

Perspective on Global Polio Eradication Initiative

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Abstract

The subject of poliomyelitis cuts across several courses undertaken as part of the requirements for the PhD in Public Health program. It involves issues of public health, use of data in its implementation and monitoring, including education of communities and the population at large on the dangers of the disease and prevention.

In 1988, the Forty-first World Health Assembly adopted a resolution for the worldwide eradication of polio. This resolution marked the launch of the Global Polio Eradication Initiative (GPEI), a public-private partnership led by national governments with five partners – spearheaded by national governments, WHO, Rotary International, the US Centers for Disease Control and Prevention (CDC), UNICEF, and later joined by additional key partners including the Bill & Melinda Gates Foundation and Gavi, the Vaccine Alliance. This followed the certification of the eradication of smallpox in 1980, progress during the 1980s towards elimination of the poliovirus in the Americas, and Rotary International's commitment to raise funds to protect all children from the disease.

The main goal of the GPEI is to eradicate polio worldwide using four strategies, namely: strong routine immunization coverage, conduct supplemental immunization activities (SIAs), conduct Acute Flaccid Paralysis (AFP) surveillance and conduct mop up immunization campaigns wherever and whenever the cases are detected. Since the resolution to eradicate polio was adopted in 1988, the number of wild poliovirus cases have decreased by over 99%,

There are 3 strains of wild poliovirus (type 1, type 2, and type 3). Wild poliovirus type 2 was eradicated in 1999 while wild poliovirus type 3 was declared eradicated in October 2019 during the celebration of the world polio day. This paper has been prepared to enhance the reader's understanding of the disease of poliomyelitis. The paper will present an overview of poliomyelitis in relation to the following

- 1. Background to GPEI*
- 2. Definition of Poliomyelitis,*
- 3. Transmission and symptoms*
- 4. Types of Polio*
- 5. Prevention,*
- 6. Complications*
- 7. Challenges to polio eradication*
- 8. Possibility of eradicating polio?*
- 9. Progress made toward polio eradication*
- 10. Measures to keep the world free of polio after certification of eradication,*
- 11. Benefits of polio eradication*
- 12. GPEI Monitoring Boards*
- 13. Conclusion*

This paper is aimed at creating awareness of the disease to the larger community so as to promote understanding of the importance of eradicating it just as smallpox was eradicated several years ago.

Keywords: *Poliomyelitis*

- GPEI** - Global Polio Eradication Initiative
AFP - Acute Flaccid Paralysis
IMB - Independent Monitoring Board
TIMB - Transitional Independent Monitoring Board

Definition of Poliomyelitis

Poliomyelitis (also known as Polio) is a highly infectious viral disease, which mainly affects young children. Children younger than 5 years are more likely to contract the virus than any other group. The virus is transmitted by person-to-person spread mainly through the facial-oral route or, less frequently, by a common vehicle (e.g. contaminated water or food) and multiplies in the intestine, from where it can invade the nervous system (Wikipedia).

According to WHO reports, even one confirmed case of polio puts children in all countries at risk.

Transmission and symptoms of Polio

Transmission

Man is the only natural host for poliovirus. The virus enters the mouth and multiplies in lymphoid tissues in the pharynx and intestine. Small numbers of virus enter the blood and go to other sites where the virus multiplies more extensively. Another round of viremia (virus in the bloodstream) leads to invasion of the central nervous system (CNS), the spinal cord and brain, the key sites struck by the virus.

As a highly contagious virus, the wild polio virus (WPV) transmits through contact with infected feces. Objects like toys that have come near infected faces can also transmit the virus. Sometimes it can be transmitted through a sneeze or a cough, as the virus lives in the throat and intestines. However, this is a less common mode of transmission.

People living in areas with limited access to running water or flush toilets often contract polio from drinking water contaminated by infected human waste. Pregnant women, people with weakened immune systems such as those who are HIV-positive and young children are the most susceptible to the poliovirus.

Recently, research has pointed towards the role of poor sanitation and hygiene in the spread of polio virus. (Lahariya 2007)

In polio, there is inflammation of the central nervous system, especially the anterior horn cells of the spinal cord and the brainstem (the portion of the brain between the cerebral hemispheres and spinal cord).

Amin t.t. (2014), describes common types of epidemics as common source, propagated epidemics and slow (modern) epidemics. **Common source epidemics** include single exposure/point source and continuous or multiple exposure. **Propagated epidemics** include person-person, arthropod vectors and animal reservoirs. Together with Hepatitis, Polio is classified under the propagated type of epidemics whose characteristics are; usually infectious in origin, have person-person abilities, gradual rise and tails off, transmission speed depends upon herd immunity and have secondary attacks. **Slow (modern) epidemics** refers to non-communicable diseases

Symptoms of polio

Symptoms of polio depend on the type of polio.

Polio can be a minor illness, as it is in 80% to 90% of clinical infections, chiefly in young children, and not involve the Central nervous system (CNS). Symptoms are slight fever, malaise, headache, sore throat, and vomiting 3-5 days after exposure. Recovery occurs in 24-72 hours. This is termed the abortive type of polio.

As a major illness Polio may or may not be paralytic. Symptoms usually appear without prior illness, particularly in older children and adults, 7-14 days after exposure. These include fever, severe headache, stiff neck and back, deep muscle pain, and sometimes areas of hyperesthesia (increased sensation) and paresthesia (altered sensation). There may be no further progression from this picture of viral meningitis or there could be loss of tendon reflexes and weakness or paralysis of muscle groups.

It's estimated that 95 to 99 percent of people who contract the poliovirus are asymptomatic. This is known as subclinical polio. Even without symptoms, people infected with poliovirus can still spread the virus and cause infection in others.

Types of Polio

Non-paralytic polio (abortive polio.)

Signs and symptoms of non-paralytic polio can last from one to 10 days. These signs and symptoms can be flu-like and can include: fever, sore throat, headache, vomiting, fatigue, meningitis. Non-paralytic polio is also known as abortive polio

Paralytic polio

About 1 percent of polio cases can develop into paralytic polio. Paralytic polio leads to paralysis in the spinal cord (spinal polio), brainstem (bulbar polio), or both (bulbo-spinal polio).

Initial symptoms are similar to non-paralytic polio. But after a week, more severe symptoms will appear. These symptoms include: loss of reflexes, severe spasms and muscle pain, loose and floppy limbs, sometimes on just one side of the body, sudden paralysis, temporary or permanent, deformed limbs, especially the hips, ankles, and feet.

It's rare for full paralysis to develop. Less than 1 percent of all polio cases will result in permanent paralysis. In 5–10 percent of the polio paralysis cases; the virus will attack the muscles that help to breathe and cause death.

1 in 200 infections leads to irreversible paralysis. Among those paralyzed, 5% to 10% die when their breathing muscles become immobilized. Paralytic polio, though not fatal, has devastating social and economic consequences among affected individuals. (IDSR Guidelines).

Post-polio syndrome (PPS)

It's possible for polio to return even after one has recovered. This can occur after 15 to 40 years. Common symptoms of post-polio syndrome (PPS) are: continuing muscle and joint weakness, muscle pain that gets worse, becoming easily exhausted or fatigued, muscle wasting, also called muscle atrophy, trouble breathing and swallowing, sleep apnea, or sleep-related breathing problems, low tolerance of cold temperatures, new onset of weakness in previously uninvolved muscles, depression, trouble with concentration and memory. It's estimated that 25 to 50 percent of people who survive polio will get PPS.

Recovery is complete in the abortive and nonparalytic forms of polio. In paralytic polio, about 50% of patients recover with no residual paralysis, about 25% are left with mild disabilities, and the remaining patients have severe permanent disability. The greatest return of muscle function occurs in the first 6 months, but improvement may continue for up to 2 years.

Measures to prevent Poliomyelitis

Polio is a disease that has no cure but it can be effectively prevented by use of the polio vaccine. Polio vaccine, given multiple times, can protect a child for life. As long as a single child remains infected, children in all countries are at risk of contracting polio. Failure to eradicate polio from the last remaining strongholds could result in as many as 200 000 new cases every year, within 10 years, all over the world.

Complications of Poliomyelitis

About 1%-3% of individuals who contract polio may experience permanent paralysis of the extremities and, in some individuals, paralysis of the muscles necessary for breathing. Prior to the development of ventilators (breathing machines), those with such paralysis either spent their life in an iron lung or suffocated.

Polio used to be very common in the United States. It paralyzed and killed thousands of people a year in epidemics before a vaccine to prevent it was developed. Complications of polio include paralysis and death (CDC)

In May 2014, the World Health Organization (WHO) declared the international spread of polio to be a public health emergency of international concern under the authority of the International Health Regulations (2005) to prevent further spread of disease, (Alexander et al (2017).

Challenges to polio eradication

Since its inception, the programme of polio eradication has experienced many challenges. However, most of the challenges have been overcome by various innovative measures that the polio staff, volunteers, partners and Governments have put in place resulting in the progress witnessed thus far.

Some of the challenges include

1. Political advocacy: There is need for sustained advocacy at the highest political level to maintain the tempo of the program.
2. Social mobilization and community participation
3. Poor community participation and insufficient community ownership are factors that have contributed to the endemicity of wild polio virus in the polio endemic areas.
4. Vaccine failure or failure to vaccinate. This may be due to many factors among which is poor social mobilization.
5. Threats of importation and re-emergence. As long as some pockets of wild polio virus still exist in some areas, this challenge is real.
6. The cost of eradication. Millions of Dollars have been spent to get to the low levels of WPV achieved globally. However, with continuing support of all polio eradication partners and involvement of Governments what is remaining to complete the job is not much. Resource mobilization is key to completion of the exercise.
7. New threats
8. The persistence of myths about polio, particularly in endemic areas, can result in low participation and poor cooperation. Hence the need for greater sensitization on the disease of polio and the importance of vaccinations.
9. Other threats include decreased morale of health workers and volunteers when new cases of WPV are reported.
10. In addition, the persisting low routine polio immunization coverage, combined with the below standard quality supplementary immunization activities (SIAs) for polio in several countries, increases the vulnerability to the reintroduction of wild poliovirus from countries where it currently exists and/or the emergence and spread of polio vaccine-derived pathogenic viruses.

Achievements

Since the inception of the Polio eradication programme in 1988, the number of polio cases have decreased by over 99%, from an estimated 350 000 cases in 125 countries, to 102 reported cases in two countries in 2019. As a result of the global efforts to eradicate the disease, more than 16 million people have been saved from paralysis.

In 1994, the WHO Region of the Americas was certified polio-free, followed by the WHO Western Pacific Region in 2000 and the WHO European Region in June 2002. On 27 March 2014, the WHO South-East Asia Region was certified polio-free, meaning that transmission of wild poliovirus has been interrupted in this bloc of 11 countries stretching from Indonesia to India. This achievement marks a significant leap forward in global eradication, with 80% of the world's population now living in certified polio-free regions.

More than 16 million people are able to walk today, who would otherwise have been paralyzed. Furthermore, an estimated 1.5 million childhood deaths have been prevented, through the systematic administration of vitamin A during polio immunization activities.

The Polio Eradication Program has nearly halted ongoing wild-type polio transmission worldwide through use of oral poliovirus (OPV) vaccine. Globally, poliovirus type 2 appears to have been eliminated.

Polio eradication has assumed a prominent position in the regional and national political agendas.

Is it possible to eradicate polio?

Yes, it is possible to eradicate polio. Experience has proved that efforts to reach the global goal of eradicating polio are paying off and meanwhile, efforts are continuing to eradicate all remaining strains of wild poliovirus. The last reported case of poliomyelitis due to wild poliovirus type 2 was reported in 1999: wild poliovirus type 2 was officially certified as eradicated in September 2015. Wild poliovirus

type 3 has not been detected globally since November 2012, when the last case of poliomyelitis due to this strain was reported in Yobe State, Nigeria. Since that time, all cases of paralytic poliomyelitis due to wild poliovirus have been caused by wild poliovirus type 1, which until 2016 continued to circulate in three countries in which the disease is endemic: Afghanistan, Nigeria and Pakistan.

In Nigeria, no new cases of poliomyelitis due to wild poliovirus type 1 were confirmed in 2017, following the detection of cases in August 2016 from Borno State. To this effect, Nigeria has finally been declared free of wild polio virus leaving only Afghanistan and Pakistan still experiencing outbreaks of poliomyelitis due to wild polio virus.

The Global Polio Eradication Initiative is focused on strengthening surveillance to find and respond to the virus, wherever it emerges, and closing immunity gaps to protect the population and stop the virus from circulating. The program is also committed to advocating for sustained political commitment and ensuring necessary financial resources and technical support for polio eradication at all levels.

Progress Against Polio

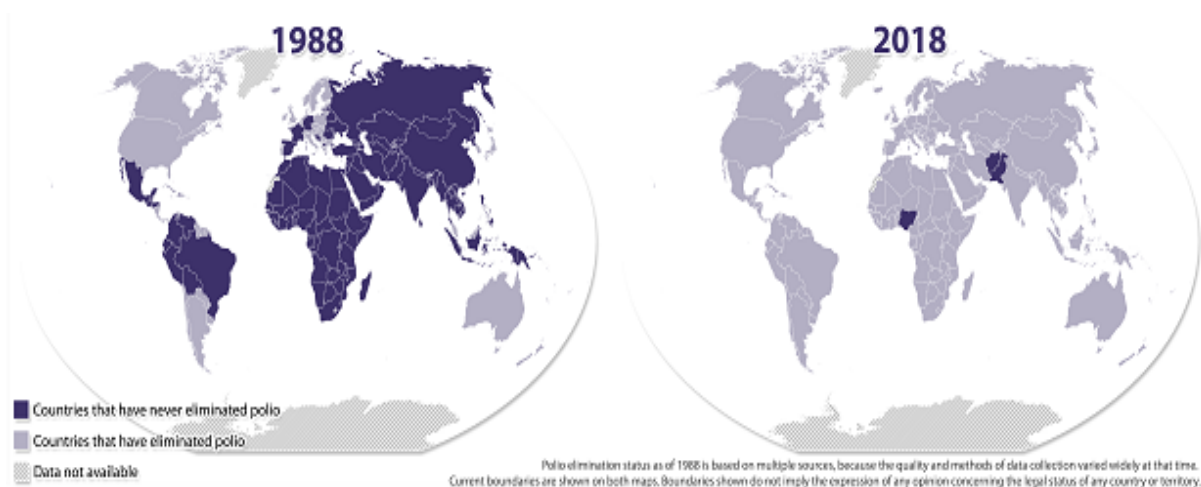


Figure 1

Adapted from CDC 2018.

Measures to keep the world free of polio after certification

To keep the world free from polio after certification, GPEI is working to strengthen surveillance and immunization systems in the African and Eastern Mediterranean regions of the World Health Organization to ensure that polio has truly ended and immunity against the virus improves. In many countries of the world, surveillance against polio is maintained through the GPEI, and vaccination activities continue to ensure that children remain protected. Surveillance is key to early detection of suspected cases of polio.

Surveillance is expected to provide the necessary data with regard to end of polio and should include time, place and persons.

Time. Graph monthly cases (which should be zero to very few cases per area per year), or weekly cases during an outbreak. Evaluate the percent of suspected cases reported within 48 hours and the percentage with adequate laboratory evaluation.

Place. Plot location of case households. Investigate the circumstances of poliovirus transmission in each case thoroughly. Examine the possibility of other potential areas of transmission.

Person. Count monthly routine and outbreak-related cases. Analyze age distribution. Assess risk factors for low vaccine coverage.

Active AFP surveillance also provides a great monitoring tool for presence/absence of poliomyelitis. Through active surveillance, the program is monitored against set indicators.

A polio-free world requires updated vaccination policies, including the phased withdrawal of oral polio vaccines (OPV), appropriate containment of the poliovirus in facilities, certification that polio has been eradicated, and planning for the transition of knowledge and infrastructure to serve other health goals.

Benefits of polio eradication

Once polio is eradicated, the world will celebrate the delivery of a major global public good that will benefit all people equally, no matter where they live. Economic modelling has found that the eradication of polio would save at least US\$ 40–50 billion between 1988 and 2035, mostly in low-income countries. Most importantly, success will mean that no child will ever again suffer the terrible effects of lifelong polio-paralysis.

Furthermore, through the ongoing programme of polio eradication, many other surveillance programmes have been strengthened through lessons learned and by integration with AFP surveillance.

Global polio eradication Initiative monitoring boards

Further monitoring of trends for progress made toward the global goal of eradication is achieved through certain bodies that have been set up to guide the process. These include:

The polio oversight board which consists of

Director General, World Health Organization; Executive Director, UNICEF; Director, U.S. Centers for Disease Control and Prevention; President 2016-17, Rotary International; and, President, Global Development Program, Bill & Melinda Gates Foundation.

Global Polio Eradication Initiative (GPEI) Independent Monitoring Board (IMB)

The Independent Monitoring Board (IMB) was established in 2010 to monitor and guide progress toward stopping polio transmission globally. The Independent Monitoring Board (IMB) assesses progress towards the attainment of a polio-free world, providing independent monitoring and guidance on the work of Objective 1 of the GPEI Strategic Plan – the detection and interruption of poliovirus.

The IMB evaluates progress towards key milestones on the basis of polio epidemiology, poliovirus virology, standard performance indicators and other programme data. If milestones are found to be ‘at risk’, ‘off track’ or ‘missed’, the IMB advises countries, implementing partners, and/or donor agencies on the required corrective action plans, and evaluates the quality, implementation and impact of these plans.

Polio Transition Independent Monitoring Board (TIMB)

As we near the end of the polio eradication initiative, there is a need to plan for the ramp-down and closure of the GPEI. During nearly three decades of operations, the GPEI has mobilized and trained millions of volunteers, social mobilizers, and health workers; accessed households untouched by other health initiatives; mapped and brought health interventions to chronically neglected communities and areas of conflict; and established a standardized, real-time global surveillance and response capacity, and a global laboratory network of accredited labs and personnel.

Polio legacy transition planning aims to

1. Ensure that functions needed to maintain a polio-free world after eradication are mainstreamed into ongoing public health programs
2. Ensure that the knowledge generated and lessons learned from polio eradication activities are documented and shared with other health initiatives
3. Support, where feasible, desirable and appropriate, transition capabilities and processes to assist other health priorities and ensure sustainability of the experience of the GPEI program.

The Polio Transition IMB (TIMB) is tasked with the responsibility of independently monitor and guide the process of transition planning, assessing the quality, sufficiency and impact of work being undertaken to achieve transition planning aims stated in the Polio Eradication and Endgame Strategic Plan 2013-18. The Polio Transition IMB is established at the request of the Polio Oversight Board

Conclusion

Poliomyelitis is a disease of public health concern targeted for eradication. The Global Polio Eradication Initiative (GPEI) has been spearheading polio eradication activities in member states of the World Health Organization (WHO). Since the launch of the Global Polio eradication initiative (GPEI) in 1988, the number of cases has fallen by over 99%. This is a clear demonstration that the end of polio

is nigh. The inability to eradicate polio by the year 2000 (which was the initial target) is a clear illustration that each disease is unique in its own way and thus the GPEI has provided very good lessons that will be put to good use for other public health programs/efforts.

The polio eradication program has greatly contributed to a better understanding of the biological, socio-political and economic complexities of eradication, which will immensely benefit any future effort against other diseases. Furthermore, lessons learnt from polio eradication will benefit countries as they move on with other health programs because in most countries, the global efforts to eradicate polio have expanded capacities to tackle other infectious diseases by building effective surveillance and immunization systems, including integration of other child health programs such as Vitamin A supplementation, de-worming, malaria program activities, etc.

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