states of the African Region with a comprehensive tool to guide and facilitate the implementation of surveillance activities. This regional guideline updates a preceding document and reflects important recent technical and operational developments in AFP and poliovirus surveillance. It will be useful as a reference document, and for training and sensitizing technical and medical field officers involved in polio surveillance.

**Target audience.** The field guide is intended to assist persons directly involved in surveillance for AFP and poliovirus with their day-to-day duties and to help them to clarify and trouble-shoot surveillance- related issues they encounter in the field. The tool will also be very useful for the induction and on-the- job training of any newly recruited public health staff, for whom AFP and poliovirus surveillance is part of their terms of reference. Another target group are data managers working on the collection, analysis and dissemination of immunization and surveillance data, who need to be acquainted with the basic principles and processes of AFP and poliovirus surveillance.

Overall, the guidelines highlight three cross-cutting issues that remain central to the success of the polio eradication programme:

1. the speed of poliovirus detection,
2. the quality of surveillance at the subnational levels, and
3. the need for integrating surveillance for polioviruses with surveillance for other vaccine- preventable diseases (VPDs), while ensuring that the quality of polio surveillance is sustained.

**Main content.** The updated guideline outlines well-established strategies and activities for AFP and poliovirus surveillance which allow countries to attain and maintain a surveillance system sensitive enough to either detect any circulating polioviruses, including wild polioviruses (WPVs), vaccine-derived polioviruses (VDPVs) and Sabin-like (SL) viruses, or to conclude that they remain free of poliovirus circulation.

The document makes use of several recently produced global guidelines and technical documents, including [the 2022-2024 Global Polio Surveillance Action Plan](https://polioeradication.org/wp-content/uploads/2022/05/GPSAP-2022-2024-EN.pdf) (pls also see [Annex 10. Technical](#_bookmark107) [resources for reference](#_bookmark107)) and the updated Global Guidelines for Acute Flaccid Paralysis (AFP) Surveillance1. (pls also see [Annex 5](#_bookmark98))

Main current surveillance-related challenges in the African Region are highlighted and new tools are presented, in particular those intended to enhance surveillance sensitivity and increase the speed of detecting circulating polioviruses. In addition to well-established indicators to assess surveillance quality, the updated guidelines also introduce new indicators, such as those aimed at capturing the timeliness of field activities.

**Chapter summary.** The document consists of 11 self-contained chapters which allow for quick reference to a specific topic of interest without having to go through the whole document. Following an outline of the overall objectives, [Chapter 1](#_bookmark3) provides an introduction to poliomyelitis and an overview of the Polio Eradication Initiative, including of the current status in the African Region, followed by chapters on the principles ([Chapter 2](#_bookmark9)) and main field strategies ([Chapter 3)](#_bookmark13) of AFP surveillance. [Chapter 4](#_bookmark21) provides details on all activities related to AFP case detection, reporting and investigation. It is followed by chapters on monitoring AFP surveillance performance ([Chapter 5](#_bookmark28)), environmental surveillance ([Chapter](#_bookmark38) [6](#_bookmark38)) and the role of the laboratory ([Chapter 7](#_bookmark47)), and on surveillance logistics and support functions ([Chapter 8](#_bookmark58)). [Chapter 9](#_bookmark66) describes specific activities required to enhance surveillance in outbreak settings,

and [Chapter 10](#_bookmark72) provides an overview of the principles of certification of polio-free status and of poliovirus laboratory containment. [Chapter 11](#_bookmark78) outlines the need for all countries of the African Region to further improve the integration AFP and poliovirus surveillance into national VPD and infectious disease surveillance systems.

**More details for important chapters in the Annexes.** In order to maintain the readability of the main text, some more detailed material, such as SOPs, other protocols and bulleted lists, is provided in a series of [Annexes.](#_bookmark82) Notes and links in the respective Chapter refer readers looking for more details on a given subject to these Annexes. Finally, [Annex 10](#_bookmark107) lists relevant reference and resource documents, with hyperlinks for documents which are available on the internet.

All entries in the Table of Content at the beginning of the document are hyperlinked to the respective chapter and section in the document, which will facilitate navigation for readers using the digital version of the document.

# Introduction

## Poliovirus and poliomyelitis

Poliomyelitis is a highly contagious disease caused by a human enterovirus called poliovirus. Poliovirus consists of a ribonucleic acid (RNA) genome enclosed in a protein shell, referred to as a capsid. Each of the three serotypes of wild poliovirus (WPV types 1, 2, and 3), has a slightly different capsid protein. Largely, immunity to one serotype does not confer immunity to the other serotypes.

The virus is most often spread by the fecal-oral route through contact with the feces of an infected person, which occurs mostly in areas with poor water, sanitation and hygiene. It can also spread through droplets from a sneeze or cough (oral-to-oral transmission), though this is less common and occurs mainly in areas with relatively better hygiene and sanitary conditions. Poliovirus enters through the mouth and multiplies in the intestine. Infected individuals shed poliovirus into the environment for several weeks, where rapid person-to-person spread can occur in the community, especially in areas of poor sanitation.

Poliovirus infection (wild or circulating vaccine-derived poliovirus) of persons without immunity can have two main results:

* + - Most poliovirus infections are asymptomatic or cause only a minor illness, with non-specific mild symptoms, and without affecting the central nervous system.
    - Less than 1% of poliovirus infections in non-immune persons result in paralysis by affecting the central nervous system, a life-threatening disease called paralytic poliomyelitis.

Poliomyelitis cannot be cured but can be prevented by vaccination. Two vaccines are available: the live oral poliovirus vaccine (OPV), itself a weakened, 'attenuated' form of poliovirus, which is given by mouth, and the 'killed', inactivated polio vaccine (IPV), which is injected.

Both vaccines have been proven to be safe and efficacious.

However, the success of the polio eradication campaign is largely attributed to the widespread utilization of the cost-effective OPV. The key factor driving this success is that OPV, in contrast to IPV, not only stimulates a humoral immune response, leading to the production of antibodies, but also induces mucosal immunity within the recipient's intestines. As a result, OPV more effectively enhances 'herd' immunity or population-wide protection, when compared to the effects of IPV.

Unfortunately, in very rare circumstances (approximately 1 in 2.7 million doses), the attenuated Sabin virus strains in OPV cause vaccine-associated paralytic poliomyelitis (VAPP) in the vaccine recipient or a non-immune close contact person.

In addition, through prolonged excretion and transmission in under-vaccinated populations, the OPV vaccine virus can, on rare occasions, mutate genetically to a form known as vaccine-derived poliovirus (VDPV). VDPVs can revert to cause paralytic polio and start to circulate, causing polio outbreaks. All three serotypes (see above) of VDPV virus have been found, reflecting that, for many years, the trivalent OPV preparation used for polio eradication campaigns contained attenuated vaccine virus of all three serotypes.

There are three categories of VDPVs: circulating, immunodeficiency-associated and ambiguous VDPVs. VDPVs, and particularly polio outbreaks caused by VDPVs, represent a challenge to polio eradication.

Despite major progress towards eradicating wild poliovirus

globally and in the WHO African Region, which became the fifth WHO Region to be certified wild poliovirus-free in 2020, outbreaks of circulating VDPV, in the African Region particularly due to type 2 VDPV, continue to occur. Response activities to interrupt outbreaks caused by circulating VDPVs have become a major focus of the polio eradication programme in the last mile to eradication.

## Polio eradication

Following the widespread use of poliovirus vaccine in the mid-20th century, the worldwide incidence of poliomyelitis declined rapidly. In view of the near-eradication of wild poliovirus from the WHO Region of the America (AMR) through the use of nationwide OPV vaccination campaigns (wild polio-free certification of AMR in 1994), the World Health Assembly (WHA) adopted the goal of global polio eradication in 1988.

The benefits of the global eradication of polio are at least threefold:

1. **Reduction in morbidity and mortality:** Polio was a leading cause of disability in populations before the vaccine era. With the eradication of WPV types 2 and 3 (WPV2 and WPV3), the incidences of infection caused by these two WPV types have already been reduced to zero, thereby preventing thousands of polio-related deaths and saving millions of children from being crippled for life.
2. **Strengthened health systems:** The polio eradication programme has enhanced the collaboration between the surveillance systems and laboratory networks. It has helped revitalize immunization programs and it contributes to the strengthening of health system planning, management and evaluation.
3. **Economic impact:** It is estimated that US$1.5 billion will be saved per year after the final remaining serotype (WPV1) is eradicated and immunization against polio can be stopped.

Polio can be eradicated because of the following main reasons:

* + Polioviruses reside in the human intestinal system only - there is no animal reservoir;
  + poliovirus survives for only a limited amount of time in the environment; and
  + inexpensive and effective vaccines exist to protect the population and completely prevent the disease.

More than 200 countries and territories have eliminated WPV circulation through time-tested strategies by:

* + attaining high routine immunization coverage (>90%) within the first year of life with at least three (3) doses of polio vaccine;
  + conducting high-quality supplementary immunization activities (SIAs) to stop outbreaks and interrupt the spread of the virus; and
  + implementing a sensitive surveillance system for poliovirus.

The following criteria are applied for the certification of WPV eradication (also see [Chapter 10](#_bookmark72)):

* + no WPV transmission detected from any population source for a period of no less than three (3) years,
  + adequate, 'certification quality' global poliovirus surveillance; and
  + safe and secure containment of all WPVs retained in facilities, such as laboratories and vaccine manufacturing facilities.

Global wild poliovirus-free certification will have to be further sustained by requirements for the containment of all polioviruses used in vaccine manufacturing and remaining in laboratories, and by stopping the use of all live polio vaccines (OPVs) in order to eliminate the risk of emergence of VDPVs.

Since its establishment in 1988, the Global Polio Eradication Initiative (GPEI) has made major progress towards the goal of eradicating wild poliovirus (WPV). Five of six WHO regions have been certified as WPV-free: the Region of the Americas (1994), the Western Pacific Region (2000), the European Region (2002), the South-East Asian Region (2014) and the African Region (2020).

The Global Commission for the Certification of the Eradication of Poliomyelitis (GCC) has certified the global eradication of two of the three poliovirus serotypes: type 2 and type 3, last reported in 1999 and 2012, respectively. At the time of this writing (1st quarter 2023), only WPV type 1 (WPV1) remains, with only two countries of the WHO Eastern Mediterranean Region still classified as endemic for WPV1: Afghanistan and Pakistan.

## Poliovirus surveillance

As the GPEI comes closer to the global goal of WPV eradication, sensitive surveillance allowing to reliably conclude the absence of poliovirus circulation becomes increasingly important. This is particularly true for the WHO African Region, where wild poliovirus-free countries need continued high-quality surveillance to be sure they remain polio-free and that no WPVs are circulating. They also need to be able to detect and respond to possible new outbreaks following virus importations or following emergence of VDPV in a timely manner.

Likewise, cVDPV outbreak-affected countries in the African Region need sensitive surveillance in order to monitor progress towards interrupting the outbreak.

To date, poliovirus surveillance permitting the reliable and timely detection of all types of poliovirus (WPV, VDPV, Sabin-like viruses) is mainly conducted using AFP and environmental surveillance.

1. **Acute flaccid paralysis (AFP) surveillance:** This case-based syndromic surveillance system is used globally and in all 47 member states of the African Region. It seeks to identify all cases of AFP in children aged < 15 yrs and to confirm the presence or absence of poliovirus by testing AFP case stool specimens in WHO-accredited laboratories. AFP surveillance remains one of the cornerstones to guide progress of polio eradication globally and in the African Region (see [Chapters 2,](#_bookmark9) [3,](#_bookmark13) [4](#_bookmark21) and [5)](#_bookmark28).
2. **Environmental surveillance (ES):** AFP surveillance is complemented by environmental surveillance (ES) which systematically tests sewage samples for poliovirus in specific settings. ES is conducted in an increasing number of countries globally; in the WHO African Region, 42 out of 47 member states (89%) use ES, as of mid-2023. Provided that ES is appropriately implemented in suitable locations and implementation is well-supervised, ES data can significantly increase the sensitivity of surveillance to detect polioviruses in order to show that circulation has either continued, or increase the confidence that an area or country is polio-free (see [Chapter 6](#_bookmark38)).
3. **Surveillance for immune-deficiency associated poliovirus (iVDPV surveillance):** A third, specialized surveillance system - iVDPV surveillance - is currently being introduced in some countries of the African Region and globally, targeting the identification of persons with primary immunodeficiencies (PIDs) affecting the antibody-producing B-cell immune system. The immune system of some PID patients cannot clear the intestinal OPV infection, which may lead to excreting vaccine-derived poliovirus ('iVDPV') for prolonged periods2. Such chronic poliovirus excretors will pose a serious problem in the future, once the use of all OPVs has been stopped globally, because they could be the source of new community circulation of poliovirus. (Also see [Annex 2](#_bookmark85)).

All three of the above systems receive critically important support from the African Regional Polio Laboratory Network (see [Chapter 7](#_bookmark47)) as well as from global specialized polio labs. These laboratories perform confirmatory testing of stool and environmental samples, using viral isolation, intratypic differentiation and genomic sequencing procedures.

Epidemiological and virologic data generated by AFP and ES systems are reported to the AFRO Regional Office (see [Chapter 5](#_bookmark28)), where they are analyzed, integrated and forwarded weekly to the WHO global level to allow the ongoing 'real time' assessment of progress towards global eradication.

## Main milestones - poliomyelitis and polio eradication, WHO African Region

At the time of the 1988 WHA resolution to eradicate polio globally, all member states and sub-Regions of the WHO African Region were considered endemic for wild poliovirus. Most countries in the WHO African Region started to implement polio eradication activities from 1998; 10 years after the 1988 WHA resolution. (Please also see [Annex 3. Timeline of poliomyelitis and polio eradication in the African Region](#_bookmark87)).

By 2000, eleven African countries had begun to notify Wild Poliovirus (WPV) through laboratory confirmation of reported AFP cases. Large polio outbreaks were detected in Angola in 1999 (55 cases) and Cape Verde (12 cases). In 2001, only 14 out of 47 AFR member states had achieved certification standard AFP surveillance quality.

With progress of the GPEI in all remaining endemic WHO Regions, the number of polio-endemic countries globally decreased to 10 (Afghanistan, Angola, Egypt, Ethiopia, India, Niger, Nigeria, Pakistan, Somalia and Sudan) in 2001, and to six in 2003 (Afghanistan, Egypt, India, Niger, Nigeria and Pakistan).

In mid-2003, the suspension of vaccination activities in the polio- endemic states in Northern Nigeria due to false rumors about the vaccine led to a resurgence in wild poliovirus transmission in the African region. By end-2004, more than a dozen countries within the African region and beyond had experienced importations of wild poliovirus of Nigerian origin. Wild poliovirus transmission was re-established in five countries: Burkina Faso, Central African Republic, Chad, Cote d’Ivoire and Mali. .

At the end of 2005, massive response vaccination campaigns successfully interrupted transmission in most outbreak-affected countries, leaving one country considered as 'endemic' (Nigeria), two countries with re-established transmission (Chad and Mali) and four countries with ongoing outbreaks due to recent importations.

* Sub-national gaps in AFP surveillance quality continue to be detected in many countries of the Region, especially where surveillance networks may not cover special population groups, or in remote, hard-to-reach areas.
* Considerable delays in specimen or sample shipment to WHO-accredited laboratories still occur within the Region, resulting in late confirmation of polio cases and delaying outbreak response, while allowing the continues spread of poliovirus.
* Rapid staff turnover and attrition and insufficient training, supervision and monitoring affect the quality of field and laboratory surveillance and lead to the loss of skills, competencies and institutional memory.
* In countries that have been polio-free for many years, polio activities are no longer prioritized, and surveillance quality and sensitivity decrease. As a result, poliovirus importations or new emergences of VDPV and subsequent outbreaks are detected only very late, which affects the effectiveness of outbreak response.
* Low routine immunization coverage in some countries and large numbers of susceptible persons leading to persistent viral transmission
* Weak government ownership of surveillance in many countries. There is much dependence on donors due to low levels of domestic funding.
* Insecurity also is a challenge in surveillance, leading to pockets of areas/geographies that are not accessible for surveillance activities, including supervision and case search.

# Principles of AFP surveillance

Acute flaccid paralysis (AFP) surveillance is a case-based surveillance system to detect and report the syndrome of acute flaccid paralysis, in children aged < 15 yrs3, and to test stool specimens from all AFP cases for the presence of poliovirus. AFP surveillance has been developed and standardized by WHO and is in use in the majority of WHO member states (> 150 countries). Similar processes, forms and tools, surveillance quality indicators and reporting systems are used in every country, including in all 47 member states of the WHO African Region.

Countries share uniform data collected with this standardized system with the regional and global level of WHO on a weekly basis. This allows the real-time monitoring of progress towards regional and global eradication goals, as well as the detection and targeting of areas where surveillance quality is weak.

The epidemiology of polio and characteristics of poliomyelitis make it particularly challenging to detect circulating poliovirus:

* Only 1 in 200 wild poliovirus (WPV) infections of persons who are not immune results in paralysis. This means that the great majority of poliovirus infections are “silent” as they do not cause paralysis; however, even persons with asymptomatic infections will excrete virus for several weeks and can transmit the disease to others.
* Even if a poliovirus infection causes paralysis, the clinical presentation of paralytic polio is not unique to polio, but is very similar to the presentation of other neurological diseases, such as Guillain-Barré syndrome (GBS) - the most common non-polio cause of AFP.

To overcome these challenges, two key measures were universally agreed on in the 1990s to improve the sensitivity of the surveillance system:

* adopting the syndrome of AFP as a reportable condition, and
* laboratory testing of AFP case stool specimens in polio laboratories accredited and quality- controlled by the World Health Organization (WHO), to separate AFP cases due to polio from non-polio AFP cases.

## Adopting AFP as a reportable syndrome

When the Global Polio Eradication Initiative (GPEI) was first established, most countries were reporting only clinically confirmed polio cases. Polio was reported as just one of many diseases within disease surveillance systems, often on an annual basis. Given the epidemiology and characteristics of polio, i.e. that clinical polio cases represent only the 'tip of the iceberg' of many silent infections, this made it difficult to detect new cases and respond to outbreaks of polio both swiftly and effectively.

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| **AFP case definition** |
| An AFP case is defined as a child aged under 15 years presenting with sudden onset of floppy paralysis or muscle weakness due to any cause, or any person of any age with paralytic illness if poliomyelitis is suspected by a clinician. |

Also, reporting of 'clinically confirmed polio cases' very likely

included a number of acute paralysis cases that were *not* due to polio, because several other neurological diseases may initially look like polio. For the purpose of eradication, a sensitive surveillance system to detect the poliovirus itself was needed.

Rather than reporting only cases that appeared to be polio clinically, it was decided to establish a system for the timely detection, reporting and investigation of all cases presenting with polio-like paralysis, i.e., cases of AFP, followed by laboratory testing to confirm or rule out polio as a cause. This led to the adoption of acute flaccid paralysis, or ***AFP, as the syndrome*** to be reported.4 Of note, AFP is neither a diagnosis nor a disease, but the lead syndrome (set of associated symptoms) for several neurological diseases, including paralytic poliomyelitis.

Because this sensitive case-based syndromic definition captures not only acute poliomyelitis but also other diseases that present similarly, including GBS, transverse myelitis and traumatic neuritis, each case of AFP case must be investigated with laboratory tests to confirm or rule out polio. ([**Annex 1**](#_bookmark83)**. Poliovirus, poliomyelitis and polio vaccines** offers more details on poliovirus, poliomyelitis, clinical signs and symptoms of polio and polio vaccines).

## Testing all stool specimens in a WHO-accredited polio laboratory

Polioviruses are primarily transmitted from person-to-person through the fecal-oral route in settings with poor sanitation and hygiene and limited access to clean water. Polioviruses replicate (multiply) in the human intestinal system, and are excreted, or shed, intermittently (i.e., not continuously) in the stool of infected individuals. Shedding is most intense up to two weeks after the onset of paralysis, but can continue up to six to eight weeks after onset.

experience in the global eradication programmer confirmed that the most reliable way to test children with AFP is to:

* collect two (2) stool specimens, 24 hours apart, from each AFP case - because shedding in the stool is not continuous;
* collect both specimens as early as possible, but no later than 14 days, after onset of paralysis in the AFP case, and
* use an appropriate carrier box, to

transport the stool specimens to a WHO-accredited polio laboratory within 3 days after specimen collection (for details see [Chapter 4.3](#_bookmark24)).

## Main AFP surveillance quality indicators

One of the most important tasks for countries conducting AFP surveillance is to continuously monitor the quality of surveillance, in order to make sure surveillance data are reliable. The GPEI has established a number of indicators for the purpose of monitoring the sensitivity and performance of AFP surveillance quality. Surveillance results are considered as reliable only if the main surveillance quality indicators reach and surpass agreed-upon thresholds.

Two main quality indicators are used to assess AFP surveillance sensitivity: the 'non-polio AFP rate', and the percentage of reported AFP cases for which 'adequate specimens' were collected and sent to a WHO- accredited laboratory.

For both indicators, thresholds were set to indicate at what level AFP surveillance is considered sufficiently reliable to confirm or rule out poliovirus circulation in an area.

1. *Non-polio AFP rate*. This indicator measures how thoroughly the system detects and reports all cases of AFP in persons aged < 15 years. Experience in many countries has shown that, even in the absence of poliovirus circulation, an AFP system is only sensitive enough to detect poliovirus if at least one (1) case of AFP *not due to polio* (also called: non-polio AFP) per

year is reported for every 100 000

children under 15 years. In the WHO African Region, due to the increased polio risk in many countries, the

expected non-polio AFP rate was increased to at least 2 non-polio AFP cases per 100.000 < 15 year olds annually.

1. *Adequate stool specimen rate (also called 'stool adequacy') -* the percentage of reported AFP cases for which adequate stool specimens (see text box above) are available for testing in a WHO- accredited laboratory; this percentage should be at least 80%.

The reason why this indicator is so important is that the presence or absence of poliovirus as a cause of AFP can only be reliably determined by the laboratory if it receives two 'adequate' specimens, collected and sent to the laboratory in a timely manner.

The expected target non-polio AFP rate of at least 2/100.000 < 15s may be increased in scenarios where AFP surveillance needs to be enhanced, such as when poliovirus is present or suspected. In at-risk countries or those with an ongoing outbreak the expected non-polio AFP rate will be increased to 3/100.000, in order to enhance the reporting of AFP cases. ([See Annex 3.](#_bookmark88) with quality Indicators for AFP surveillance.)

# Strategies for AFP surveillance

Epidemiological surveillance is the ongoing systematic collection, analysis, evaluation and dissemination of health data for the purpose of planning, implementing and evaluating disease control measures. Surveillance for AFP and poliovirus is a critically important component of the global and regional polio eradication effort, because without sensitive surveillance it would not be possible to target vaccination campaigns and to monitor progress towards the eradication goal.

For acute flaccid paralysis surveillance in countries of the WHO African Region, two main strategies are used to detect and report AFP cases: passive, or routine AFP surveillance, and active surveillance for AFP (AS). Overall AFP reporting is supplemented by community-based AFP reporting and other supplemental strategies for the detection and reporting of AFP cases from special population groups and from inaccessible, hard-to-reach areas.

## Passive (routine) AFP surveillance

**What is passive (routine) AFP surveillance?** The regular reporting of AFP cases from reporting sites, such as health facilities and hospitals, is called passive, or routine AFP surveillance. For passive surveillance, unlike in active surveillance (see below), province or district surveillance staff do not actively search for AFP cases but rely on

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| **Defining routine surveillance** |
| Routine surveillance is a process in which reporting sites are expected to a) immediately notify a case of AFP seen in the site, and b) send regular weekly reports to public health authorities, regardless of whether an AFP case has been seen or not (‘zero reporting’). |

thousands of facility surveillance focal points to detect and report AFP cases.

In all countries of the Region, AFP is a notifiable condition; passive (routine) surveillance for AFP in most countries is conducted as part of an existing overall notifiable disease reporting system.

For passive (routine) AFP reporting, surveillance focal points at the reporting site are expected to check in their facility every week whether an AFP case has been seen. Any AFP case detected in the site must be immediately reported, or notified, to public health authorities at the district or province level. However, the focal points are also required to send a weekly report to the district level, whether or not an AFP was found. This is why passive / routine AFP reporting is also referred to as *zero reporting*. Having to submit regular zero reports is an important way to keep reporting sites sensitized about the need to report all AFP cases.

Every week, district level teams send summaries of facility reports to the provincial/regional level, from where they are sent to the national level.

1. **Monitoring of passive (routine) AFP surveillance**. All countries are required to monitor the completeness and timeliness of routine AFP reporting, which allows for the timely detection of gaps in reporting and surveillance quality. The indicators to monitor the completeness and timeliness of routine surveillance for AFP at the district and province / regional level are:
   * the percentage of designated sites submitting weekly reports (including “zero reports”), even in

the absence of cases, for a given time period (*completeness*); and

* + the percentage of designated sites submitting weekly reports (including “zero reports”) on time,

even in the absence of cases, by the agreed weekly deadline (*timeliness*).

Surveillance teams should use these indicators to identify and follow up on priority sites repeatedly failing to submit their weekly report or those reporting late.

Reports on the completeness and timeliness of passive (routine) reporting by districts are included in the annual update reports sent from countries of the African Region to the African Regional Polio Certification Commission (ARCC), which reviews this data as important evidence for the quality of surveillance, and that polio-free status is maintained.

1. **Immediate reporting of any identified AFP case.** AFP is a notifiable condition and AFP cases represent a potential public health emergency, i.e., possibly indicating a new polio outbreak.

Therefore, focal points at priority sites, as well as any other physician, health worker or community informant who identify an AFP case, are required to immediately report the case (i.e., within 24 hours) to a designated public health surveillance team for rapid investigation and stool specimen collection.

The requirement to immediately report is in addition to entering data on the identified AFP case on the weekly notifiable disease reporting form. Routine weekly surveillance reports, including zero reports, at all levels should be regularly reviewed to detect any unreported AFP cases that were included on the weekly report but not immediately notified, and that may have also been missed by the [active surveillance](#_bookmark15) [system.](#_bookmark15)

1. **Challenges with implementing passive (routine) surveillance.** Experience has shown that the following main challenges may be encountered in the implementation of passive (routine) AFP surveillance.
   * **Incomplete weekly reports.** Repeated failure to submit weekly reports from a reporting site may occur when the district or province level team has limited capacity either to follow up with “silent” reporting sites or to conduct training and sensitization activities for all reporting sites. It is important that non-reporting sites should be contacted to find out why they failed In these cases, active surveillance (see below) provides opportunities to strengthen routine surveillance through visits with focal points at important reporting sites.
   * **Declining awareness of AFP reporting.** Declining and insufficient awareness among health providers of the principles of AFP surveillance, i.e., of the importance of reporting AFP as a syndrome and notifiable condition, as opposed to reporting polio as a diagnosis, may lead to missing AFP cases at the reporting site. This may be a particular problem in facilities with high fluctuation of staff.
2. **Confusion between passive and active surveillance** may lead to insufficient engagement of both the formal and informal health sector. Under passive (routine) surveillance, district and provincial surveillance teams rely on AFP cases being reported from the reporting site. However, for active AFP surveillance (see 3.2 below), district and provincial surveillance teams are actively engaged in finding AFP cases by visiting surveillance sites on a regular basis.

The inquiries which a facility focal point should make to check for AFP cases before sending the weekly report has sometimes been considered as 'active surveillance'. However, by definition, only visits and searches by personnel external to the facility constitute *active surveillance*. Another incorrect practice

that has been observed, is that public health staff designated to conduct active surveillance do visit the active surveillance site, but then just collect the weekly zero report, instead of spending time and searching the facility to find unreported AFP cases.

## Active surveillance for AFP

Experience during the early phase of the global eradication programme has shown that passive (routine) surveillance for AFP alone may not be sufficient, and that a combination of passive and well-implemented active surveillance (AS) for AFP is the most effective strategy to assure that AFP surveillance is sensitive enough not to miss ongoing poliovirus transmission.

It is highly recommended that active surveillance is used to complement passive surveillance in all 47 member states of the African Region.

**What is active surveillance (AS)?** For AS, trained public health surveillance staff regularly visit priority reporting sites to search for and investigate any unreported AFP cases. These sites can be within the formal health sector, such as tertiary, secondary and district hospitals, clinics, health centres and rehabilitation centers, or part of the informal health sector, such as community health centers run by nongovernmental organizations (NGOs), premises of traditional and faith healers and bone setters, or traditional birth attendants, patent medicine vendors or pharmacies.

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| **Defining active surveillance** |
| For AS, trained surveillance staff regularly visit all priority surveillance sites (i.e. all priority health facilities and community structures) to search for and investigate any unreported AFP cases. AS visitors ask AFP focal points at the site if they have seen a case of AFP, and review registers, log books and hospital wards at a health facility or reporting site to ensure that no AFP case is missed. These visits are used also for continued sensitization of staff on AFP and other VPD surveillance. |

During the visits, AS staff conduct interviews with health workers and other potential informants, review health facility records (registers, logbooks, medical records), and visit all relevant departments and wards within hospitals. The visits are also used to inform and sensitize health workers and facility staff on polio eradication and AFP surveillance. To be effective, AS visits, particularly at larger hospitals, should be done by well-qualified staff who understand the polio eradication programme and have good interpersonal skills.

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* *Experience has shown that some countries have effectively used AS for AFP as*

*a platform for surveillance for vaccine-preventable diseases (VPDs) or other outbreak-prone diseases.*

* [**Download *Best Practices in Active Surveillance for Polio Eradication***](http://polioeradication.org/wp-content/uploads/2018/12/Best-practices-in-active-surveillance-for-polio-eradication.pdf)*.*

1. **Establishing active surveillance**. Key activities in establishing effective active surveillance for AFP are the following:
   1. Creating a network - selecting and prioritizing AS sites, followed by regular review, reprioritization and possible adjustment of the network later; it is recommended to review the site prioritization every six months
   2. In each site, identifying a person who serves as surveillance 'focal point' and sensitizing health workers and potential informants on polio eradication and AFP surveillance,
   3. Training and building capacity of surveillance staff to conduct AS visits and carry out AFP-related activities;
   4. Ensuring that AS visits follow a structured procedure to ensure that AS visits are effective and no AFP cases are missed.
2. **Active surveillance site selection.** Most sites in an AS network will be facilities in the formal health sector (hospitals, clinics etc.), with some sites also drawn from the informal health system (i.e. NGO clinics in IDP camps, busy traditional healers, TBAs, etc.).

Main factor to consider when selecting facilities or sites to be included in an active surveillance network is *the probability that children aged < 15 yrs with AFP are seen at the facility*. In countries and areas where the population has access to hospitals, large- and medium-sized hospitals, i.e., tertiary and secondary hospitals, particularly those with pediatric and neurology departments, will therefore have priority to be included in the AS network.

The importance of larger hospitals has often been confirmed when countries find that the majority of AFP reports nationally originate from a relatively small number of facilities, namely the large and medium sized (tertiary and secondary) hospitals in the country. The reason for this is that parents and caregivers, when faced with a sudden emergency such as the sudden onset of paralysis in a child, are likely to bypass local health centers and small hospitals and go

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| **Selecting active surveillance sites** |
| Active Surveillance networks include reporting sites from the formal and the informal health sector.  The primary factor to consider in selecting sites for the AS network is the probability that children under 15 years of age with AFP are seen at the facility. |

directly to the largest hospital accessible to them.

Therefore, the primary factor to consider when selecting AS sites should be:

* the probability that children under 15 years of age with AFP are seen at the facility. Additionally, AS sites should also be selected to ensure:
* that the AS network is *demographically and geographically well-distributed and representative of the population in a province or district*; and
* that facilities within the network *represent all sectors of the health system*, from public and private hospitals, to clinics and health centers, to pharmacies and even traditional healers, religious leaders or other local community resources.

Health providers in the informal health sector play an important role, particularly in countries and areas where the population does not have easy access to hospitals, or where families and communities traditionally first seek health care or advice from informal providers. In such areas, informal health providers (traditional medicine practitioners, faith healers etc,) who are likely to be consulted by caretakers of AFP cases need to be identified, sensitized and oriented on AFP surveillance. They also need to receive contact names and telephone numbers of who they should notify.

Overall, it is important to assess and consider the health-seeking behaviour of the population during surveillance site section and prioritization.

1. **Prioritization of active surveillance sites**. Based on the likelihood that they see AFP cases, all facilities and sites selected for the AS network need to be assigned one of four priorities: highest, high, medium, and low priority. This prioritization determines the frequency with which district and provincial surveillance staff will conduct AS visits (see [Table 1](#_bookmark16)). Active surveillance visits are conducted two times per week to highest-, weekly to high priority, twice a month to medium and once a month to low priority sites. The highest priority should be given to those sites that see the most AFP cases.

Highest priority sites are facilities or sites located in IDP, refugee camps or serving communities of IDPs or refugees. High priority sites typically include larger health facilities and hospitals, with large flows of

patients in the target age group. It is also recommended that the other non-priority sites in each district are visited at least once every three months since AFP cases can seek health care anywhere.

###### Table 1: AS sites by priority and frequency of visits

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| **Classification** |  | **Frequency of site visits** |
| **Highest priority sites** | Sites located in IDP or refugee camps, or sites in communities hosting refugees or IDP camps. | Visited twice weekly |
| **High priority sites** | Very large national referral hospitals (in some countries)  All tertiary and secondary public and private hospitals and all hospitals with pediatric departments | Visited weekly |
| **Medium- priority sites** | Medium-sized hospitals, smaller hospitals and large  health centers (in some countries)  Traditional healers renowned for treating paralysis (in certain communities) | Visited every two weeks |
| **Low-priority sites** | Health posts, small health facilities, traditional healers, pharmacies that could see an AFP case | Visited monthly |
| **Not prioritized** | Not part of the AS network, but part of the routine surveillance network | At least one visit every three months |

AFP = acute flaccid paralysis; AS = active surveillance

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*Experience in polio-endemic countries has shown that, provided the prioritization*

*exercise is executed appropriately, the number of sites in the highest and high priority group should be lowest, with more in the medium priority group, and the remainder of sites in the low priority group.*

1. **Updating the Active Surveillance network.** National, provincial and district surveillance teams should review the AS network twice per year and make adjustments, as needed, since the prioritization of a site may change over time. Facilities may have closed, or new facilities have opened. In many countries, the private health sector is growing rapidly, and new facilities may be predominantly in the private sector. Sites should be dropped from or added to the network accordingly.

Adjusting the AS site network is especially important in conflict settings, as conflict and insecurity may disrupt the healthcare system. In such instances, public health surveillance teams need to respond by updating and possibly expanding the AS network in those parts of the country around inaccessible areas and in host communities receiving IDPs or refugees, based

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| **Reviewing and adjusting site network** |
| The AS network must be reviewed and updated twice a year to account for the opening and closing of health facilities, as well as to reflect sociodemographic changes to the population. |

on their health-seeking behavior. Where people no longer have regular access to health facilities, surveillance activities should be expanded to include direct reporting from affected communities by including IDP and refugee camps or NGOs that provide health services (see also [**Community-based**](#_bookmark18)

[**surveillance**](#_bookmark18)and [**Annex 7**](#_bookmark101)). Facilities within those IDP and refugee camps are usually designated as 'very high priority' AS sites.

1. **Site focal points and surveillance officers.** Depending on a country’s size, district, provincial or national surveillance health officers will be responsible for organizing and scheduling regular AS visits to reporting sites in their area.

In each AS site, a suitable AFP surveillance focal point must be identified or designated, if not already in place. While different groups may be considered for this function, depending on the size of the health facility, priority should always be given to a pediatrician, if available.

The AS focal point has several key roles and responsibilities that include to:

* immediately notify an identified AFP case and provide support for the case investigation
* coordinate with public health staff during AS visits; and to
* check facilities and submit weekly routine / zero reports, for formal health facilities.

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| * Shape  Description automatically generated with low confidence | * *Experience has shown that, particularly in larger hospitals such as university hospitals, effective AS requires senior staff, who have experience working with senior clinicians. They can be shadowed by junior staff, who will in turn learn to build rapport with clinicians and eventually conduct AS visits independently.* |

In the informal health sector, such as the premises of traditional healers, private pharmacies, or prominent community members, the focal point by default will be the service provider, whose responsibility will be to notify any new AFP case immediately. These informal establishments are typically not part of the routine surveillance system, hence are not expected to provide weekly 'zero reports'.

1. **Active surveillance visit procedures.** At the district or provincial level, public health surveillance officers should coordinate to plan and conduct AS visits according to the prioritization scheme, and following a AS site visit calendar (see [**Table 1**](#_bookmark16)).

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| **Annex guidance** |
| Surveillance officers should always follow standard procedures to structure AS visits. See [**Annex 5**](#_bookmark98)for an example of an AS visit form to support data collection and monitoring. |

The following are key points and activities surveillance officers should be aware of before and during site / hospital visits to assure that AS is effective:

1. Make sure to take along the current AFP case line listing for the district or health area in which the visited facility is

situated; sometimes AFP cases detected during AS have already been reported previously. Also bring copies of AFP case investigation and laboratory forms, and other documents (i.e. for sensitization, such as the AFP field guide) if required.

1. At the start of the visit, meet with the facility surveillance focal point to ask whether any AFP cases were seen since the last visit, and to provide surveillance and polio eradication updates (or updates on progress in outbreak response, in outbreak settings).
2. Visit all relevant departments and wards and review patient registers.
   * Look for missed or unreported AFP cases since the date of the last visit. Look for “AFP” or associated signs, symptoms, or diagnoses ([Table 2](#_bookmark17) below). Because AFP surveillance targets a syndrome, it is important to review both diagnoses and symptoms listed in registers and logbooks.
   * Highlight any AFP cases (or possible AFP cases) which were found in the register directly in the register (with a colored marker, if possible) and cross-check the line listing of all AFP cases (or possible AFP cases) which were found in the register.
   * Date and sign all patient registers that were reviewed.
3. Follow up on any AFP cases detected during the visit.
   * Compare with the district line listing - if an AFP case was already reported and investigations were done, no further action is needed.
   * If AFP cases are found that were not previously reported, request medical records to search for details. Visit patients in the hospital if still admitted; if discharged, obtain addresses to visit patients at home. If the case is verified as AFP, conduct the AFP case investigation and initiate specimen collection (see **Case investigation and validation** under [**Case activities for AFP**](#_bookmark21)[**surveillance**,](#_bookmark21) as well as [**Annex 4**](#_bookmark100)). In addition, speak to the physician or nursing staff to inquire why the case was not reported yet and sensitize them to report such cases immediately from now on. Conduct follow-up visits to ensure that no additional AFP cases are missed and that all relevant staff has been sensitized.
4. In addition, assess the overall status of polio-related functions during the visit.
   * Take opportunities to sensitize department and ward staff on polio and AFP surveillance.
   * Determine whether and when a training session may be needed, and offer to conduct a session, such as during weekly staff meeting, or after staff turnover.
   * Ensure sufficient supplies and resources are available in the facility, including forms, stool kits, and wall posters, and check on stool sample handling and storage practices. One of the tasks for the (district) surveillance officer conducting AS visits is to bring along an replenish surveillance tools, including case investigation forms, stool collection kits, AFP wall posters etc.
   * Check immunization-related equipment and supplies, such as vaccines (oral polio vaccines [OPVs] and/or inactivated polio vaccine [IPV]) and cold chain storage and carriers.
   * Check how AFP surveillance is coordinated with other VPD surveillance functions, i.e., how well *Integrated Disease Surveillance* is implemented (see [Chapter 11](#_bookmark78) ) . As the integration of AFP surveillance into VPD surveillance progresses, it is important to take advantage of AS visits and search for and collect data on other VPDs or other outbreak-prone diseases.

###### Table 2: Symptoms and diagnoses in registers and logbooks indicating an AFP case

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| **Disease conditions always presenting as AFP** | * Paralytic polio * Guillain-Barré syndrome (GBS) * Transverse myelitis * Traumatic neuritis |
| **Disease conditions which may initially present with AFP** | * Pott’s disease (spinal tuberculosis) * Bacterial or tuberculous meningitis * Encephalitis * Cerebrovascular accidents (stroke) * Hemiplegia |
| **Other signs and history to be considered suspicious, indicating that AFP may have been present initially** | * Frequent falls * Weakness, paresis * Abnormal gait, unable to walk, difficulty in walking * Easy fatigability |

AFP = acute flaccid paralysis; GPS = Guillain-Barré syndrome

1. **Monitoring and supervision of active surveillance**. The completeness and adequacy of AS visits must be monitored at the district, provincial and national level. For a list of indicators used to monitor AS, see [Annex 4. Quality indicators for AFP surveillance.](#_bookmark88)

Monitoring is best accomplished by using a form that is completed by the visiting surveillance officer and submitted after each visit to a supervisor at the provincial level. [**Annex 5 .**](#_bookmark97) **Examples of forms** contains a

sample AS visit report. The form collects key data on all AS visits: the date, time and location, facility visited, and a list of departments visited within large hospitals, as well as whether an undetected AFP case was found during the visit, whether any AFP sensitization or orientation activities were conducted, and whether supplies were provided to the facility (e.g., stool collection kits or posters).

Supervision of AS is important to make sure that surveillance officers conduct effective AS visits. The best way to do this is for supervisors to join the responsible surveillance officer during a visit, observe how the visit is conducted, note any deficiencies and provide feedback and suggestions for improvement at the end of the visit. It is recommended that such supervisory visits should be regular, especially for supervising AS in the highest and high priority facilities. ([also see Chapter 8.5](#_bookmark64)).

* *Monitoring AS visits via mobile data and visualizing the analyzed data can help*

*identify blind spots in the surveillance network and accelerate corrective actions.*

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* *In the African Region, it is highly recommended that all Active Surveillance visits*

*be documented using the eSurv checklist on the Open Data Kit (ODK)*

* *See* [***Monitoring AFP surveillance***](#_bookmark35)*for more innovations in disease surveillance.*

1. **Challenges with implementing active surveillance**. As public health surveillance teams implement AS, several challenges may arise.

**Insufficient resources:** After establishing the reporting network, surveillance teams often report insufficient resources (such as not enough time, qualified staff, or means of transportation) to conduct visits to all AS sites in the network.

* Faced with lack of human or other resources, teams should ensure that at least all highest and high-priority sites are visited regularly, followed by as many medium- and low-priority sites as possible. This should be feasible as a majority of high-priority sites (e.g., large hospitals) are in national or provincial capitals and relatively close to the national or provincial surveillance office. Highest priority sites are generally limited to areas with IDPs or refugees and should be given top priority for visits.
* For facilities that cannot be visited, facility surveillance focal points should at least be contacted by phone or email, OR the remote ACS tool in ODK should be used, in addition to monitoring the passive (routine) reports submitted from these sites.
* Lists of sites and a calendar of visits should be reviewed or re-adjusted regularly until more resources are made available.

**Lack of attention to capital cities:** AFP quality indicators from national capitals and the capital regions of many countries worldwide and in the WHO African Region tend to be surprisingly low. This is opposite to what should be expected, as these areas host large tertiary and secondary care hospitals and are densely populated, with large numbers of expected AFP cases.

In fact, the workload for AFP surveillance staff in capital city areas is often even higher than expected because relatively large numbers of AFP cases from nearby or even distant provinces are referred to or seek care in the large capital city hospitals. Unless additional staff time is allocated for AS in the capital, staff will not be able to cope with the relative work overload, and AFP cases will be missed as a result. This is why it is important to designated a trained surveillance focal point in each site.

Sensitive AFP surveillance, and particularly high-quality active surveillance for AFP, in capital city areas should be given highest priority in every country in the African Region.

* Large hospitals and high-priority tertiary care should be mapped and enrolled as reporting sites, with subsequent ACS visits planned and conducted on a regular and frequent basis.
* Taking into account the large dense populations of capital city areas, and the additional AFP cases coming in from other provinces, sufficient staff time should be allocated for AS visits to all high and medium priority sites in capital city areas.
* AS visits must be conducted by surveillance officers who are trained and experienced in sensitization and who are comfortable with medical personnel; this is particularly important when interacting with senior doctors in large hospitals. These visits should be accompanied by supportive supervision and monitoring for timeliness and completeness.

**Inexperienced staff conducting AS visits:** To successfully use AS visits for continuous sensitization of clinicians and other hospital workers on AFP surveillance concept and practices, public health officers must be trained on establishing rapport with medical staff, including with the chiefs of units, some of whom may still not accept or fully understand syndromic AFP surveillance (see also [Chapter 8.2](#_bookmark60)).

* Country programs should commit to building junior staff capacity through supportive supervision. Good mentoring and training ensure staff are well-qualified and equipped with strong interpersonal communication skills.
* Particular attention should be given to female public health officers who may encounter gender barriers while interacting with medical and hospital administrative staff.

**Lack of access at private hospitals and facilities:** Active surveillance visits can be challenging in private, military or other sector-specific facilities. Surveillance officers should be aware of this and may need support from higher-level officials to negotiate access for regular AS visits, and to be allowed to review log books and medical records. Experience has shown that access for AS staff to some private health sector hospitals must be renegotiated at regular intervals.

**No access to patient records in hospitals with electronic patient data:** surveillance staff may not be able to search patient registers and records in modern hospitals where most patient data is being digitalized. District and provincial surveillance teams should visit these hospitals and discuss alternative ways to review patient registers (i.e. provide a printout with relevant variables of patients seen since the last AS visit).

**Insufficient geographic and demographic coverage or representativeness of AS network:** The AS network may possess geographic or demographic blind spots. Surveillance teams should be vigilant to identify:

* overlooked population groups that live in remote or hard-to-reach areas;
* overlooked mobile populations, such as refugees and IDPs;
* overlooked informal health sector sites, including traditional medicine or faith-based healthcare facilities, or other healthcare sites, such as military or private facilities, patent medicine vendors, pharmacies, traditional birth attendants etc.;
* AS sites not visited for long periods;
* AS sites not updated, thus missing newer facilities or potentially key practitioners; and
* AS sites that have closed down.

The AS network can be kept up to date only through regular reviews and thorough mapping of healthcare sites. It is recommended that sites are updated twice per year in each district, and that this is preferably done in February and July. Special populations and the health-seeking behavior of cases and their caregivers are also need to be taken into consideration when identifying and addressing weaknesses and gaps in the coverage and geographic and demographic representativeness of the active surveillance network.

## Community-based surveillance for AFP

1. **What is community-based surveillance?** Community-based surveillance (CBS) is a surveillance strategy in which trained community members are engaged to report suspected AFP cases to a designated focal person, based on a simple AFP case definition.5

What distinguishes CBS from routine and active surveillance is that case detection occurs outside health facilities and that those performing case

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| Defining community-based surveillance (CBS) |
| CBS is an AFP surveillance strategy that relies on trained community members to identify possible AFP cases in areas and communities with limited access to health facilities. |

detection activities are community members, not health professionals.

CBS is a key method to access hard-to-reach areas and communities that are not reached by the regular AFP surveillance system (see [**Supplemental strategies for special**](#_bookmark19)

[**populations**](#_bookmark19)above). CBS may be particularly useful in 'silent areas' (i.e. areas not reporting any AFP cases) and settings or areas at high risk of undetected poliovirus transmission or at risk of new outbreaks following importation or following emergence of vaccine-derived poliovirus (VDPV).

Settings where CBS can be very useful include:

* + security-compromised areas;
  + mobile populations such as nomads and seasonal workers;
  + special populations that are underserved, such as refugees, IDPs, slum dwellers, ethnic minorities, isolated religious communities or remote populations in hard-to-reach areas; and
  + areas or populations relying largely on traditional medicine, where people are less likely to have access to or seek care at a health facility.

CBS provides a link between communities and the health system through designated focal points – and it may increase community engagement in health care and acceptance of immunization and surveillance activities.

In the African Region, new technologies, such as the smartphone-based AVADAR system (Auto-Visual AFP Detection And Reporting6) were being used successfully in a community-based surveillance approach, in order to rapidly relay reports of suspect AFP cases from remote or access-compromised areas to the district or provincial surveillance team.

While CBS can increase the sensitivity and timeliness of AFP case detection, it can also be resource- intensive and should be used only where health facility-based surveillance cannot be performed or is not functioning well. CBS methods range in resource intensity. Training, sensitization, and supervision are minimum essential activities, and the addition of other activities comes with increased costs. Major cost drivers include: training (initial training and refreshers); supervision; reporting incentives or monthly payment, and the use of digital technology, mobile phones, o r other tools (initial and recurring costs).

When considering CBS, countries should note that this strategy may be more cost-effective if used for multiple diseases rather than a single disease.

5 Rather than the full standard AFP case definition (see *Principles of AFP surveillance*, section 2), a simplified AFP case definition should be used when sensitizing community informants, such as: “Report all children with sudden presence of floppy paralysis or weakness.”

6 Auto Visual AFP Detection and Response (AVADAR) is a community-based digital platform that deals with the collection and distribution of real-time information. AVADAR makes it possible to report suspected cases of paralysis in the field at the central level

1. **Setting up community-based surveillance**. Initiating CBS should be carefully assessed because of its resource-intensive nature. Other sensitization activities or adjustments to the AS network may be more efficient for closing surveillance gaps. Programs are advised to look first at more sustainable, cost- effective solutions.

A needs assessment must be conducted to first determine if CBS should be used. The needs assessment explores key questions that include: How well does the current AFP surveillance system cover or reach special populations or hard-to-reach areas? What are the real issues behind surveillance gaps? Are CBS activities currently operating for other diseases? See [Annex 7. Special population groups](#_bookmark101) for more guiding questions that can inform a CBS needs assessment.

###### Steps to establish CBS include the following activities:

1. Identify key community members, such as local and religious leaders.
2. Sensitize and brief them about polio and AFP (and other VPDs); ask for their advice to select community volunteers.
3. Select and train volunteers on their role in CBS. Engage both male and female community volunteers. Women can facilitate CBS in areas where access to female household heads or members is not customary for men. Similarly, the presence of a female team member can facilitate engaging with and accessing more traditional communities.
4. Link volunteers with a designated focal point and/or surveillance officer who will follow up and verify that the initial case report is an actual ('true') AFP case, investigate and initiate stool collection.

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| Shape  Description automatically generated with low confidence | *In some countries, CBS can be set up for the purpose of AFP surveillance only, while in other countries, CBS is an already-existing network that is fully integrated in the public health system for VPDs and outbreak-prone diseases, of which AFP surveillance is only one part.* |

1. **Monitoring community-based surveillance**. CBS should be carefully monitored, particularly for context-specific challenges such as hard-to-reach populations and inaccessible areas.

Key indicators to monitor CBS include:

* No. of AFP cases reported by CBS compared with AFP cases notified by reporting sites in the specific area
* percent of initial CBS-reported AFP cases verified as “true AFP", out of all initial CBS AFP reports.

Complete indicators are available in the [Global Polio Surveillance Action Plan 2022 to 2024](https://polioeradication.org/wp-content/uploads/2022/05/GPSAP-2022-2024-EN.pdf) .

1. **Challenges with community-based surveillance**. The following are main challenges and issues to look out for when setting up CBS.
   * Implementing and sustaining effective CBS can be resource-intensive, as mentioned above. The resources needed for CBS depend upon the country context and results of the needs assessment for CBS, and on the decisions of the surveillance team.
   * Hard-to-reach areas present unique challenges for ensuring a reliable line of communication between community informants and surveillance officers. To address this, some teams offer mobile phones or dispense petty cash to pay for communication expenses.
   * Low literacy levels within local communities may require more time and effort on the part of the public health staff for adapting AFP surveillance training and sensitization protocols.
   * Partially or fully inaccessible areas can seriously hinder the monitoring and supportive supervision of CBS informants, as well as create problems for conducting AFP case verification and investigation. If this occurs, AFP cases may need to be brought outside inaccessible areas for investigation (as has been necessary previously in parts of Borno state, NE Nigeria).
   * A considerable percentage of reports of “suspected AFP” may not meet the standard AFP case definition and may give a low yield of actual (“true”) AFP cases, which may increase the workload of public health staff through the added time needed for verification and investigation.

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| Shape  Description automatically generated with low confidence | *Volunteers involved in conducting CBS for polio can be also referred to as “a network of informants,” “village polio volunteers” or “informers.” Depending on the country, community volunteers may or may not be remunerated or financially motivated and may or may not be working full time on polio surveillance.* |

## Supplemental polio surveillance strategies for special populations

Certain population groups are underserved or not served at all by formal health systems. They are also likely to be missed by surveillance efforts. While the reasons for these gaps can be varied, one finding is that persistently missed population groups often belong to high-risk mobile populations or reside in hard- to-reach or inaccessible areas, including areas affected by insecurity and conflict.

These special population groups are particularly important for disease control and eradication programs because they have higher susceptibility to infection due to low immunization coverage and are therefore more likely to transmit viruses – and more likely to be missed by surveillance systems.

A GPEI document - "*Guidelines for Implementing Polio Surveillance in Hard-to-Reach Areas and Populations"* details some strategies (of which CBS is one approach) for implementing surveillance among special populations, with a focus on high-risk mobile populations.7

1. **What are special populations?** Several different marginalized population groups are at risk of being underserved or altogether missed by surveillance efforts.

These include:

* + mobile populations, nomads and seasonal migrants such as agricultural, mine, brick kiln or construction workers;
  + refugees and IDPs living in camps and in host communities;
  + populations in settled areas which are underserved by existing health services such as cross- border populations, slum dwellers, ethnic minorities, islanders, fishermen and those living in hard- to-reach areas; and
  + totally inaccessible population groups, such as those in security-compromised and conflict- affected areas.

1. **Identifying and mapping special groups.** By identifying, mapping and profiling unserved or underserved populations, special surveillance strategies can ensure that such populations are covered by polio immunization and surveillance.

The following data and information are critical to better characterize and reach such groups:

7 Global Polio Eradication Initiative (GPEI). Guidelines for Implementing Polio Surveillance in Hard-to-Reach Areas & Populations. Geneva: World Health Organization; 2017 [(https://polioeradication.org/wp-content/uploads/2020/10/Guidelines-](https://polioeradication.org/wp-content/uploads/2020/10/Guidelines-polio-surveillance-H2R-areas.pdf) [polio-surveillance-H2R-areas.pdf](https://polioeradication.org/wp-content/uploads/2020/10/Guidelines-polio-surveillance-H2R-areas.pdf)).

* geographic location and population size for mobile groups: itineraries and routes of migration, timing and possible seasonality of nomadic movement;
* current access to health services and health-seeking behavior (see [Annex 10. Technical resources for](#_bookmark107) [reference](#_bookmark107) - Health-seeking behavior);
* availability of the existing surveillance network (facility- or community-based) to detect AFP cases in this special population;
* identification of service providers who exist in the area but are not yet participating in polio activities (public and private, including NGOs or faith-based organizations);
* availability of options to develop communication activities targeting these special groups;
* means of communication through the availability of network coverage and/or readily available use of cell phones for public health officers and community workers and volunteers; and
* general information, such as language, literacy, community structure in terms of leaders and influencers.

1. **Implementing a mix of surveillance strategies for each special group.** Once special populations have been identified and profiled, surveillance approaches can be specifically tailored to ensure each group is adequately covered by poliovirus surveillance (see Table 3 below). A set or mix of suggested surveillance strategies for each kind of special population is recommended.

The key recommended strategies are:

* + **Enhanced AFP surveillance** with ad hoc AFP case search and systematic contact sampling.

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| **Annex guidance** |
| For surveillance strategies suitable to different kinds of special populations, see [**Annex 7. Special population groups**](#_bookmark101) |

* + - Ad hoc AFP case search in large gatherings of nomads, for example during SIAs and during mobile outreach services, during social ceremonies like child naming ceremonies in Nigeria etc
    - Systematic AFP contact sampling for all inadequate AFP samples, with one sample each from three contacts of an AFP cases with inadequate samples, for example. However, in coordination with surveillance and laboratory teams, this can be expanded to all AFP cases from special populations.
  + **Targeted healthy children sampling** (also referred to as 'community sampling' in AFR) can be conducted in special populations that are at high risk for poliovirus; however, this is not a routine strategy and can only be initiated in coordination with and with the approval of surveillance and laboratory teams at the national and regional levels (for details pls also see Chapter 9 of the [Guidelines for polio surveillance in hard to reach areas](https://polioeradication.org/wp-content/uploads/2020/10/Guidelines-polio-surveillance-H2R-areas.pdf)).
  + **Ad hoc environmental surveillance sampling sites** can enhance surveillance in areas considered at high risk of poliovirus circulation because of an outbreak or the sudden influx of an at-risk population.9 This strategy should only be considered after strengthening AFP surveillance and in

9 Global Polio Eradication Initiative (GPEI). Standard Operating Procedures (SOPs) for Polio Environmental Surveillance Enhancement Following Investigation of a Poliovirus Event or Outbreak. Geneva: World Health Organization; 2020 [(https://polioeradication.org/wp-content/uploads/2021/02/SOPs-for-Polio-ES-enhancement-following-outbreak-](https://polioeradication.org/wp-content/uploads/2021/02/SOPs-for-Polio-ES-enhancement-following-outbreak-20210208.pdf) [20210208.pdf](https://polioeradication.org/wp-content/uploads/2021/02/SOPs-for-Polio-ES-enhancement-following-outbreak-20210208.pdf)).

coordination with the laboratory. (For details pls also see Chapter 11 of the [Guidelines for polio](https://polioeradication.org/wp-content/uploads/2020/10/Guidelines-polio-surveillance-H2R-areas.pdf) [surveillance in hard to reach areas](https://polioeradication.org/wp-content/uploads/2020/10/Guidelines-polio-surveillance-H2R-areas.pdf)).

###### Table 3: Examples of activities by type of special populations

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| **Population type** | **Activity examples** |
| **Populations living in security- compromised areas** | Access mapping and analysis of population dynamics and movements; access negotiation, if needed.  Coordination with armed forces or groups and relevant partners.  Review of surveillance network and establishment of CBS as appropriate, including identifying and training appropriate focal points.  Enhanced surveillance in parts of the country bordering inaccessible areas and wherever IDPs come out of inaccessible areas and are received (e.g., adding to reporting sites based on health- seeking behavior, identification and training of local informants). |
| **Nomadic populations** | Mapping and profiling of nomadic groups in coordination with nomad leaders; AFP focal points designated for each nomad group.  Determining itineraries and migration pathways; mapping healthcare facilities and providers, as well as veterinary services, along the route.  AFP sensitization among providers and in public places along migration pathways (i.e., in markets, at watering points and camps frequented by nomads); study of nomads’ health-seeking behavior.  Regular contact with AFP focal points established and maintained.  A similar approach should be used for other mobile population groups, as appropriate: seasonal migrants; mine, brick kiln and construction workers; etc. |
| **Refugees and IDPs in camps** | Camp AFP focal point identified, designated and included in the AS network. Profile assessed of new arrivals: origin, immunization status, etc.  Active AFP case search.  Permanent vaccination and surveillance team installed. |
| **Refugees and informal IDPs in host communities and outside camps** | Key informants identified from the community and included in AS network (see **Community- based surveillance**).  Tracking of IDPs and refugees in the community via special “tracker teams” to support  understanding their health-seeking behavior.  AS network adjusted to include providers serving refugees and IDPs. |
| **Cross-border groups** | Mapping of official and informal border crossings, villages and settlements, special groups, gathering places and seasonal movements; surveillance networks installed on both sides of the border.  Averages estimated for numbers of population moving and migrating across borders.  Regular contact between AFP surveillance officers on both side of the border to ensure sharing of data, cross notification, joint investigation and tracking of mobile groups.  Organizations working at border entry and exit points identified (e.g., immigration, port health services and police); orientation and sensitization on polio and AFP surveillance provided to healthcare workers on both sides. |
| **Communities in urban slums** | Profile of communities and their origin.  Health-seeking behavior studied, with adjustments to AS network. Active AFP case search conducted.  Evaluation of any need to add environmental surveillance (ES) sites. |

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| **Other hard-to- reach communities** | Mapping and profile of special populations who may live in remote areas such as islanders and highlanders, or ethnic minorities who may not access the same health facilities as the broader population.  Identification of and regular contact with local key informants.  Study health-seeking behavior of these communities and adjust the network. |

AFP = acute flaccid paralysis; AS = active surveillance; CBS = community-based surveillance; IDP = internally displaced population

The decision to develop, implement and possibly modify any of these strategies should be discussed by all stakeholders involved at the local, national, and regional levels, including national or regional laboratories.

1. **Challenges with supplemental strategies for special populations.** Challenges to anticipate when implementing poliovirus surveillance in special groups are similar to those listed for CBS. See also [**Annex**](#_bookmark101)

###### [7. Special population groups.](#_bookmark101).

# From AFP case detection to final AFP case classification

The main goal of surveillance for AFP is to reliably detect polioviruses wherever they may still circulate, and to target vaccination activities so that transmission can be interrupted.

Particularly for countries and areas considered as free of polio, the detection or emergence of poliovirus is a public health emergency that should trigger effective outbreak response activities as rapidly as possible after lab confirmation of poliovirus. Any delays in detecting virus or initiating response activities allows further spread of the virus and makes it more difficult to interrupt transmission.

As a result, timely coordination is required between field and laboratory surveillance for all required activities following the detection of an AFP case – from onset of paralysis in a patient, to reporting and investigating the case, collecting and testing of stool specimens, to final AFP case classification (pls see Figure 1). Every stage of the process depicted in Fig. 1 should be targeted for time-saving interventions, as timeliness will be closely monitored.

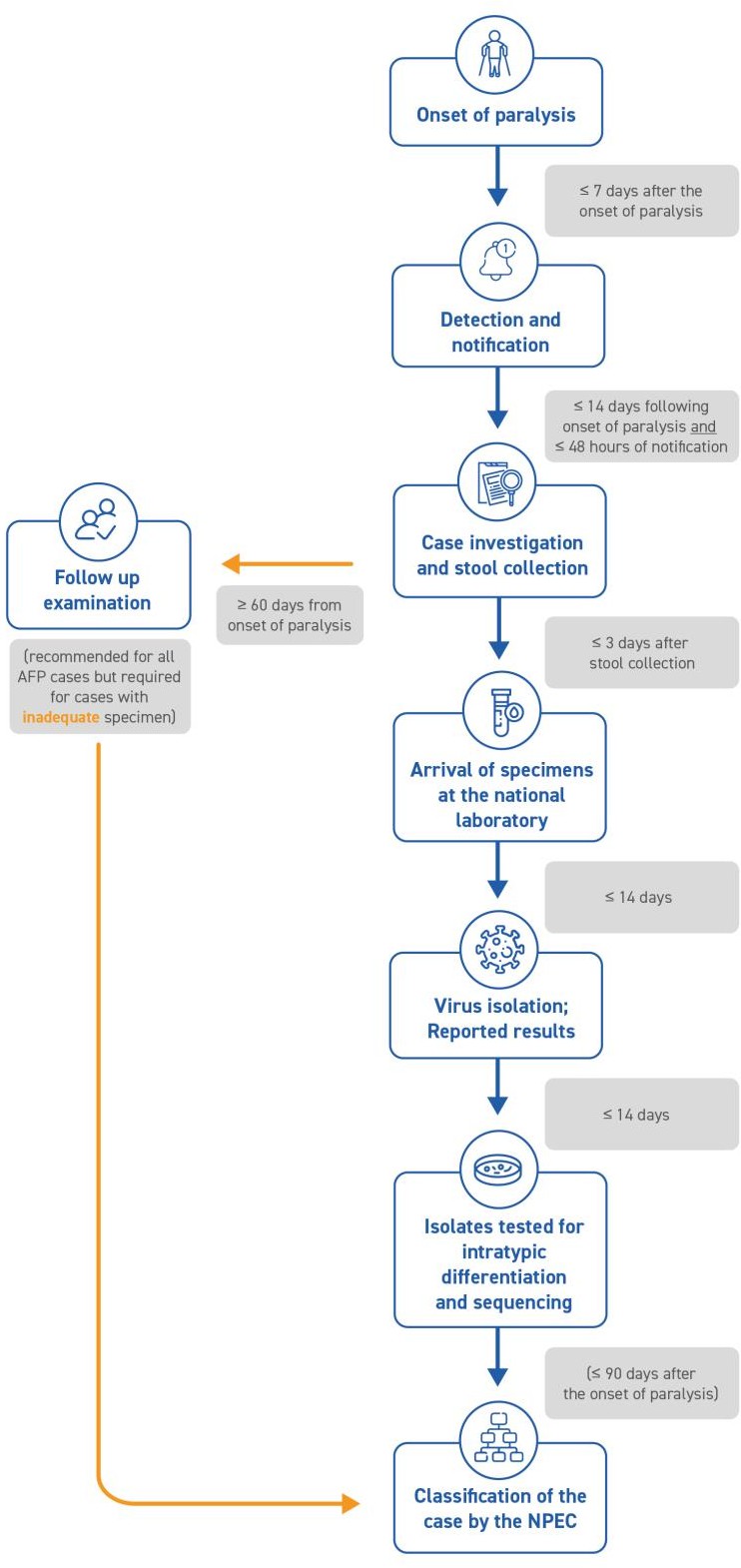
Recent [guidance on polio surveillance from](https://apps.who.int/iris/bitstream/handle/10665/345967/9789240031937-eng.pdf) [the GPEI](https://apps.who.int/iris/bitstream/handle/10665/345967/9789240031937-eng.pdf) has strongly focused on improving the timeliness of outbreak detection and response (see [Annex 4. Quality indicators for](#_bookmark88) [AFP surveillance](#_bookmark88)).

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| **Timeliness of PV detection: certification standard unchanged** |
| For certification purposes, in all countries, the definitions and thresholds for stool specimen collection and adequacy will remain unchanged:  - stool adequacy target of at least 80% AFP cases with 2 specimens collected within 14 days of paralysis onset, reaching the lab in good condition, within 3 days of collection |

For certification purposes, in all countries, the definitions and thresholds for stool specimen collection and adequacy will remain unchanged (i.e. stool adequacy target of at least 80% AFP cases with 2 specimens collected , 1st and 2nd stool separated by an

interval of at least 24 hrs and all the 2 stools within 14 days of paralysis onset and received in good condition in WHO accredited laboratory).

Activities to be conducted at the country, regional, and global levels have been identified to help meet these new timeliness targets in priority countries (also see [Table 19: Delays in detection and possible](#_bookmark106) [mitigation measures](#_bookmark106)) .



*Figure 1: Process of AFP surveillance, with required intervals and timelines*

## Case detection and notification

A physician, health worker, community informant or volunteer who identifies an AFP case must report, or notify, the case **immediately** to the public health surveillance team at the district or provincial level. Notification is best to take place **before seven (7) days** after the onset of paralysis.

There are two possible reasons why AFP cases may be detected and notified late. First, parents or caretakers of the AFP case may be late in consulting a health provider, whether this is in the informal or formal health system. However, experience in polio eradication has shown that this is very rare; acute paralysis in a child is quite frightening to the family, who will usually seek help as soon as the problem is seen.

The most common reason for delays in detection and notification is that one or more health providers have been consulted and have actually seen the AFP case, but failed to recognize and notify the case. This is why the most important way to assure AFP cases are rapidly detected and reported is to set up and maintain a dynamic and wide-reaching AFP surveillance reporting network. As many health workers and providers in both the formal and informal sector, as well as community informants and volunteers, should have good awareness of the AFP concept and reporting requirements.

Whenever AFP cases are notified beyond 7 days of paralysis onset, it is important for surveillance teams to investigate if the AFP case has already been seen, but not reported, earlier by one or more health providers or community informants. This health-seeking history of AFP cases that were reported late should be documented in case investigation forms. Providers or informants who saw the AFP case but failed to report should be contacted and sensitized on AFP surveillance, to prevent this from happening again.

## AFP case verification and investigation

Once an AFP case is notified, a trained, designated AFP focal point or surveillance officer, within 48 hrs, should first verify that the case is actually AFP (i.e. that the case conforms to the AFP case definition), and then conduct and document a thorough case investigation, using the national AFP case investigation form.

To support case verification and investigation, all supplies and materials should be prepared in advance to allow quick deployment of the investigation team. This includes case investigation forms (CIFs), laboratory request forms, stool specimen collection kits and stool carriers.

To minimize the risk of missing key information that may explain delays in detection, CIFs capture the social profile of cases and their community, as well as health-seeking behavior and gender-related information. (See [**Annex 5. Examples of forms**](#_bookmark97).)

1. **AFP case verification.** Before starting the investigation, the AFP focal point or surveillance officer must verify whether the case meets the AFP case definition. An AFP case is defined as:

*"A child younger than 15 years of age, presenting with sudden onset of floppy paralysis or muscle weakness due to any cause, or any person of any age with paralytic illness if poliomyelitis is suspected by a clinician*."

The person tasked with AFP case verification and investigation should do the following:

* + carry out the full case investigation, using the national Case Investigation Form (CIF), if the case meets the case definition;
  + stop the investigation, if the case **clearly does not meet the case definition**, and record the case as ‘not an AFP’ on the CIF. The only reasons for considering the case as 'not AFP' include age > 15 yrs, onset of paralysis not recent (i.e. onset > 6 months ago, or congenital problem), spastic paralysis (not flaccid), or recent trauma. The reasons for which the case was considered ‘not an

AFP’ should be clearly documented. A list of these initially reported cases verified not to be AFP should be kept separately.

* + In case a clinician suspects paralytic polio in a person older then 15 year of age, the district (and/or province and national level) surveillance team should be informed, to alert the polio lab that specimens from an older person will be received and tested.

However, whenever there is any doubt about whether or not AFP is present, cases should be rather included as AFP (with investigation and stool collection) than excluded. Therefore, investigators should:

* + still regard the case as AFP, even if in doubt about whether the observed weakness meets the AFP case definition - for example, a severely dehydrated infant showing general muscle hypotonia, or a young child suffering from acute protein-energy malnutrition); in such cases, a full investigation should be conducted and stool specimens collected;
  + still conduct an investigation, even if the case has died in the meantime. The CIF must be filled out with the case history (date of paralysis onset; travel history of the case; history of health seeking; household members and visitors) and AFP contact specimens (see below) collected. Such cases will be sent to the NPEC for classification.

1. **AFP case investigation**. For all cases meeting the case definition (all cases verified as AFP, as per previous paragraph) the surveillance officer proceeds to the full investigation by performing the following steps and documenting these on the national CIF.

Invite the attending physician or health worker who reported the case to join in the case investigation.

1. Ask about the **working (or 'provisional') diagnosis** currently being considered, if the case was seen by a physician, and document this. For history-taking and clinical examination, signs and symptoms to look out for are *asymmetric flaccid paralysis, fever at onset, rapid progression of paralysis, without impaired sensory nerve function*.
2. Establish and document on the CIF the **history of the illness** (i.e. timeline and type and severity of symptoms), also including the travel history (recent travel to one or more locations away from home) and if parents or caregivers had consulted one or more other health providers for this illness (for details, see [**Annex**](#_bookmark98) **6**).
3. Conduct a **physical examination.** Note that the objective of the clinical examination in the AFP case investigation is *not* to establish an exact medical-neurological diagnosis. Instead, it should be *established whether or not the patient currently shows any degree of paralysis or paresis, consistent with AFP; this is regardless of the current provisional medical diagnosis* (for details, see [**Annex**](#_bookmark98) **6**).
4. Begin to organize the collection of two stool specimens.
5. **Assigning an EPID number**. A unique epidemiologic identification number (EPID #) must be assigned to each AFP case. This number should appear on all documents and forms related to this case, including on documents and tools with info on the investigation, stool specimen collection and laboratory testing results, 60-day follow-up and final classification. Consistent use of the EPID number is compulsory for each AFP case, because this is the only way in which all forms, documents and lab results pertaining to one AFP case can be reliably linked.

The EPID number (see Figures 2 and 3 below) contains information on the residence of the case, using 3- digit codes for country, province and district, on the year of onset of paralysis and also lists a 'running number' for each case within the district of residence (i.e. is it the first, second, or subsequent AFP case

for this year in the district). In smaller countries, the last three digits may represent a 'running number' at the national level, especially if EPID numbers are given at the national level.

Depending on the country context, it is best if the EPID number can be assigned at the time of case investigation, so that it can be used immediately to link the case investigation form (CIF) and the laboratory request form, which accompanies the specimens to the lab. Depending on the country, the assignment of EPID numbers can be coordinated at the district, provincial or the national level.

The EPID number is a 14-character string that consists of the following codes (**Figs. 2** and **3**)

* 1st to 3rd characters specify the country code in letters
* 4th to 6th characters specify the first administrative level (usually province) in letters.
* 7th to 9th characters specify the second administrative level (usually district) in letters.
* 10th to 11th characters specify the year of paralysis onset.
* 12th to 14th characters represent the 3-digit number of the case (using a chronological order)



*Figure 2: Nomenclature for EPID number*

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*Figure 3: Components of the EPID number*

1. **International and national cross-notification.** If the onset of paralysis occurred in a country other than where the AFP case was detected, the AFP case will be assigned to the location in the other country where the paralysis began, and where, for polio cases, the AFP case was likely infected. All parties should be informed, including field, data and laboratory surveillance teams. International cross-notification is facilitated by the WHO regional office. National cross-notification, such as between two different provinces, is usually coordinated at the national level, according to national guidelines. The EPID number assigned to the case may also need to be modified accordingly, especially after a detailed field investigation has been completed.
2. **AFP case validation.** For a subset of AFP cases (around 50% or more, depending on the country surveillance guidelines), the accuracy of collected data should be 'validated' by someone other than the person who conducted the initial case investigation. AFP cases for validation should either be selected at random or based on country-specific criteria. Validation is ideally conducted within 14 days of the original case investigation by senior surveillance staff, typically by secondary and tertiary supervisors, interviewing the case and parents or caregivers.

The focus of case validation should be on cross-checking critical data: date of onset, place of onset, areas visited prior to onset, stool collection dates/processes, vaccine doses received through routine immunization (RI) and supplementary immunization activities (SIAs), health-seeking history - i.e. were one or more health providers consulted before the case was detected and reported, and collection of appropriate contact specimens. Based on the findings of the validation exercise, AFP surveillance data should be updated and corrected, if necessary. Any discrepancies of data between the initially recorded investigation and the validation should be systematically recorded.

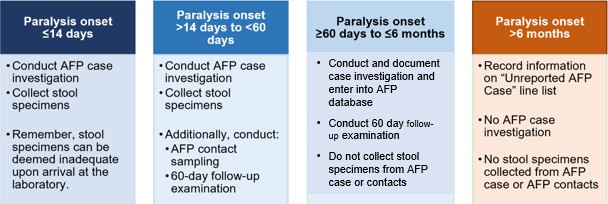
## Stool collection and transport to the laboratory

To optimize isolation of poliovirus in a WHO-accredited polio laboratory, two stool specimens must be collected as soon as possible, preferably within 14 days and no later than 60 days after the onset of paralysis (see ).

Please note that in priority countries, as per Global Polio Surveillance Action Plan 2022-2024, both collection of 2 specimens (max. 11 days) and transport to the lab (3 days) should be accomplished within 14 days.

In AFP cases caused by poliovirus, the probability that poliovirus is actually isolated in the lab are greatest when the two specimens:

* are collected as soon as possible after onset of paralysis (the first specimen should therefore be collected at the time of the investigation or as soon as possible thereafter);
* are collected within 14 days and no later than 60 days of paralysis onset;
* are collected with an interval of at least 24 hrs; and
* arrive at a WHO-accredited laboratory within three (3) days of collection in 'good condition'.



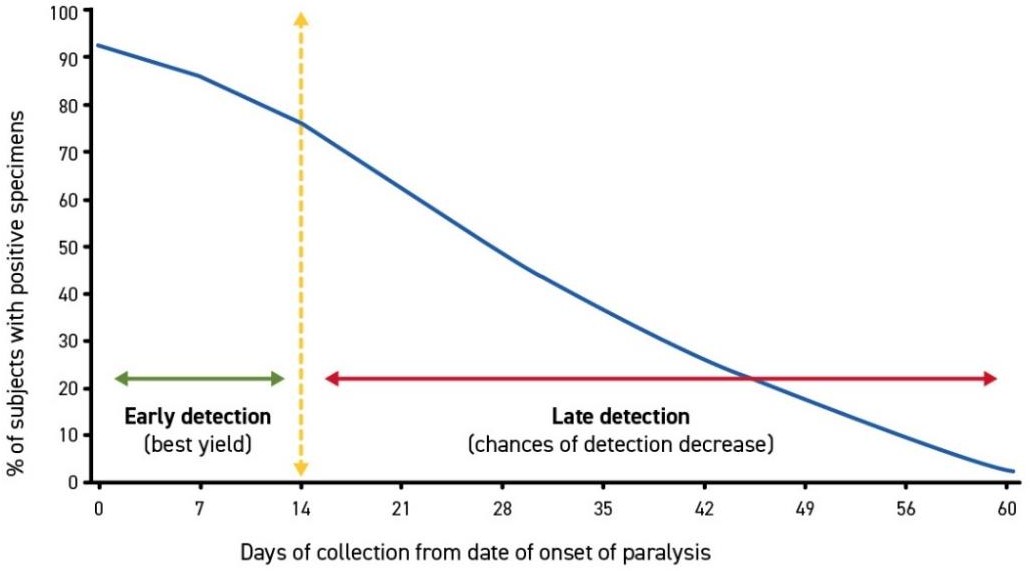
*Figure 4: Stool collection relative to date of onset of paralysis*

Persons infected with poliovirus do not excrete virus continuously, i.e., excretion is intermittent. Therefore, the chance of detecting virus in an infected person increases if not one but two specimens are collected, at least 24 hours apart.

Virus shedding is most intense during the first two weeks after paralysis onset, hence the need to collect the two specimens as soon as possible - best within 14 days of onset. Stool specimens should still be collected *after* two weeks, but *no later than 60 days* after paralysis onset (see Figure 4 above) For AFP cases detected very late, i.e. beyond 60 days past paralysis onset and up until six months after onset, no stool specimens should be collected but a CIF should still be completed and entered into the AFP database.

Stool specimens should ideally be collected at a health facility by trained personnel. If specimens cannot be collected at a health facility and must be collected by a caregiver at the home of the case, a sample

collection and transport kit with frozen ice packs should be left with the caregivers. Ensure the instructions are clearly understood, using simple language if needed, with contact information in case of questions or problems arise. Make an appointment to change melted ice packs and collect both specimens.



*Source:* Adapted from Alexander JP, Gary HE, Pallansch MA, Duration of Poliovirus Excretion and Its Implications for Acute Flaccid Paralysis Surveillance: A Review of Literature, J Infect Dis 175(1):S175-82;1997 ([**https://doi.org/10.1093/infdis/175.Supplement\_1.S176**](https://doi.org/10.1093/infdis/175.Supplement_1.S176)).

*Figure 5: Probability of excreting poliovirus over time, from date of onset of paralysis*

[**Annex 5 - 'AFP case investigation'**](#_bookmark98)provides a standardized, step-by-step procedure for stool specimen collection, including a list of materials and supplies.

1. **Adequate and inadequate stool specimens.** One of the two key AFP surveillance quality indicators is the 'adequacy of stool specimens'; for at least 80% of AFP cases, adequate specimens should be available, to maximize the chance that poliovirus can be isolated and confirmed in the laboratory. Low specimen adequacy, or having more than 20% of AFP cases with inadequate specimens in an area, points to gaps in surveillance quality and may mean that virus transmission is missed.

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| **Adequate stool specimens** |
| * Two (2) stool specimens. * Collected at a minimum 24 hours apart from each other’s collection. * Collected within 14 days of the onset of paralysis. * Received at a WHO-accredited laboratory in good condition   (at least 8 grams, reverse cold chain maintained from collection to arrival at laboratory, with no evidence of desiccation or spillage) and with adequate documentation. |

AFP stool specimens are considered as 'adequate' if *two specimens are collected at least 24 hrs apart, within 14 days of paralysis onset, and received in a WHO-accredited laboratory in good condition, and with required documentation* (see text box).

In view of this definition, specimens are considered as **inadequate** for the following reasons:

* + Delays in specimen collection - one or both specimens are collected after 14 days of onset of paralysis in the AFP case; this can be due to late detection and reporting of the AFP case and to late investigation of the AFP case;
  + No specimen or only one specimen reaches the lab; reasons for this include:

- the AFP case dies or cannot be found (is 'lost to follow-up') before specimen collection, or specimens were collected but are lost during transport to the lab, or if the team failed to collect a second specimen;

* + **Specimens are not in 'good' condition** on arrival in the laboratory (see text box above):
* improper collection procedure or use of inadequate transport box, leading to spillage or desiccation of specimens during transport, or amount of stool collected is too low;
* temperature of > 8 degrees C in transport box on arrival in the laboratory, caused by poorly maintained 'reverse cold chain'.

1. **Storing and transporting stool specimens.** At all times after collection, specimens should be stored and transported maintaining a temperature between 4° and 8° C from the moment of collection until arrival at the laboratory - a system referred to as the 'reverse cold chain' (in comparison to the 'cold chain' used to transport vaccines from central to peripheral level).

In many countries, WHO and Ministries of Health (MOH) have contracts with commercial courier companies to provide ground or air transport services to facilitate specimen transport. Based on established indicators, transport time from collection of the second stool specimen to arrival in the WHO- accredited laboratory should not exceed three (3) days, irrespective of whether the laboratory is located within or outside of the country. Stool specimens should arrive at the laboratory in *good condition* (definition see above), including complete documentation (CIF and laboratory request form).

1. **Maintaining the specimen reverse cold chain'.** National polio programs must assure that the 'reverse cold chain' for safe storage and transport of specimens remains intact. Any interruption of the reverse cold chain, i.e. exposure of specimens to higher temperatures, may inactivate polioviruses in the specimens and decrease the ability of the laboratory to isolate the poliovirus**.** If it is anticipated that specimen transport duration will be > 72 hrs between collection of second stool and reaching the lab, provisions should be made to exchange cold packs, and/or assure intermediate cold storage of the specimens.

## Collection of AFP contact specimens

Specimens collected from AFP cases which, for the reasons explained above, are considered to be 'inadequate', no longer allow the laboratory to produce reliable test results. As a consequence, poliovirus may be missed in specimens from poliovirus-infected AFP cases.

This is why the GPEI recommends that, for all AFP cases with inadequate specimens, stool specimens should be collected from direct contact persons of the AFP case. If polio caused the paralysis in the AFP case, virus is likely to circulate in the family and among close contacts of the case. Specimen collection from AFP contacts can therefore increase the chance to detect virus circulation; if any of the direct contacts is virus-positive, the AFP case will be confirmed as a polio case (see [**Annex 7 - contact sampling**](#_bookmark103)).

If the initial AFP case investigation is conducted late, and it is clear that two stool specimens cannot be collected in a timely manner (within 14 or 11 days of onset), AFP contact sampling should be conducted during the initial AFP investigation - ideally, within 7 days of AFP case notification. AFP contact sampling can still be done up to 60 days after paralysis onset, although it must be noted that the probability of detecting virus rapidly decreases with time.

To increase the sensitivity of poliovirus detection, AFP contact sampling can also be performed either as a part of regular AFP surveillance activities or as part of outbreak response activities. However, any decision to expand AFP contact sampling must be made in close consultation between regional and national polio teams and the polio laboratory to ensure that there is a sufficient reason justifying the additional sampling, and that the laboratory can accommodate the increase in workload.

AFP contact sampling should **not be done** in situations when the AFP case has already been confirmed as WPV or VDPV, or when the onset of paralysis of the AFP case occurred more than 60 days earlier, because in these situations contact sampling will not provide new or additional programmatically useful information.

1. **How to conduct AFP contact sampling**. AFP contact sampling should be done following a standardized procedure:
   * Identify potential contacts. Give priority to younger children (under five years of age) who are in frequent, direct contact with the AFP case. Include siblings, household members or playmates. If the AFP case stayed in other locations one week prior to and/or two weeks after paralysis onset, then identify additional contacts at these locations.
   * Explain the purpose of collecting samples to parents or guardians of the selected contact.
   * Collect one stool sample each from three separate contacts.
   * Follow AFP surveillance protocols for collection, storage, and transport of stool specimens (for details, see [**Annex 5**](#_bookmark98)).
   * Fill out a separate laboratory request form for each contact.

Each contact specimen should be labelled clearly as a contact of the AFP case, using the EPID number of the AFP case with an added contact indicator (“C”) and a number from 1 to 3 (...C1, ....C2, C3). Please

also see [Annex 7.](#_bookmark103)

1. **How to interpret and use results from AFP contact sampling.** The following explains how laboratory results from AFP contact specimens should be interpreted and used.
2. If neither WPV nor VDPV were found in specimens from the AFP index case, the *isolation of WPV or VDPV from a healthy contact confirms the AFP case as a WPV or VDPV case*, even if the AFP case had adequate stool specimens.
3. If the AFP case was WPV- or VDPV-positive, the isolation of WPV or VDPV from a contact still represents information that is valuable for the program. However, the virus-positive community samples of AFP cases are **not** classified as confirmed poliovirus cases because they do not meet the case definition, which requires the presence of AFP. Such lab results are included as “others” or “other human source” in the count of poliovirus isolates.

## 60-day follow-up investigation

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| **For which AFP cases is a 60-day follow-up exam required?** |
| In the WHO African Region, a follow-up exam is required for the following:   * AFP cases without any specimen collection; * AFP cases with with inadequate specimens; and * AFP cases with isolation of vaccine-type (Sabin- type, nOPV-type) poliovirus. |

A typical feature of paralytic poliomyelitis is that a majority of cases will not fully recover, but suffer permanent neurological sequelae, or 'residual paralysis'. A neurological examination of AFP cases at least 60 days after onset of paralysis can give a strong indication for whether or not polio was the cause of AFP. This is why, before the era of laboratory confirmation, all AFP cases had to receive such a '60-day follow' examination.

###### Which AFP cases need a 60-day follow-up

**examination?** For AFP cases with adequate specimens, results from a WHO-accredited laboratory provide a very sensitive test to distinguish AFP due to polio from non-polio AFP. For these cases, the 60- day follow-up result is not needed.

In the WHO African Region, **only AFP cases with no or inadequate specimens must have a 60-day follow-up exam**. (In the absence of reliable lab results due to the inadequacy of the AFP case, the 60- day follow-up result will give some clue for such patients as to whether polio was the cause of AFP).

The National Polio Expert Review Committee (NPEC), responsible for AFP case classification, will closely review all cases, and particularly those with inadequate specimens and residual paralysis at 60 days, to decide if such a case can still be discarded as non-polio AFP, or if the case should be classified as 'polio- compatible' (see also Figure 9 and [section on AFP case classification](#_bookmark27) below).

1. **How to conduct a 60-day follow-up examination**. The result of the 60-day follow-up examination depends considerably on the experience and clinical skills of the person conducting the exam. This examination should ideally be conducted by a pediatrician experienced in examining children. Well- trained pediatricians will detect even small degrees of residual weakness which less trained health workers may not be able to find. It is also preferred to have it done by the physician/officer who initially examined the case. Where no pediatricians are available, senior surveillance officers can also be trained to conduct the 60-day follow-up exams.

A 60-day follow-up examination is conducted using both the original CIF and the 60-day follow-up examination form ([Annex 4. Examples of forms](#_bookmark97)). During the exam, the clinician or officer should systematically assess the patient and

* + verify with the family that all information on the previously documented CIF is correct;
  + inquire if the paralysis or weakness has completely resolved, has improved, has remained the same, or has progressed;
  + observe how the child moves their limbs or affected areas of the body. Watch the child walk, or move arms, and look for signs of atrophy (muscle wasting);
  + examine muscle tone, power, and reflexes. Verify that sensation is normal; even mild residual

weakness should be considered as ‘residual paralysis’;

* + complete all sections of the 60-day follow-up examination form and send it to the national Expanded Programme on Immunization (EPI) or polio program.

Possible outcomes of the 60-day follow-up examination include:

* + No residual paralysis: 60 days after date of onset, no weakness or paralysis in the initially affected limb or limbs; all functions were recovered.
  + Residual paralysis: 60 days after date of onset, some weakness or paralysis persists (no improvement or slight improvement).
  + No follow-up examination was possible - because the case could not be found ('lost to follow-up'), or died before follow-up could be done.

## Final AFP case classification

Once final laboratory results have been received and the 60-day follow-up examination has been done, all AFP cases need to undergo final AFP case classification. This means that all AFP cases are either

1. *confirmed as polio,*
2. *discarded as non-polio AFP,* or
3. *classified as 'polio-compatible'* (for details see below).

The GPEI target is that all AFP cases should be finally classified no later than 90 days of the onset of paralysis.

For final classification, national polio teams, supported by the National Polio Expert Committee (NPEC), should follow the standard WHO AFP case classification criteria (see ).

1. **AFP case classification depending on specimen adequacy status and lab results.** AFP cases for whom any stool specimen, regardless of whether they are adequate or not, test *positive for wild or vaccine- derived poliovirus* in a WHO-accredited laboratory are classified as 'confirmed polio'; virus-negative cases are also confirmed if WPV or VDPV is isolated from a close case contact.

Cases with *adequate specimens testing negative for poliovirus* are by default classified as *discarded* as *non-polio AFP* by the programme. This is done because if specimens were adequate, the result from a WHO-accredited lab is accepted as proving that the specimens did not contain WPV or VDPV, i.e., that a poliovirus infection was not the cause of the AFP.

AFP cases *without specimens or with inadequate specimens* are harder to classify, because classification has to be done without the benefit of a reliable lab result, based only on clinical data and on the result of the 60-day follow-up. Final classification for this group of cases is done by the National Polio Expert Committee (NPEC).

1. **Role of the National Polio Expert Committee.** The NPEC is a group of experts in pediatrics, neurology, virology and epidemiology, who meet regularly - at least four times a year, or more often, depending on the AFP case load - to assist in AFP case classification.

In the African Region, the role of the NPEC is to:

* + conduct a detailed review and classification of AFP cases with no or inadequate specimens; while all *adequate* cases are classified by the secretariat, these must also be presented to the NPEC for validation;
  + review AFP cases with adequate specimens testing positive for SABIN-like poliovirus, to decide on a possible diagnosis of vaccine-associated paralytic poliomyelitis (VAPP);

- in this context, VAPP cases with a history of receiving nOPV2 should be referred to the *'Causality Assessment Committee'* to check a possible association with the use of nOPV2. In some countries using nOPV2 for outbreak response, the NPECs terms of reference include to serve as *'Causality Assessment Committee'* (for details, pls see the GPEI's [Guide for Surveillance](https://polioeradication.org/wp-content/uploads/2022/06/nOPV2-AESI-surveillance.pdf) [of Adverse Events of Special Interest (AESI) during nOPV2 use](https://polioeradication.org/wp-content/uploads/2022/06/nOPV2-AESI-surveillance.pdf))

* + provide other technical advice and support pertaining to AFP cases and AFP surveillance, such as by participating in training courses on AFP surveillance and other advocacy activities to increase AFP awareness, particularly among clinicians;
  + Exceptionally, the NPEC may request that a further detailed clinical review of the AFP case may be done by a neurologist, to provide additional neurological information which may facilitate final case classification.

###### How does the NPEC classify AFP cases without or with inadequate specimens?

Following the WHO classification scheme (see ), the NPEC will classify such cases as:

* + *confirmed polio* if WPV or VDPV was detected in any stool specimens from *either the AFP case or a direct contact;*
  + *polio-compatible10,* if the NPEC has concluded that, after close review, polio could not be ruled out because the case had either
    - residual paralysis at the time of the 60-day follow-up, or

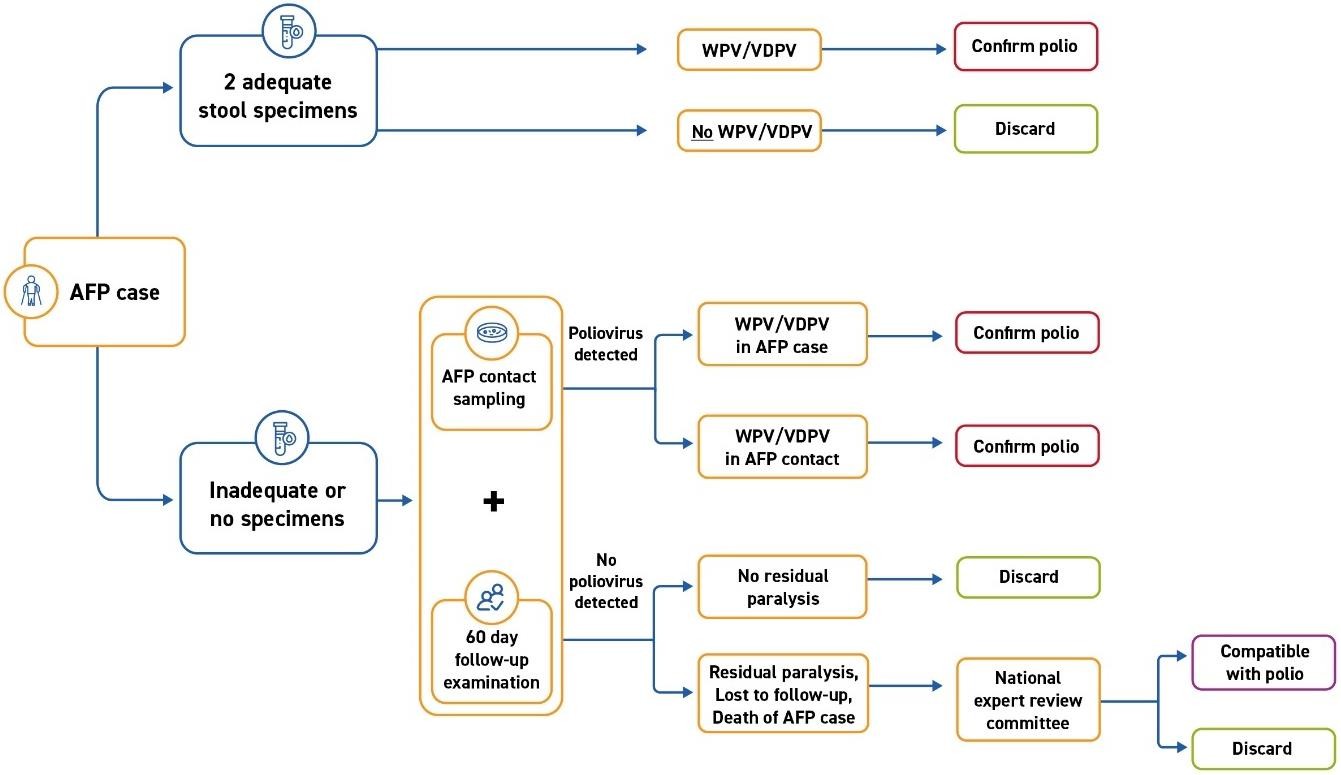
10 It should be noted that a case classified as *polio-compatible* cases is neither confirmed as polio, nor discarded as non-polio AFP

* + - no follow-up exam could be done because the case died or could not be found (was 'lost to follow-up'); or
* *discarded as non-polio AFP*, if no residual paralysis was observed at the 60-day follow-up visit of the case; note that the NPEC *may* discard as non-polio even cases *with residual paralysis, or without follow-up examination,* if the committee feels that there is sufficient evidence (from clinical notes, or other documentation) to show that the illness was *not clinically compatible with poliomyelitis.*

1. **Significance of polio-compatible cases.** Only the NPEC can classify an AFP case as 'polio-compatible'. Since no reliable lab results are available, 'compatible' AFP cases are neither confirmed as polio nor discarded as non-polio. However, polio-compatible cases are programmatically important. Since polio could not be reliably excluded, such cases do indicate a surveillance failure in any of the steps required to collect adequate specimens, from delays in the AFP case seeking health care to specimens received at a WHO-accredited polio laboratory in good condition.

A cluster of polio-compatible cases in a short period of time is of concern, as the programme cannot rule out polio as one of the reasons for this cluster of AFP cases. Regular mapping and review of polio- compatible cases helps to find areas with poor surveillance to address the underlying problem that has caused late specimen collection*.*

NPECs should make use of the 'polio-compatible' category whenever the available documentation is not sufficient to reliably rule out polio. The African Regional Commission for the Certification of Polio Eradication (ARCC) has repeatedly noted that NPECs in many countries of the Region tend to discard a considerable proportion of 'inadequate' AFP cases, without sufficient clinical evidence. The ARCC reminded NPEC chairs and polio country teams not to over-discard AFP cases, but to use the 'polio- compatible' classification category and utilize and map such cases as to indicate areas of weak surveillance.

AFP =

acute

*Figure 6: WHO AFP case classification scheme*

flaccid paralysis; VDPV = vaccine-derived poliovirus; WPV = wild poliovirus, *Source:* WHO.

1. **Role of the MoH/WHO secretariat in supporting the NPEC.** At each NPEC meeting, MoH/WHO surveillance staff, acting as secretariat to the NPEC, will present all available data on AFP cases for which NPEC support for classification is required; the NPEC will discuss the case and suggest how it should be classified.

To prepare for the NPEC meeting, the MoH/WHO secretariat should assemble a file for each case with, at a minimum, the following documents:

* + the completely filled-out case investigation form (CIF), and any other additional notes or report prepared after the case was investigated;
  + for hospitalized AFP cases, copies of all medical records and clinical notes as well as any other documents and test results;
  + for AFP cases who died, a copy of the death certificate;
  + a copy of the duly filled-out 60-day follow-up form, and any other clinical notes made by the clinician who conducted the follow-up examination;

The MoH/WHO secretariat should briefly present each case, with all relevant details, to the NPEC, focusing on any underlying condition or past medical history that may have a bearing on an illness causing paralysis. Where possible, a representative of the district team who first notified and investigated the AFP should attend the NPEC meeting and assist in presenting the case.

# AFP surveillance data management, monitoring and evaluation

A well-functioning AFP data management and information system is crucial for national immunization and polio eradication programs in order to provide programme managers with the data required to take appropriate action to guide the programme in the most effective way.

Jointly with data on polio routine and supplementary immunization coverage, AFP surveillance data analysis should allow polio program managers to regularly assess and monitor main polio risks, such as the risk of new outbreaks following virus importation or emergence of cVDPV.

Surveillance data is monitored and used by programme decision makers in several areas:

* Regular analysis of AFP surveillance quality indicators allows to monitor surveillance performance and sensitivity, to detect and focus corrective action on areas with low-performing surveillance
* In remaining endemic areas and outbreak-affected countries, AFP surveillance data tracks circulation of WPV or VDPV to monitor progress towards interrupting transmission.
* AFP surveillance data provides evidence on surveillance quality to national and regional certification groups, to monitor polio-free status in certified Regions and to provide the basis for eventual regional (only EMR remaining uncertified, as of mid-2023) and global WPV-free certification.

## AFP data management

**Data collection and management.** Data that are complete, accurate and timely are key to monitoring the polio eradication program. For data to be of use, data collection and processing tools must be used correctly, and the data must be analyzed on a regular basis and interpreted properly to produce information that is reliable enough to guide decision making.

The programme gathers and uses acute flaccid paralysis (AFP) surveillance data from several sources:

* *Case-based AFP data*, collected through key data collection tools, such as case investigation forms (CIFs) and 60-day follow-up exam forms, are compiled in a database and shared weekly with the WHO African regional office and WHO headquarters. It is also placed on a global online polio data platform, the *Polio Information System* (POLIS).
* *Specimen-based lab data* relating to specimens collected from all sources (stool specimens from AFP cases, case contacts and community samples - also referred to as 'healthy children sampling' -

, and ES specimens), including lab results, are compiled in a laboratory database and shared weekly with WHO AFRO and WHO HQ.

* Genetic sequencing results for poliovirus isolates provided by global specialized laboratories also provide a source of data for AFP surveillance.
* Data on routine (passive) surveillance data (zero-reporting) is collected from all reporting sites and compiled at district, provincial and national level, to calculate completeness and timeliness of reporting.
* Date on active surveillance (AS) visits to health facilities and providers at all priority levels in the surveillance network is also collected and compiled at all levels, to assess completeness of AS visits.

**Role of polio data managers.** Broadly, poliovirus and AFP surveillance data management is indispensable to support decision-making (Table 5).

With a focus on AFP surveillance, the role of data managers is to ensure that:

* AFP data is collected and shared, where applicable, in a timely manner;
* AFP data is complete and free of data entry errors (data quality checks);
* AFP data is accurate (e.g., logical chronology of dates); and
* AFP data is filed and archived properly.

In collaboration with polio surveillance officers, polio data managers also ensure that:

* accurate and up-to-date data is analyzed, and information is presented clearly, to best support data-driven decision making; and
* reports and feedback are complete and provided in a timely manner, particularly the data used to monitor surveillance performance.

###### Table 4: Main uses of AFP and poliovirus surveillance data for programme decision-makers

|  |  |
| --- | --- |
| **Country context** | **Use of AFP surveillance data** |
| **All countries** | * Calculate standard AFP quality indicators for surveillance performance at least at the national, provincial and district level * Focus corrective efforts on low-performing areas |
| **All countries** | * Provide evidence on surveillance quality to national and regional certification bodies as the basis for regional and global polio-free certification |
| **Endemic countries, outbreak areas** | * Track WPV, VDPV circulation to inform immunization activities and monitor progress towards interrupting transmission |

AFP = acute flaccid paralysis; VDPV = vaccine-derived poliovirus; WPV = wild poliovirus

Routine calculation and sharing of key data include the calculation, at national and first subnational level, of key AFP surveillance performance indicators, such as the non-polio AFP rate and stool specimen adequacy, as well as of timeliness indicators for stool specimen transport and laboratory testing and data on the completeness and timeliness of AFP passive (routine, zero) reporting and active surveillance visits.

## Main AFP and poliovirus surveillance tools and forms - WHO African Region

**The AFP case register (also called the 'AFP line list')** is the main database kept at district, province and national level, which contains all relevant data and information on all notified AFP cases. Using the individually assigned EPID number, AFP cases should be recorded in the register in the sequence in which they are notified. The case register, also called the 'AFP line list' in many countries, may be kept in paper form at the district and province level, but its content is then computerized and forms the core of the case-based AFP data shared weekly with the national, AFRO regional and global level.

The AFP register contains all relevant information collected in the case investigation form (CIF, see below) by the surveillance staff investigating the AFP case. Additional important data is added as they become available later, including the results of laboratory testing and of 60-day follow-up examination (in case of no or inadequate specimens).

**The AFP case investigation form (CIF).** The CIF is the form filled out by the persons conducting the case investigation. All parts and variables on the CIF must be completely and correctly filled out, because the CIF data are used to record and document all basic data related to 'time, place and person' of the AFP case which is required conducting important epidemiological analyses.

Key data to be entered on the CIF include identifying information - the EPID number, personal information, full address of residence or locating information, and data on the surveillance site and health worker initially notifying the case. Important dates to record include the date of onset of paralysis, date of consultation, investigation and notification, and information on the clinical history, main symptoms, vaccination status, date of collection of stool specimens, and results of laboratory testing and 60-day follow up examination, as well as final classification.

**Stool specimen shipment form.** All stool specimens must be accompanied by a fully completed stool specimen shipment form, on which important identifying information, such as the EPID-number, patient name, and dates of stool collection, are recorded. This form is also used to record important information on the itinerary the samples take on their way to the lab, and details on maintaining the 'reverse cold chain' (i.e. change of ice packs, other notes on the status of the samples during transport).

**Sixty-day follow-up form.** This form is filled out by the person conducting the 60-day follow-up examination for cases with inadequate specimens. The form includes the usual identifying information, most importantly the EPID-number, and details on the findings of the clinical exam of the AFP case seen 60 days after the date of the onset of paralysis.

**Logistics management form.** In the WHO African Region, this form is used to document and follow up on the the utilization of available transport when conducting surveillance-related tasks, such as field visits for supervision, active surveillance, or community sensitization activities. This form must be filled out for each surveillance-related mission conducted.

###### Please also see examples of the main AFP surveillance forms in [Annex 4](#_bookmark97).

## Mobile applications and mobile data collection

The use of digital communication technologies can help to accelerate surveillance processes and improve the efficiency of data management. Applying such innovative technologies has been very helpful to improve timeliness in the collection, storage, analysis and dissemination of data and to improve

monitoring and supervision of activities (also see [Chapter 8.5](#_bookmark64)). There are also new digital tools to aid in locating populations and getting a better understanding of the scope of the surveillance network.

###### Table 5: Examples of digital mobile technologies used in countries of WHO AFR

|  |  |  |  |
| --- | --- | --- | --- |
| **Innovation** | **Definition** | **Benefits** | **Tool** |
| **e-Surv** (Electronic surveillance) | Real-time monitoring and reporting system on active surveillance (AS) visits. | * Registers time, location and record data on AS visits. * Tracks the coverage of AS visits | Mobile phone or tablet |
| **ISS**  (Integrated supportive supervision) | Real-time monitoring and reporting system on supervisory visits for essential immunization, cold chain and vaccines, and incidence of VPDs. | * Registers time, location and record data on supervisory visits * Tracks coverage of supervisory visits * Displays trends across time and geographies | Mobile phone or tablet |
| **AVADAR**  Auto-Visual AFP  Detection and Reporting11 | Reporting and monitoring tool for CBS to enable community members (i.e., birth attendants, traditional healers, village healers) to detect and report AFP cases | * Reminder to look for AFP cases * Time and location of notification of “suspected AFP case” * Directs electronic notification of suspect AFP case to supervisor(s) | Mobile phone or tablet |
| **Geo- localization** | Mobile devices with global positioning system (GPS) receivers can allow geolocation of cases | * Allows exact localization of AFP cases or health facilities | Mobile phone or tablet |
| **WebIFA**  Web Information For Action | Designed to collect, report and analyze surveillance data using a mobile device | * Centralized and harmonized data from field collection and laboratory reporting for AFP, environmental, and iVDPV surveillance * Improves data quality, streamlines workflow between surveillance teams | Mobile phone or tablet, computer |
| **Barcode** | QR code system to track samples from collection to testing | * Real-time tracking of samples * Avoids data entry errors * Linked to WebIFA for tracking and data verification | Mobile phone or tablets  Currently being pilot tested |
| **WhatsApp** | Chat groups | * Improves communication within surveillance teams, strengthens and connects teams * Supports direct information dissemination and issue resolution. * Motivates frontline surveillance efforts, provides training opportunities by taking and sharing pictures of their work. | Mobile phone |

The widespread use of mobile devices (smart phones), has allowed for cleaner, faster and more reliable data capture and is greatly facilitating communication between surveillance officers and the healthcare network. A number of such innovative mobile phone technologies are already being used successfully across the polio programme in countries of the WHO African Region (see [Table 5](#_bookmark33)). It is recommended

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that country programs consult with AFRO to decide on which application is most suitable for the intended purpose, while meeting the required data standards.

## Geographic information system (GIS) mapping

GIS mapping and satellite imagery are also useful to identify and locate populations and catchment areas. GIS is now widely used by the programme for vaccination campaigns but also in the context of surveillance to:

* + - Map AFP cases and the surveillance network (network of ES sites) by their respective geo- coordinates, and to ensure that populations are covered by the surveillance network.
    - Better understand population movements and where populations are located. This helps to understand the performance of the surveillance system (indicators) and areas where surveillance strategies need to be adapted (e.g., inaccessible, hard-to-reach populations, such as in North-East Nigeria).
    - Track the movement of polioviruses and outbreak response rounds to identify areas with reported polioviruses and with no or low quality of previous vaccination campaigns. This guides decision making during polio risk assessment.
    - Map AFP surveillance indicators – NPAFP, Stool Adequacy – and overlay this with other surveillance data to identify areas with critical gaps.

While not possible in all contexts, the wider deployment and use of GIS mapping and satellite imagery is encouraged, including to capture the GPS coordinates of where AFP cases reside, of health facilities, reporting sites, etc., and to better visualize catchment areas.

## Polio programme monitoring

Monitoring should be conducted on a regular basis and should highlight both trends and anomalies in the performance and quality of surveillance.

**Collect, analyze, and use data.** Data should be consolidated and analyzed at district, provincial and national levels to assess the sensitivity, timeliness and quality of surveillance. All data should be updated promptly once errors are found. Data should also be updated after laboratory results are received and once a final case classification is assigned.

Monitoring should be done:

* for case- and specimen-level data (in the AFP register, or line listing)  monitor the quality of case investigations (including completeness of forms) and ensure accurate and up-to-date case- and specimen-based data is available for performance analyses;
* for site visits, including active surveillance (AS) and supervisory  monitor completeness and timeliness of AS and supervisory visits and related data; and
* for reports, including AS and zero-reporting  monitor completeness of data and timeliness of reports.

Data should be disaggregated by space and time:

* within and/or across geographies: local, district, province, national; and
* over time: by month, by quarter, semester, yearly.

Data should also be stratified, where possible and whenever a more descriptive analysis is required:

* by gender (e.g., “number of unreported AFP cases by gender identified during AS visits”);
* by special population group (e.g., “number of AFP cases reported by category of special population”); and
* by health-seeking history (e.g., “number of AFP cases seen by 2 or more health providers before being notified)”).

Routine analyses include the following set of reports and products:

* graph of confirmed polio cases by year (indicates progress made towards eradicating polio);
* graph of reported AFP and confirmed polio cases by month and 1st admin. level (indicates possible clustering of reported AFP cases in time and space;
* dot map (spotmap) of confirmed polio cases (shows where poliovirus is circulating and high-risk areas to be targeted with special strategies);
* dot map (spotmap) of AFP cases and compatible cases (identifies possible areas of low performance);
* table showing the key surveillance performance indicators by first administrative level (see

[**Annex 3**](#_bookmark88));

* disaggregation of indicators by gender and by special population/high-risk groups or areas (helps pinpoint possible reasons for suboptimal performance or gaps in surveillance; hence can direct to possible solutions); and
* graph of OPV/IPV status, i.e., how many doses were received, of non-polio AFP cases aged 6-59 months (indicates whether immunization efforts should be intensified and areas of possible risk of virus emergence and/or spread).

In certain situations, the initial case investigation should be expanded into a more detailed investigation to gain a better understanding of the context and circumstance of the case or cluster of cases and thus uncover possible reasons for the occurrence and assess the risk of virus spread if present.

Therefore, any one of the following situations warrants a prompt detailed case investigation:

* a single isolate of WPV through AFP or ES;
* a single isolate of VDPV1, VDPV2 or VDPV3 through AFP or ES;
* any SL2 poliovirus in an area with no recent vaccination campaign with type 2-containing vaccine;
* a clustering of AFP cases classified as polio-compatibles, i.e., usually defined as two or more cases in either a single district or two neighboring districts within four weeks;
* a clustering of AFP cases within a district or in neighboring districts, i.e., at least twice the number of expected AFP cases reported within a month, in a limited geographical area.

**AFP surveillance performance indicators**. Performance indicators are used to monitor the quality of disease surveillance and laboratory performance using both core and non-core indicators. For a comprehensive list, see Annex 3. Indicators for AFP surveillance.

Two indicators remain the gold standard to assess AFP surveillance quality:

* the non-polio AFP rate, and
* stool adequacy.

###### Table 6: AFP surveillance indicators related to timeliness

|  |  |
| --- | --- |
| **Timeliness of** | **Indicator** |
| **Detection** | # of AFP cases with WPV/VDPV final laboratory results ≤ 35 days of onset |
| **Notification** | # of AFP cases reported within 7 days of paralysis onset |
| **Investigation** | # of AFP cases investigated within 48 hours of notification |
| **Stool collection** | * # of AFP cases with 2 samples collected ≥ 24 hours apart, within 14 days of paralysis onset (*non-priority countries*), and * # of AFP cases with 2 samples collected ≥ 24 hours apart, collected (within 11 days) and shipped (3 days) within 14 days of paralysis onset (*priority countries*) |

AFP = acute flaccid paralysis; VDPV = vaccine-derived poliovirus; WPV = wild poliovirus

Indicators for the timeliness of activities, as introduced in the GPEI 2022-2026 Strategy, are of particular importance (see Table 9).

These timeliness indicators apply in particular to outbreak and at-risk countries. Delays in detection can happen at any stage of field, logistic, and laboratory activities. Countries must monitor timeliness at every stage of the process. [**Annex 3**](#_bookmark88)provides a full set of core and non-core AFP quality indicators, as per the GPSAP 22-26, and [**Annex 8**](#_bookmark105)provides insight into causes of delays and ways the programme can address them.

## Polio surveillance evaluation

Evaluations can take the form of audits and desk or field reviews. For outbreak-affected countries, outbreak response quality assessments (OBRAs) are also conducted.

**Conduct audits.** All countries benefit from internal annual audits of their AFP surveillance system to assess the system, in order to identify and respond to subnational managerial and performance gaps. The findings of an audit are particularly useful for annual surveillance planning.

Audits involve carrying out analyses on data that has been disaggregated by high-risk status, sex and health-seeking behavior. They also explore context-specific risk factors, such as special populations or hard-to-reach geographies.

Audits should assess all components of the AFP surveillance system: passive reporting, active surveillance, including the quality of AS visits, community-based surveillance (where applicable), staffing, logistics, financing, and more. Audits are typically performed internally by the national team and may include desk and/or field assessments.

**Desk and field polio surveillance reviews.** Periodic evaluations of poliovirus and AFP surveillance systems are done through desk reviews, often followed by field reviews; both types of review are typically done as 'external' activities, so conducted by, or with participation of, experts from outside the country.

* **Desk reviews** thoroughly review existing data and analyze surveillance quality indicators to assess overall AFP surveillance performance. Desk reviews provide an overview of surveillance sensitivity over a defined period, usually three years, and aim to highlight possible gaps. These reviews can be done at the office, i.e., at a “desk,” unlike field reviews that involve site visits. Generally field reviews also have the component of desk reviews as part of the activity.

Desk reviews are an excellent tool do identify and highlight the scope and type of surveillance quality gap and their location. Desk reviews alone will usually not, however, be sufficient to clarify the causes in detail, or to arrive at specific recommendations to address the problems.

* **Field reviews** build on preceding desk reviews by targeting a set of provinces or districts for visits. Field reviews are conducted by a team of peer reviewers, usually a mix of internal and external reviewers, to assess the performance of the surveillance system and the quality of the surveillance network.

Recommendations from desk and field reviews are translated into a surveillance plan to further improve the system, focusing on strengthening it wherever performance gaps were identified. Depending on the purpose and scope of these reviews, special attention should be paid to high-risk, access-compromised and hard-to-reach areas and populations, as these areas and populations require special strategies and added resources.

For outbreak-affected countries that use nOPV2 as part of their response, the GPEI has provided nOPV2 specific guidance for surveillance requirements.

[**Download Polio Field and Laboratory**](https://polioeradication.org/wp-content/uploads/2022/06/nOPV2-surveillance-guidance.pdf)[**Surveillance Requirements in the Context of**](https://polioeradication.org/wp-content/uploads/2022/06/nOPV2-surveillance-guidance.pdf)[**nOPV2 Use**](https://polioeradication.org/wp-content/uploads/2022/06/nOPV2-surveillance-guidance.pdf)

**Conduct outbreak response assessments (OBRAs).** Poliovirus surveillance quality is a key component of outbreak response assessments (OBRAs), conducted by the GPEI for all polio outbreaks. OBRAs assess whether vaccination and surveillance activities are robust enough to detect and stop poliovirus transmission. They also identify further activities to address remaining gaps and interrupt transmission of the outbreak virus.

OBRAs are conducted regularly throughout an outbreak until an OBRA mission declares the outbreak to be over. Closure of the outbreak can only be done if there is evidence of high-quality surveillance sensitivity.12

# Environmental surveillance (ES) for poliovirus

Environmental surveillance (ES) for poliovirus is the routine collection and testing for poliovirus of environmental (sewage/ wastewater) samples from designated locations. ES collection sites usually are at sewage treatment plants or sewage collectors downstream from areas with high-risk populations, which they are draining. If implemented well, ES can ideally complement AFP surveillance because it has the potential to detect virus excreted by infected individuals in the community regardless of manifestation of symptoms

The Global Polio Laboratory Network (GPLN) has developed and standardized sensitive methods to collect and concentrate sewage/wastewater samples, test them for the presence of poliovirus and then further differentiate wild polio from vaccine-derived poliovirus (VDPV) or Sabin-like virus. Genetic sequencing can then be used to establish links to other ES or AFP poliovirus isolates to confirm poliovirus circulation and track routes of transmission.

## Rationale for ES and where ES can be useful

Well-implemented ES can significantly increase the sensitivity of surveillance for poliovirus in an area or region. ES has been used for more than 70 years as a surveillance system to detect polioviruses. Its

12 For OBRA resources, see: Global Polio Eradication Initiative (GPEI). Aide-mémoire on OBRAs, version 2. Geneva: World Health Organization; 2019 [(http://polioeradication.org/wp-content/uploads/2016/07/Polio-Outbreak-Response-Assessment-English-](http://polioeradication.org/wp-content/uploads/2016/07/Polio-Outbreak-Response-Assessment-English-Version-2-December-2019-201912.pdf) [Version-2-December-2019-201912.pdf)](http://polioeradication.org/wp-content/uploads/2016/07/Polio-Outbreak-Response-Assessment-English-Version-2-December-2019-201912.pdf). Global Polio Eradication Initiative (GPEI). Standard operating ivenprocedures: responding to a poliovirus event or outbreak, version 4. Geneva: World Health Organization; 2022 [(https://polioeradication.org/wp-content/uploads/2022/07/Standard-Operating-Procedures-For-Responding-to-a-Poliovirus-](https://polioeradication.org/wp-content/uploads/2022/07/Standard-Operating-Procedures-For-Responding-to-a-Poliovirus-Event-Or-Outbreak-20220807-EN-Final.pdf) [Event-Or-Outbreak-20220807-EN-Final.pdf)](https://polioeradication.org/wp-content/uploads/2022/07/Standard-Operating-Procedures-For-Responding-to-a-Poliovirus-Event-Or-Outbreak-20220807-EN-Final.pdf). Global Polio Eradication Initiative (GPEI). Interim Quick Reference on Strengthening Polio Surveillance during a Poliovirus Outbreak. Geneva: World Health Organization; undated (https://polioeradication.org/wp-content/uploads/2021/12/Quick-Reference\_Strengthening-Surveillance-during-Poliovirus-Outbreaks\_24- March-2021.pdf).

routine use in countries that were polio-free for a long time allowed to detect the reintroduction of wild poliovirus, such as in Finland, the Netherlands and Israel, and to monitor progress towards interrupting the respective outbreaks. ES also proved extremely useful during the final phase of polio eradication in previously polio-endemic countries, including in Egypt and India. Repeatedly, polio transmission was detected through ES even in areas where virus-positive AFP cases were no longer found, highlighting its complementary role to AFP surveillance.

ES is increasingly being used in the context of WPV-free certification. ES provides additional confidence that virus transmission has been truly interrupted, as endemic countries reach the final phase of eradication and countries experiencing outbreaks stop circulation. It also provides an additional level of confidence that polio-free status is being maintained in an area or country. While countries endemic for WPV were previously at the forefront of using ES, ES has become valuable beyond endemic countries, such as in the context of the evolving circulating VDPV type 2 (cVDPV2). As of 2023, ES is already routinely used in 42 of 47 member states of the WHO African Region.

In summary, the use of ES is indicated in the following settings (provided that suitable ES sites can be identified and established):

1. In *polio-endemic countries13*, ES supplements AFP surveillance by detecting poliovirus circulation and providing increased evidence and confidence that circulation has been interrupted.
2. In *previously polio-free countries with outbreaks following importation of WPV or emergence of cVDPVs*, ES is useful in the following contexts:
   * *Within communities known to be infected* to assess transmission of WPV or cVDPV and whether outbreak response activities were sufficient to stop transmission (i.e., breakthrough cases); and *where novel OPV 2 (nOPV2) has been used in cVDPV2 outbreaks,* to monitor possible persistence and potential transmission of Sabin 2 virus.
   * *Outside known infected communities* to monitor for any potential spread from known-to- be-infected areas, to guide the potential expansion of outbreak response, and to monitor for Sabin 2 virus wherever nOPV2 was used (see above).
3. In *polio-free countries*, ES is useful as a monitoring tool in *countries and areas at highest risk* of outbreaks following WPV importation or VDPV importation or emergence, as well as in countries with chronically low-performing AFP surveillance.

Following the withdrawal of OPV components (Sabin 2 cessation through the tOPV-bOPV switch or the future planned bOPV cessation), use of ES in highest-risk countries will be important for the early detection of newly emerged VDPV, to document the elimination of all Sabin-type viruses, as well as to monitor the effectiveness of poliovirus containment in designated polio-essential facilities (see Chapter 10 on PV containment).

This summary chapter describing ES is not intended to replace more detailed guidance recently published by the GPEI14 on setting up and implementing quality ES, focusing on collection site selection, sample collection and transport, and the use of ES data for action. Other documents, such as the 2015 Guidelines

13 As of August 2023, only two countries remained endemic for WPV1: Afghanistan and Pakistan

14 Field Guidance for the Implementation of Environmental Surveillance for Poliovirus https://polioeradication.org/wp-content/uploads/2022/11/Field-Guidance-for-the-Implementation-of-ES- 20221118-ENG.pdf

on environmental surveillance for detection of poliovirus15, contain detailed information on laboratory procedures for testing environmental samples for the presence of poliovirus.

## Factors affecting the reliability of environmental surveillance

The probability of detecting poliovirus in wastewater samples depends on a number of variables, such as

* the duration and amount of poliovirus shed by one or more infected individuals in the catchment area of the ES site,
* the effect of physical, mechanical or chemical factors on the dilution and survival of poliovirus in the sewage system sampled at an ES site,
* the location of the excreter relative to the sample collection site,
* the frequency of collection and the laboratory’s ability to detect poliovirus present in the sample,
* and seasonal variation in enterovirus isolation.

This means that it is not possible to successfully conduct environmental surveillance in all desired locations. In fact, ES works best in areas with networks of confluent sewers. The lack of convergent sewer networks in rural areas and some urban settings in developing countries reduces the feasibility (and/or cost effectiveness) of ES, thus reducing its advantage over AFP surveillance in some areas at highest risk for poliovirus circulation.

Therefore, to maintain poliovirus surveillance at the high sensitivity and specificity levels required to achieve and certify eradication, countries may rely on a combination of environmental and AFP surveillance, implementing best practices that optimize their effectiveness in the field.

In view of the factors mentioned above, ES results should be interpreted with caution: negative results do not exclude virus transmission in an area, and poliovirus-positive results cannot be linked to any individual but merely indicate that one or more persons excreting poliovirus is present in the area drained by the sewer which was sampled.

## Coordination and planning to set up ES for poliovirus

Any new establishment of ES or expansion of existing ES systems requires close coordination with the WHO regional office and WHO headquarters teams, and with the regional and global polio lab networks. Such an endeavor should follow careful evaluation of the advantages of the newly established ES sites in the context of regional and national poliovirus surveillance objectives. The role of the country teams and collaboration with other stakeholders within the country such as the ministry of environment and sanitation agencies in the coordination and success of ES cannot be over emphasized.

A comprehensive national ES action plan should be developed, which should address the following: details of chosen sites, including estimated population catchment size; schedule of sampling; tasks and responsibilities; logistics; polio lab requirements, including space, personnel, equipment and reagents;

ES site management includes activities through the following phases: from selecting and opening, to operating and monitoring, and to closing sites, when this is deemed necessary.

15 Global Polio Eradication Initiative. Guidelines on environmental surveillance for detection of poliovirus. Geneva: World Health Organization; 2015. <http://polioeradication.org/wpcontent/uploads/2016/07/GPLN_GuidelinesES_April2015.pdf>

sample transport to the laboratory, particularly if this is outside the country; lab procedures and capacity building of staff; data management and reporting of results; and training and quality assurance.

## Selection of areas where ES will be used

Selection of specific areas for locating environmental surveillance sites should be based on the country’s polio risk profile and the epidemiological situation. Sites should be in areas where they are most likely to complement and strengthen overall poliovirus surveillance efforts. Optimal areas in-country can be identified by mapping vulnerable populations and geographic areas that either pose a risk for poliovirus circulation or present an opportunity for gaining access to previously inaccessible and highly mobile communities.

Examples of selection criteria include:

* Areas with populations at epidemiologic risk for poliovirus circulation (history of WPV or VDPV or a shared border with areas or countries with recent endemic or outbreak transmission).
* Areas with suspected immunity gaps due to inadequate access to vaccination (i.e., minorities, temporary workers, undocumented migrants) or high numbers of vaccination refusals.
* Camps and host communities for refugees or IDPs, especially if they are fleeing from areas with a current or recent history of poliovirus circulation. Communities with suboptimal access to sanitation and health care, such as slums, illegal urban or peri-urban developments, and areas with a high proportion of minoritized groups.
* Areas with suboptimal AFP surveillance indicators and areas with "orphan viruses", i.e. poliovirus isolates with genetic characteristics which indicate that the virus strain has been circulating undetected for a prolonged time.
* Hubs for transportation, commerce, or large gatherings (i.e., festivals, markets and pilgrimage sites) with presence of women and infants.

## Selection of ES sampling sites

Once areas of epidemiological interest have been selected within the country, field visits will be necessary to identify sampling sites, or sampling points, within these areas, where the collection of ES samples will be both feasible, cost-effective, and likely to detect polioviruses, should these be circulating in the area.

When identifying a sampling site, the national programme should consult with both local sanitary engineers and epidemiological experts who can assist in evaluating sewer and wastewater systems in the area and provide information about the size and type of populations and the catchment areas drained by the particular site.

**Catchment population:** The number of people living in the catchment area drained by an ES site affects the sensitivity of poliovirus detection in a population. In general, a

If sewage network maps are not available, collecting GPS (global positioning system) coordinates along the wastewater ways will allow the creation of “blue line maps” using specific computer software to get an estimate of the catchment population for a specific sampling point.

catchment population of ~100 000 to 300 000 individuals for a sampling site is recommended as the optimal size to allow isolation of poliovirus if it is circulating in the population.

###### Type of sewer system:

* **Closed, converging sewer networks** which connect to household water closets, and which drain into wastewater treatment plants, are optimal for systematic ES. The best location for sampling sites is the inlet closest to the entry into the wastewater treatment plant, where the wastewater containing human faecal material from a larger population can be caught before being treated.

###### Open canals or water channels

Selecting ES sites:

Choose areas based on Epi and risk profile and assess suitability of a site in the area, optimally an area:

* With converging sewer networks
* Downstream from flowing water and sewage
* Away from industrial sites
* With assured regular flow
* Which is easily accessible, without physical barriers

carrying wastewater may be the choice for establishing ES sites which are available in developing countries. Main disadvantage of sites is that a sample is unlikely to representative of a large catchment area population, compared to a sample collected downstream from a converging sewage system. Therefore, when open canals or channels, it is even important to conduct a thorough mapping of the size and type of the population upstream from the potential ES sampling site.

only

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using more

* Selection of sites should be done in collaboration with local sewer engineers to detect blockages of wastewater lines that may exclude segments of the catchment population as well as to identify potential sources of toxic waste entering the sewage canal, which may decrease the chance to detect entero- and polioviruses in the wastewater. The usefulness of such sites will need to be carefully monitored (i.e. % of samples yielding enteroviruses)
* In areas where human waste is disposed into **latrines, septic tanks or open fields** without a convergent system, environmental sampling is not recommended because the number of individuals disposing of waste in a certain spot is too small.

###### Impact of toxic substances and compounds:

Several kinds of biological and chemical substances and compounds can reduce the survival of entero- and polioviruses in a wastewater sample. Before selecting a sampling site, points should be identified where potentially toxic substances and compounds may enter the sewage canal or channel, upstream from the site being considered. Such sites should note be selected.

Color and odor of wastewater at the sampling site may indicate the presence of toxic materials. In cases where wastewater canals or channels are located near agricultural or industrial activities (such as dairy farms, factories, garages or cloth dying sites), the sampling point should be moved up-stream, even without active observation of toxic waste in the canal during the exploration.

###### Accessibility:

* it is also important to assess the overall accessibility of a candidate site, including the requirements for logistics and transportation, as collectors will need to walk and stand in public areas for 30 minutes to complete procedures.
* In areas that are inaccessible for part of the year because of flooding, snow or other seasonal considerations, sites should not be established on a permanent basis, but only as ad-hoc or temporary environmental sites, in specific situations, such as to enhance surveillance sensitivity during outbreak response.
* Areas affected by active conflict or other situations which might threaten the safety of ES workers should be avoided.

## Establishing a schedule of ES sample collection

For each selected ES site, the optimal time during the day when samples should be collected is decided after discussion with local sanitary engineers and following on-site observation of the wastewater flow at the sampling point at different times of the day during the initial assessment. The sampling schedule must also be discussed with and agreed upon by the poliovirus laboratory receiving the ES samples

* **Collection date:** collection days, and dates, should be scheduled to make the most efficient use of transportation and laboratory resources. For example, samples from several sites can be collected on the same day or consecutive days to send samples to the laboratory in batches, in order to reduce shipment cost. Coordination of collection and shipment schedules with the receiving poliovirus lab is important to allow the laboratory to optimize the lab's workflow, and to avoid any delays in testing and reporting.
* **Optimal time of day for collection:** Generally, samples collected during the early morning hours (e. g., the time of peak toilet usage, such as 06:30–08:30 am) are more likely to detect poliovirus. The exact timing of the peak sewage flow through a sampling time will vary depending on the distance from the sampling point to the catchment population and the slope of the waterways.
* **Sampling frequency:** The minimum sampling frequency is monthly for routine sites. The decision to increase sampling frequency (i.e., from once to twice monthly) needs to balance the potential enhancement in

In any site, sample collection should be monthly (or bi-weekly, under certain conditions)

sensitivity or timeliness of detection with the increase in workload for the laboratory.

**Pooled or composite samples:** 24-hour pooled or composite samples made from aliquots collected several times a day are ideal and will be optimally representative for the drained catchment area. However, this sampling method is expensive and only feasible with a converging sewage system. It is usually not feasible to use this method where sampling is conducted from open, publicly accessible sewage canals.

## Capacity building and required resources for ES

The country polio programme should ensure that personnel involved in field ES activities are well- trained and equipped and that sufficient supportive supervision is provided.

* **Training:** all staff involved in ES sample collection need to be well-trained. GPEI ES guidelines and advice from the WHO AFRO Regional Polio Laboratory Coordinator should be followed when training sample collectors on specific collection procedures. Sample collection and transport should be done using the appropriate standardized collection material which is supplied by WHO. Usually, one main sample collector and one backup staff are trained for each site to ensure continuity of sample collection even when the main sample collector is not available.
* **Supplies:** Collectors should have access to all re-usable and disposable supplies needed for collection, as per the table below. Prior to going to a collection site, it is the responsibility of collectors to ensure all required supplies are available, including cold chain materials. Samples must be placed into cold chain containers immediately upon collection, and the 'reverse cold chain' must be always maintained until arrival of the container in the laboratory.

|  |  |
| --- | --- |
| ***Reusable*** | ***Disposable*** |

|  |  |
| --- | --- |
| * 5-litre bucket * Rope or stick (~7 metre) * Plastic funnel * Rubber boots and thick rubber boots * Permanent marker * Pen * Phone with ODK software installed (as relevant) * Dedicated vaccine carrier (marked for transport of environmental samples only) | * Personal protective equipment (PPE): surgical mask or respirator, disposable gloves, gown or apron * Liquid bleach, water and gauze or paper towels to clean supplies * Robust liquid container (1-1.5 litres) * Parafilm tape * Prefilled labels (with bar code, if available) * Plastic bags or small zippered bags for paper forms, large bags for samples * Frozen ice packs inside the dedicated vaccine carrier (both ice packs and vaccine carrier should be used   for ES only) |

## ES sample collection, packaging, and transport to the laboratory

The ES sample collection currently recommended by the WHO is referred to as 'grab sampling'. With grab sampling, a sample of at least one litre (1L) of wastewater is collected. This sample of 1L will usually be concentrated into ~20 mL (i.e., 50 to 100-fold concentration) in the laboratory. Collecting samples via a so-called 'bag-mediated filtration system' (BMFS) is an alternative collection method accepted by the WHO and used by several countries.

During ES sample collection, collectors need to be aware of all technical guidance regarding sample location, midstream sampling, and environmental conditions that may impact sampling.

* **Sampling location:** Samples should always be collected at the same “sampling point” decided during

the site’s initial field assessment.

* + If there are changes in accessibility within a few metres from the initial sampling point, such a change is acceptable only if it does not involve losing or adding any branch / inflow into the sewage canal or channel.
  + If the actual sampling point is shifted more than 50 metres away from the initial sampling point, or if the change involves a loss or gain of convergent branches in the catchment population, the collector must consult with the supervisor and surveillance focal person before making the change. These more drastic changes in location of the actual sampling point may be required because of construction or the appearance of toxicity.
  + Once the change is approved, notification should be made in the database.
* **Midstream sampling:** samples should be collected midstream, i.e. from the middle of the flowing sewage. Depending on the width and depth of the canal, sewage inlet or manhole, the collector may need to use a rope attached to a bucket or attach the collection container to a long handle.
  + Avoid the bottom of the canal, where a large amount of solid debris and potentially toxic compounds may inadvertently be included in the sample.
  + Avoid places where the flow is very slow or non-existent because of debris accumulation, and avoid collection at other than the agreed upon time of day, which may risk missing the peak flow associated with high toilet use.
* **Environmental conditions:** the following conditions should be avoided for sample collection:
  + Generally, avoid sample collection during heavy rains. Delay collecting samples by one or two days in heavy rain to ensure personal safety, protect equipment and to avoid diluted samples. Collection of the monthly ES sample should only be canceled altogether if a critical situation,

such as flooding, earthquake or other safety concern, prevents access for a period greater than one to two weeks. The laboratory should be informed of these changed circumstances.

* + In cases where the smell of the wastewater and its color or other signs suggest the presence of potentially toxic substances at the sampling point, contact the supervisor to record this observation.
  + If the assumed toxicity appears to become permanent, the possibility of changing the sampling point or time of collection should be explored. Any change in sampling location and timing should be communicated in order to update the ES database.

###### Environmental sample collection and laboratory request form

* + For each sampling visit, the collector uses a form to record information regarding sample characteristics and collection details. Programmes may opt to use separate collection and laboratory request forms or incorporate into a single data collection and reporting mechanism (See Form XX in Annex XX.).
  + Bar coding may be used to track samples. If the programme uses an electronic form to document sample collection, such as the open data kit (ODK) software for cell phones, the data should be made available to the focal person and laboratory staff.

###### Packaging ES samples

* + Environmental samples should be carefully packaged before transporting and shipment in order to prevent contamination and to ensure live enteroviruses within the sample are preserved for laboratory testing.
  + *Dedicated containers:* environmental samples should be transported to the laboratory in

dedicated, robust liquid or sample containers that are packed following the “triple packing” system for biological products or diagnostic specimens. AFP specimens and environmental samples should have separate cold chain transport containers which are appropriately labelled.



* **Transporting samples & reverse cold chain:** samples should be shipped and maintained so they arrive in the laboratory intact for testing, without the appearance of toxicity or bacterial overgrowth, and with all enteroviruses preserved.
  + *Rapid transport:* Transportation to the laboratory should be accomplished within three

Sewage samples (ES samples) should not be stored in the same refrigerator as clinical samples for AFP or any other disease because of the high risk of contamination

(3) days of collection. For samples requiring international shipment, seven (7) days between collection and arrival to the laboratory is acceptable.

* + *Reverse cold chain*: If samples cannot be shipped to the laboratory on the same day, they should be maintained in a refrigerator at 4°C (range: 2°–8°C). In cases where samples will not be shipped immediately, samples should be stored at -20°C in a freezer and shipped frozen.
* **Transport logistics:** field and laboratory staff should coordinate ES sampling to minimize transportation logistics and avoid delays in testing.
  + **Required logistics:** it is important to identify all necessary logistics (means and routes of transportation, and required couriers), with focal persons identified at each stage.
  + **Budget**: the programme should budget transportation costs based upon the expected number of ES samples per month from each site.
  + **Permits**: if international shipment to another country is planned, identify the process required to obtain import permits from the country and the International Air Transport Association (IATA).
  + **Contracts**: ensure that contracts with transport courier companies include awareness and acceptance of the transportation of sewage sample conditions.

## Environmental surveillance lab results and their interpretation

The results of environmental sample testing should be reported by the laboratory and immediately uploaded to the regional and global polio database. Environmental samples often contain mixtures of enteroviruses (i.e. non-polio enteroviruses, as well as SABIN or VDPV polioviruses) and extra steps may be required in the laboratory for virus typing and sequencing. Laboratories may therefore require more time to release final results, compared to for AFP stool specimens.

The WHO-accredited laboratory should ensure results are shared with the national programme in a timely and comprehensive manner and provide support for the interpretation of laboratory findings and their significance.

The following are key points to consider in interpreting ES results:

* **Positive results** indicate viral excretion by one or more individuals, but it is difficult to pinpoint the exact source of virus - the person(s) excreting cannot be identified.
* **Negative results** do not rule out poliovirus circulation in the area, since virus transmission may be very low-level, and excretion by infected individuals may be ongoing in an area not drained by currently established ES sites.
* **Repeated sampling** increases the probability that existing low-level poliovirus transmission may be detected.
* **Significance of detecting non-polio enteroviruses (NPEV):** even without detection of poliovirus, a considerable proportion (at least 50%) of ES samples should at least yield other non-polio enteroviruses (NPEV).

Repeated, persistent results negative for *any enterovirus* (i.e., neither poliovirus nor NPEV) should prompt a review to check:

* + whether the ES site was appropriately selected,
  + if ES specimens are transported timely to the lab under proper 'reverse cold chain' conditions (i.e. in carrier boxes with ice packs, at 5 to 8 degrees C), and
  + the quality of laboratory procedures.
* **ES results need careful interpretation:** ES results reflect the situation only in the geographic scope of the population catchment area drained by the ES site; results should be interpreted with care.

## Supervision, monitoring and evaluation of ES for poliovirus

###### Supervision of environmental surveillance:

* + Is of utmost importance to ensure that all steps involved in ES sample collection and transport follow established guidelines and procedures, and that ES field activities should be regularly monitored. Trained supervisors should accompany sample collectors, in order to provide supportive supervision by identifying and correcting any issues observed during the collection, packaging and transport of environmental samples.
  + National programs should ensure and document on a quarterly basis that on-site field supervision was provided for at least 80% of sample collections, at each ES sampling site.
  + A monitoring tool for evaluating site performance is available in Annex 6 of the [ES Field Guidance](https://polioeradication.org/wp-content/uploads/2022/11/Field-Guidance-for-the-Implementation-of-ES-20221118-ENG.pdf) [document.](https://polioeradication.org/wp-content/uploads/2022/11/Field-Guidance-for-the-Implementation-of-ES-20221118-ENG.pdf)

###### Monitoring and evaluation of ES

* + Continued monitoring and evaluation of the performance of ES, including the use of site-specific process monitoring indicators and lab-specific monitoring indicators, is important to assure that data from ES is reliable and provides programmatically relevant results. Core indicators to monitor ES can be found in the [Global Polio Surveillance Action Plan (GPSAP, 2022-2024), Annex](https://polioeradication.org/wp-content/uploads/2022/05/GPSAP-2022-2024-EN.pdf) [3, Table E5.](https://polioeradication.org/wp-content/uploads/2022/05/GPSAP-2022-2024-EN.pdf)
  + The GPEI has published detailed relevant ES monitoring guidelines. A useful summary of these can be found under Section 3 of the ["FIELD GUIDANCE for the Implementation of Environmental](https://polioeradication.org/wp-content/uploads/2023/06/Field-Guidance-for-the-Implementation-of-ES-20230007-ENG.pdf) [Surveillance for Poliovirus"](https://polioeradication.org/wp-content/uploads/2023/06/Field-Guidance-for-the-Implementation-of-ES-20230007-ENG.pdf) referenced earlier. In addition, the Global Polio Surveillance Action Plan (GPSAP, 2022-2024) recommends quarterly ES desk reviews for countries and regions and biannual desk reviews at global level.
  + While each country may develop their own ES data operations, AFRO recommends that countries should be collecting a set of standard ES variables, utilizing a standardized reporting flow. Annex 6 of the above-mentioned ES Field Guidance document contains several WHO- recommended forms and checklists to facilitate the identification and registration of environmental sites and to assist with the collection and sharing of sample data and results.

## Closing a non-performing ES site

If a site does not 'perform', i.e. does not meet the expected level of quality indicators, or where the network of ES sites in a country needs to be optimized, a decision may need to be taken to close a site.

A decision to discontinue the use of an established ES site should only be made after a thorough investigation and discussion between all groups concerned, including the WHO regional office polio team.

###### Criteria for closing a sampling site:

* + *The site may no longer meet programme needs*: country- or city-specific risk-assessment strongly suggested that the risk profile has changed, and the ES site no longer represents a catchment population considered at-risk.
  + *Prioritization:* There is higher risk elsewhere in the country
  + *Limitations in ES sample laboratory processing capacity* may require rationalization of the ES network.
  + *The sampling site shows poor performance for at least six consecutive months,* with no cause identified or with no improvement in performance after corrective actions have been implemented.

###### Decision making process for closing a site:

* + The national programme *documents the need to close* one or several sampling sites, include rationale and timeline in coordination with WHO CO and share with the WHO RO and (as needed) WHO headquarters.
  + *GPEI advice may be requested* and recommendations will be sent back to the country within a week. A site opened in response to an outbreak should be closed in consultation with the lead of the outbreak response.
  + WHO (country office team, in coordination with regional office and HQ) informs all stakeholders about the decision through a *short summary report*.
  + The site data form (electronic, paper-based) is updated to reflect the new status in the environmental site database.

## Main challenges to conduct ES

Key challenges and issues to anticipate with ES implementation include the following:

* *Difficulties in finding appropriate sampling sites* - i.e., a system of convergent or confluent sewage system is not available, and the only option is collecting ES samples from open sewers.
* *Cost of sampling, sample transport, and of lab processing.* Financial resources for polio surveillance are diminishing. Hence, the programme need to explore collaboration with other programmes to ensure the long-term sustainability of ES for poliovirus.
* *Logistic problems* in specimen collection, including maintenance of the reverse cold chain and transportation of ES samples (1-liter specimens).
* *Limited access* to sites for regular sewage collection in hard-to-reach, inaccessible areas.
* *Lack of compliance with ES guidelines and SOPs,* despite of documented low site performance.
* The volume of ES samples from poorly performing sites burdens laboratories, wastes resources, and contributes to a false sense of security, since continued negative results are wrongly interpreted as 'no virus is circulating'.
* *Insufficient coordination and feedback* between surveillance and laboratory teams.

## Annex 8. Stool sampling of close AFP contacts

###### Table 18: Stool sampling of close AFP contacts

|  |  |
| --- | --- |
| **AFP contact sampling** | |
| **Also known as** | Direct contact sampling and close contact sampling |
| **Definition** | The collection and testing of one (1) stool specimen from three (3) individuals in contact with an acute flaccid paralysis (AFP) case. Children in frequent contact with an AFP case (e.g., touching, sharing toys, and sharing food) should be identified for specimen collection.  Surveillance guidelines recommend:   * Children, preferably <5 years of age. * In contact with AFP case within a week prior to and/or two weeks after paralysis onset. * Examples include siblings and other children living in the same household and/or neighboring children who played with the AFP case during the period of interest. * Stool specimens from AFP case contacts may be collected up to 60 days after paralysis onset, as poliovirus may be excreted up to two (2) months or longer. * Stool specimens are typically collected from the community of residence of the AFP case. However, if the AFP case stayed in other communities one week prior to and/or two weeks after paralysis onset, then collection of specimens from contacts of the AFP case at these locations may also be warranted. |
| **Purpose and rationale** | AFP contact sampling is used to provide laboratory evidence of poliovirus in an AFP case. Individuals in contact with AFP cases have a higher likelihood of asymptomatic infection and virus excretion than people who have not had contact. The collection of stool specimens from contacts of AFP cases provides an additional approach to determine if poliovirus is the cause of paralysis in an AFP case. Positive laboratory results of contact specimens are used to confirm poliovirus infection in an AFP case who is not otherwise laboratory-confirmed. |
| **Indications** | AFP contact sampling should be performed as part of regular AFP surveillance activities. Expanded use of AFP contact sampling may also be done as part of outbreak response activities.   * Regular AFP surveillance activities: Recommendations per the [*Global Polio*](https://polioeradication.org/wp-content/uploads/2022/05/GPSAP-2022-2024-EN.pdf)[*Surveillance Action Plan 2022–2024*](https://polioeradication.org/wp-content/uploads/2022/05/GPSAP-2022-2024-EN.pdf)for AFP contact sampling. * All AFP cases with inadequate stool specimens. Examples of inadequate stool specimens are: (a) 0 or 1 stool specimen collected; (b) at least one stool specimen collected > 14 days after paralysis onset; (c) two stools collected <24 hours apart; and (d) poor stool condition (e.g., specimen was hot upon arrival at laboratory). * After close coordination with national surveillance and laboratory colleagues, consider all AFP cases who reside in security-compromised or hard-to-reach areas to take advantage of the limited opportunity to reach these individuals and communities. * Outbreak response activities: Expansion of AFP contact sampling to enhance AFP surveillance may be warranted under specific circumstances. Expansion should occur in close coordination and collaboration between the national surveillance and laboratory colleagues.   + All AFP cases in an outbreak-affected country, to improve detection of all viruses   + All AFP cases detected outside the subnational outbreak zone, to increase the probability of detecting virus movement beyond the designated outbreak zone |

**Additional important information**

|  |  |
| --- | --- |
| **When to conduct** | AFP contact sampling should be conducted during the initial or follow-up activity of an AFP case investigation (i.e., before laboratory results are available).   * *Initial AFP case investigation*: Conduct AFP contact sampling if it is known that two stool specimens cannot be collected in a timely manner. * *Follow-up activity*: Conduct AFP contact sampling if the laboratory reports that the AFP case’s stool specimens were received in poor condition. |
| **Specimen labelling** | Each specimen should be labelled clearly as a contact of the AFP case. The unique identification number should be the same as the AFP case with an added contact indicator (“C”) and number (#) suffix (e.g., C1, C2, C3). |
| **“Other” classification** | Positive AFP contacts are not classified as confirmed poliovirus cases because they do not meet the case definition, which requires acute flaccid paralysis. Results are included as “others” in poliovirus isolation counts. |
| **Procedures** | Refer to the GPEI [Global Polio Surveillance Action Plan 2022–2024](https://polioeradication.org/wp-content/uploads/2022/05/GPSAP-2022-2024-EN.pdf) for further details. |

AFP = acute flaccid paralysis; GPEI = Global Polio Eradication Initiative