
The Future of Polio Surveillance

By Nellie Bristol & Michaela Simoneau | MAY 2019

This fourth installment in our series on U.S. support for global polio eradication highlights the role polio surveillance systems play in detecting global health threats.

Disease surveillance is essential to identifying where health threats are occurring—the first step to stopping transmission and preventing epidemics. Over its 30-year history, the Global Polio Eradication Initiative (GPEI) has developed a top notch surveillance system that can find new polio cases nearly anywhere in the world. More recently the GPEI system has been expanded to track other diseases, ranging from measles and rubella to meningitis. Many countries now depend on polio surveillance resources—funding, technical assistance, and supervisory personnel—to alert them to a variety of outbreaks within their borders. In fact, the disease surveillance system is one of the most significant potential long-term global health assets to emerge from polio eradication efforts.



Source: World Health Organization

To speed responses to potential epidemics and enhance global health security, countries and international organizations are working not only to preserve the polio system but to transform it into a broad-based global network that will allow every country to track a range of diseases. Before this can be accomplished, however, several critical questions must be answered, including who will oversee the system, what the most effective model will be, and, most importantly, who will pay for it after polio is eradicated and the GPEI winds down.

Polio Surveillance

While many countries have established disease monitoring mechanisms over the years, they often are fragmented and have varying standards, degrees of effectiveness, and resources. With its mandate to find not only every polio case in the world but every poliovirus, GPEI has had to develop a system that can consistently and reliably reach nearly everyone everywhere. Even in countries with weak public health systems and remote or disenfranchised populations with intractable disease monitoring challenges, the polio program has succeeded in ways no others have. In India, for example, the National Polio Surveillance Project, backed by GPEI, devised strategies for tracking the health of the remote population of the Kosi River Basin, a flood-prone area with limited access to health services. GPEI has also fostered a network of community health workers in several countries that facilitates disease surveillance and vaccination for mobile populations and other previously underserved groups.



Martha Dodray, a health worker in the Kosi River Basin, on a raft as she travels to Tilkeshwar village to deliver vaccinations. Source: Christine McNab/UN Foundation

GPEI's system operates in all 194 World Health Organization (WHO) member states.¹ Based on surveillance methods developed in the Americas, it searches for and reports cases of acute flaccid paralysis (AFP), the clinical symptom for polio infection that can also be present in other diseases. To prove the system is working, the GPEI set a target of at least two AFP cases per 100,000 population of children under age 15. A system that finds AFP cases at this rate is considered effective enough to discover any paralysis caused by poliovirus.

The polio system engages health workers at several levels. Health facilities are asked to report any cases of paralysis among children to a central focal point in each district. Supported by GPEI, local surveillance officers travel to a designated set of health facilities weekly to review their records to catch any cases that were not reported. Health personnel follow up on suspected polio cases by collecting stool samples at specified time intervals and sending them to accredited laboratories to test for poliovirus.

GPEI also relies on several other types of disease monitoring, including community-based surveillance and environmental sampling. To shorten the time between onset of disease and reporting, community-based surveillance relies on locally nominated volunteers or traditional healers who are trained to identify AFP, measles, and neonatal tetanus and bring the child to the attention of a designated facility-based focal point. Community-based surveillance is most often used in remote areas without easy access to health facilities.



Source: World Health Organization

Environmental surveillance is seen most frequently in high-risk areas as the number of polio cases declines. For this type of monitoring, health workers collect and test sewage in search of poliovirus. This type of surveillance will become increasingly important as the number of polio cases continues to decline.² Polio symptoms, including varying degrees of paralysis sometimes leading to death, occur in only one of every 100-200 people who become infected with the virus. Nonetheless, all of those infected can transmit the virus through their stool. Finding poliovirus

in sewage indicates the virus is circulating among the local population even though no actual cases have yet been reported.

Expanding the Disease Surveillance Network

On-going, systematic collection and analysis of disease-related data is critical to an effective public health system. It alerts officials to health threats allowing them to respond in a timely manner. It also guides resource allocation by indicating the scale and scope of disease outbreaks. The success and resources of the polio surveillance system have made it an attractive platform for country governments to monitor other diseases.

In theory, adding other diseases to the polio surveillance systems is a simple procedure: surveillance officers look for and report other designated diseases in addition to polio when they review facility records, and community-based health workers are trained to identify symptoms other than paralysis. But in practice, this adds considerably to the workload. In addition to reviewing records, surveillance officers must follow up with each patient who has left the health facility to confirm that the disease has actually been contracted, a cumbersome and time-consuming process that involves tracking down affected individuals, collecting histories, and ensuring samples are packaged adequately to remain viable for laboratory analysis. Many areas have only one surveillance officer, so countries have to be careful not to overburden them with tracking too many diseases. The polio program also needs to ensure that paralysis reporting remains the priority and that surveillance officers do not get pulled in too many different directions before eradication is achieved.

Expansion of WHO AFRO Disease Surveillance

A 1997-2014 study in the WHO Africa Region showed the dramatic expansion in the number of diseases being actively searched for by polio surveillance medical officers. This chart shows how quickly Angola, Democratic Republic of the Congo, Cote d'Ivoire, Ethiopia, Nigeria, Tanzania, and Togo grew their AFP (polio) platforms to monitor seven additional diseases.



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Source: William Mwengee et al., "Polio Redatication Initiative: Contribution to improved communicable diseases surveillance in WHO Africa region," *Vaccine* 34, issue 43 (October 2016): 5170-5174

On a more macro level, there are two main challenges to sustaining and building a comprehensive global surveillance network. First, there is no centralized authority to take over operations when GPEI disbands, a milestone expected to occur three years after the last reported case of wild poliovirus. WHO is the logical choice, however, and officials and other stakeholders are actively discussing how an expanded surveillance system would best fit into the organization's structure. Secondly, although a fraction of the cost in terms of lives and money of responding to a major outbreak, the system will be expensive and there is no clear source of funding once polio is eradicated and the GPEI phases out. WHO currently is trying to raise \$14 billion to cover its expenses for 2019–2023.³ The GPEI budget includes funding to continue needed polio assets as GPEI winds down, but new funding mechanisms will need to be developed to support polio's infrastructure and personnel into the future.

Other organizations are concerned about how GPEI's dissolution will affect their programs. Gavi, the Vaccine Alliance, relies on GPEI support staff to conduct continued disease surveillance in Chad, Somalia, South Sudan, and other fragile states. The Measles and Rubella Initiative, a global consortium aimed at reducing the incidence of both diseases, depends on polio surveillance resources for its operations. Estimates show that about 70 percent of measles surveillance is supported through polio funds totaling \$77 million a year.⁴

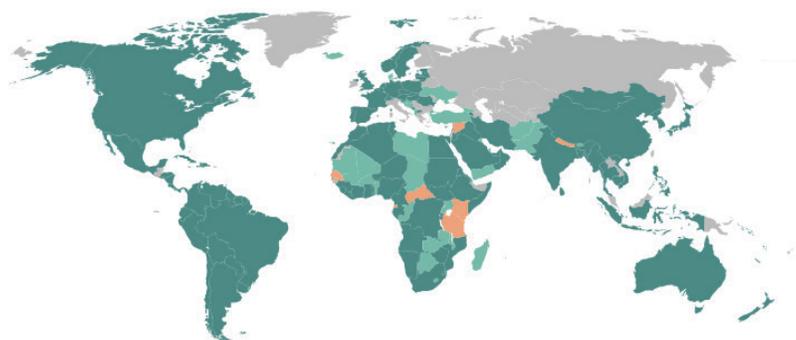
of polio endemic countries. But elation turned to alarm a year later when an area in the north-east of the country—controlled by extremist groups and inaccessible to government and GPEI personnel—reported several cases of polio. Even worse, tests proved that the virus had been circulating silently in the region for more than five years.¹² The event highlighted the need to sustain a comprehensive network of surveillance officers and ensure access to all areas before declaring a disease eliminated.

Surveillance System Standards

Under the International Health Regulations, countries are surveyed annually to see how they measure in a number of core capacities, including surveillance. Each capacity's implementation is ranked out of a score of 100.

2017 Surveillance Scores

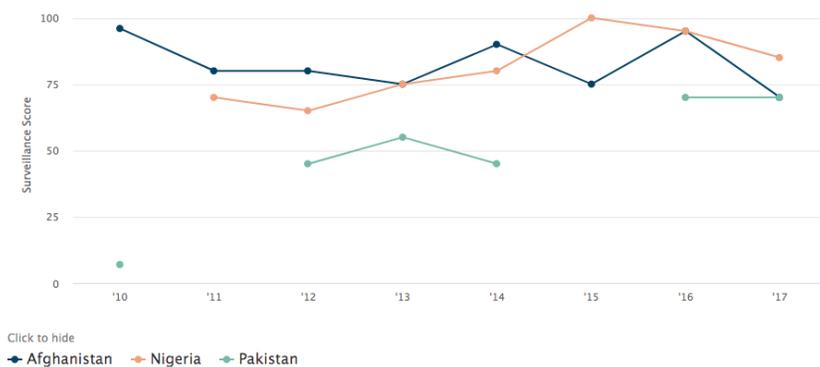
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Maintaining a polio-free world will require vigilance for some time post eradication. Significant attention and resources for polio-related tasks such as vaccination and virus containment in research and manufacturing facilities must continue for at least an additional 10 years after eradication is declared. In particular, high-quality polio surveillance will be critical to ensuring the virus has been irrevocably erased from the world's population and environment. GPEI partners have initiated a series of meetings to develop a successor organization capable of overseeing and monitoring polio assets after the original initiative disbands.

See how the scores of the three polio endemic countries—Nigeria, Afghanistan, and Pakistan—have changed over time.



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While polio funding dedicated to surveillance is expected to continue at the same level and even increase for the foreseeable future, GPEI already is preparing countries for the initiative's eventual dissolution, when country governments largely will be expected to assume the cost and operation of

polio assets themselves. In a process called polio transition, the 16 countries that now receive the bulk of GPEI funding are delineating which polio assets they want to continue, or perhaps expand, and determine how they will pay for them, either through domestic funding or in partnership with donors.¹³ Assuming financing will fall short in many resource-poor countries, WHO leadership has been hosting meetings with surveillance stakeholders to develop an in-



Source: Fabrice Coffrini/AFP/Getty Images

vestment case for potential donors.¹⁴

The U.S. and Global Leadership in Disease Surveillance

Polio surveillance is a top priority of the two U.S. agencies involved in polio eradication, CDC and the U.S. Agency for International Development (USAID). Regarded as the

world's top health technical agency, CDC works with WHO to set the system's standards and improve its quality and reach, and also provides training and salary support for health workers in the field. CDC funding for the polio surveillance system totaled \$40 million in fiscal years 2016 and 2017,¹⁵ out of polio budgets of \$169 million and \$174 million respectively.¹⁶

USAID initially funded the development of the AFP surveillance system in the Americas starting in 1988. The agency has funded global polio surveillance since 1996. It considers the surveillance system to be one of the eradication assets most likely to serve other long-term health and development goals and other disease purposes in the future. Around three-quarters of USAID's \$59 million yearly polio funding goes to NGOs that perform community-based surveillance and other tasks, and to support for WHO's surveillance work.^{17,18}



CDC's Maureen Barteo represents the U.S. Delegation during the 5th GHS Ministerial Meeting.

Source: Sara Clements/CDC

The U.S. government supports disease surveillance more broadly through the Global Health Security Agenda (GHS), a multi-national program to bolster country capacity to prevent, detect, and respond to epidemic-prone diseases globally. GHS includes real-time surveillance as one of its "action packages" to improve global disease response capacity. The package calls on all countries to develop "a functioning public health surveillance system capable of identifying

potential events of concern for public health and health security." Further, it calls for "country and regional capacity to analyze and link data from and between strengthened real-time

surveillance systems, including interoperable, interconnected electronic reporting systems.” The international impetus behind global health security is a promising vehicle for fostering the political and financial support for a broad-based global disease surveillance system built on the polio platform.

Other organizations are also working together on a global plan to preserve and expand the polio surveillance system, including WHO, CDC, the United Nations Foundation, the Measles and Rubella Initiative, and Gavi. The move is supported by the Transition Independent Monitoring Board, a panel of 11 international health experts convened to oversee polio transition. In its second report, the panel warned that failure to convert the polio system into “the global public good of a modern, dependable, and comprehensive integrated global communicable disease surveillance system” would be a “massive lost opportunity” that would “cost the world dearly.”¹⁹

The Future of Disease Surveillance

Reliable, real-time disease surveillance is essential to global health. It allows the earliest possible response to outbreaks, shows immunization teams where the greatest need is, and provides information to decisionmakers tasked with allocating scarce public health dollars. The polio surveillance system has the reach and technical capacity to serve as

the foundation for the most effective global surveillance system ever developed. But supporters must address challenges to the system’s future. Most critically, this includes designating an appropriate disease surveillance system administrator and ensuring proper funding. As GPEI phases out, it will be up to country governments and global organizations to generate sufficient political will and resources to sustain and expand the polio system. Doing so would provide the best path forward to ensuring outbreaks are detected and contained before they can become widespread epidemics.



Source: Christine McNab/UN Foundation

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Endnotes

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