

POLIO

STRATEGY OVERVIEW

OUR MISSION

Guided by the belief that all lives have equal value, the Bill & Melinda Gates Foundation works to help all people lead healthy, productive lives. Our Global Health Program supports this mission by harnessing advances in science and technology to save lives in poor countries.

We focus on problems that have a major impact on people in the developing world but get too little attention and funding. Where proven tools exist, we support sustainable ways to improve their delivery. Where they don't, we invest in research and development of new interventions, such as vaccines, drugs, and diagnostics.

Our financial resources, while significant, represent a very small fraction of the overall funding needed to improve global health on a large scale. We therefore advocate for policies and resources to provide people with greater access to health solutions. Strong partnerships are also essential to our success in making a difference and saving lives.

THE OPPORTUNITY

Tremendous progress has been made toward the eradication of polio. In 1988, when the World Health Assembly established the goal of eradicating polio, wild poliovirus (WPV) was endemic in 125 countries and an estimated 350,000 people, primarily young children, developed paralytic disease annually.¹ In the last two decades, the number of polio cases globally per year has decreased by 99 percent to 1,651 in 2008,² resulting in the prevention of more than 5 million cases.³ There remain four countries where indigenous polio transmission has never been stopped—India, Pakistan, Afghanistan, and Nigeria. Of the three WPV types, only types 1 and 3 are circulating.

Many of the key pieces for polio eradication are in place: effective vaccines, a global partnership, and a global mandate to eradicate the disease. This is feasible, as

demonstrated by interruption of WPV transmission for a period in all but four countries. However, the achievement of eradication is continually challenged. Since 2008, more than 20 countries have experienced an outbreak of polio imported from endemic countries.⁴

The risks of not eradicating polio are significant. Potentially hundreds of thousands of children could needlessly suffer lifelong disability. A 2007 report in *The Lancet* also showed that eradication will be much less expensive than a control strategy or containing the spread of disease at low levels over the long term. If we are this close to eradication of polio and fail, confidence in global cooperative programs to tackle the world's other critical health burdens may falter when we need these investments more than ever.

OUR STRATEGY

The aim of our polio strategy is to contribute to the eradication of polio. We support the milestones and strategies set by the Global Polio Eradication Initiative (GPEI)*, a program leading and coordinating the global health community in polio eradication efforts. Our strategy builds on their strong work and views the initiative as the critical vehicle through which polio eradication can be achieved.

Through our polio strategy, we are exploring all possible options to optimize the chances of stopping poliovirus transmission in the fastest way possible. Our role is to support our partners in GPEI by contributing technical and financial resources that can accelerate the implementation of strategies to succeed in the final stages. Many of these strategies are proven, such as campaigns in targeted areas and stronger routine immunization. We are also working with partners on innovative ways to enhance global polio surveillance and outbreak response, accelerate the development and widespread use of vaccines and drugs, and galvanize support for polio eradication efforts from both donor and polio-affected countries.

* The spearheading partners of the Global Polio Eradication Initiative include Rotary International, the World Health Organization (WHO), United Nations Children's Fund (UNICEF), and U.S. Centers for Disease Control and Prevention.

INTERVENTION AREAS

Increase polio vaccination campaigns

Mass immunization campaigns that administer Oral Polio Vaccine (OPV) to every child under 5 are one of the key ways to interrupt poliovirus circulation. Given the crucial role such campaigns play in reducing polio incidence, we support supplemental immunization activities in the four remaining polio-endemic countries and other countries that remain at risk. Through effective campaigns, more people can be reached with the right vaccine in the most highly polio-endemic regions. This will boost immunity levels across the population, leading to a decrease in the number of cases and a lower probability of outbreaks in regions where virus transmission has previously been eliminated.

To ensure that there are enough doses of OPV for the populations who need them, we also have invested in the purchase of vaccine through innovative financing mechanisms. In partnership with the World Bank, we have agreed to buy down World Bank loans to countries that are working to eradicate polio. Our payment is triggered when the country achieves certain milestones in its polio program within a certain time frame. So far, we have utilized this mechanism to support the procurement of vaccines in Nigeria and Pakistan.

We also help fund campaigns to respond to outbreaks. These funds are often difficult to obtain, but the ability to quickly respond to outbreaks is critical to preventing further spread of the disease and sustaining progress against polio.

Create innovative surveillance and control systems

A strong and sensitive surveillance system is critical for successful polio eradication. This worldwide system provides the information needed to ensure resources are accurately targeted, programmatic adjustments are made in a timely and efficient fashion, and outbreaks are identified and addressed as soon as possible.

Surveillance of polio is especially challenging because only a small percentage of infections results in clinically apparent paralytic disease. To ensure that paralytic polio cases will be detected if they occur, countries conduct surveillance for all acute flaccid paralysis cases using a standard case definition and then determine whether that paralysis is caused by poliovirus infection. Poliovirus infection is confirmed by collecting stool specimens from suspected cases and analyzing the stool in a laboratory to see if poliovirus is present.

We are making investments to evaluate and revise the performance of the current global surveillance system, focusing on the highest-risk areas. In addition, we are funding the study and development of new surveillance approaches, which include the development of:

- real-time polymerase chain reaction assays for detection of WPV and vaccine-derived poliovirus, which are more efficient and reliable than existing methods
- laboratory assays that will allow direct and rapid detection of polioviruses without using cell cultures, which are slow and have potential containment risks
- environmental surveillance systems, which could complement acute flaccid paralysis surveillance in the post-eradication era

The vast surveillance networks and infrastructure in place for polio eradication are already proving extremely useful in other health efforts. Recently, they have been used to step up surveillance for cases of the new influenza A (H1N1) virus, especially in Sub-Saharan Africa and the Asian subcontinent, as well as the meningitis outbreak in western and central Africa.

Increase demand among households and communities

Polio eradication has been delayed in part due to gaps in knowledge about what motivates caregivers to bring their infants for vaccination, what limits their willingness to have their children immunized, and how to use this information to reduce the number of children missed during immunization activities.

Our strategy supports investments to collect data on determinants of household and community demand and to refine vaccine-delivery strategies and approaches based on these findings. For instance, this may include offering other products, such as malaria nets, to encourage mothers to get their children vaccinated. Additionally, we are investing in social mobilization and communication strategies to keep families and communities invested in the importance of polio eradication, address their fears and concerns about immunization, and promote other health behaviors that improve the survival and well-being of children.

In India, we support a network of more than 5,000 women who interact each month with more than 1.5 million households in areas where polio transmission is highest. In Pakistan and Afghanistan, we support partners to organize mothers in small, “courtyard” meetings, while in Nigeria, the focus is on “community dialogues” to try to ensure no child misses an opportunity to be immunized against polio

and other vaccine-preventable diseases. Information about these other diseases is included in our Delivery strategy.

Advocate for funding and commitment

Since the call for eradication in 1988, funding commitments for polio have totaled \$7.5 billion (U.S.), representing overwhelming support for the global effort. However, given the challenges in countries where polio is endemic and in high-risk neighboring countries, there remains a shortfall of \$345 million (U.S.) to continue efforts as outlined in the current GPEI strategic plan over the next two years, and the shortfall will increase the longer it takes to achieve eradication.⁵

Our strategy supports advocacy to secure additional funds and sustained political commitment so that eradication activities can be carried out when and where they are needed. Our investments in advocacy include efforts to:

- seek commitments from G8 countries to meet or exceed their pledges
- encourage the governments of polio-endemic countries to maintain or increase support and funding commitments for polio eradication and to provide adequate political and managerial leadership of their programs at all levels of government
- encourage Rotarians to continue raising funds and providing leadership for polio eradication

Develop new vaccines

OPV, the vaccine for polio eradication recommended by WHO, is easy to administer, is inexpensive, protects against paralysis, and provides intestinal immunity that prevents transmission of polioviruses. OPV consists of live weakened or attenuated viruses, which induce immunity against all three polio types. However, very rarely these live, attenuated viruses can cause vaccine-associated paralytic poliomyelitis (VAPP), at the rate of nearly one per 750,000 initial doses administered.⁶ Although it is rare, in settings with very low OPV coverage the vaccine viruses can mutate and become as virulent and transmissible as the wild viruses.

Monovalent OPV (mOPV), which targets poliovirus types 1 and 3, appears to induce protection after fewer doses than traditional trivalent OPV, which administers all three polio serotypes at the same time. Used for the first time in eradication initiatives during 2005, monovalent OPV type 1 (mOPV1) led to a marked reduction in transmission of type 1 virus in 2007. However, because the focus was limited to mOPV1, the type 3 virus reemerged and spread. Therefore, wider strategic use of monovalent OPV type 3 (mOPV3) in combination or alternation with mOPV1 is seen as

critical to eradication of both poliovirus types. Through our investments and advocacy, the use of a bivalent OPV (types 1 and 3) that provides immunity against type 1 and 3 poliovirus is being developed and licensed. The hope is it will be used in campaigns in polio-infected areas with circulation of both types of virus beginning in late 2009.

Following polio eradication, global cessation of OPV use in routine immunization is essential to prevent further VAPP and the spread of circulating vaccine-derived poliovirus (cVDPV). To ensure population protection against the possible reemergence of the virus or a cVDPV outbreak, countries may utilize the inactivated poliovirus vaccine (IPV) for routine immunization. Used in most industrialized countries, IPV works like OPV in providing protection against paralysis, has no side effects, and does not cause cVDPV infection or VAPP. However, IPV is less efficient for stopping poliovirus circulation in developing countries because it provides less intestinal immunity, which is needed to prevent spread of the virus (poliovirus can be shed in the stool and transmitted when a child ingests material contaminated by stool, a problem particularly in low-hygiene areas). In addition, because it is injected instead of dropped into the mouth, IPV is more expensive and difficult to administer in campaigns than OPV.

IPV is produced from inactivation of live. As long as WPVs are used in OPV, there will always be the potential that they will escape and infect people. Thus, our investments aim to expand and accelerate research in developing modified virus strains for IPV production that are safer than wild viruses, yet immunogenic. We are also evaluating strategies to reduce final IPV costs, schedules, and the number of doses required.

Develop antiviral drugs

Stopping routine use of OPV worldwide is crucial to prevent reestablishing epidemic polio. However, whereas some countries will maintain population immunity with high routine coverage of IPV, others will likely have suboptimal IPV coverage, and still others will discontinue all polio immunization.

Most polio experts agree we need to develop one or more antiviral drugs for use in combination with stockpiled vaccines to respond to a future accidental or intentional reintroduction of poliovirus in the post-eradication era. Antiviral drugs also offer the only potential solution to stopping persistent poliovirus shedding in a small but important number of chronically infected persons who have abnormal immune systems that prevent them from getting rid of the virus on their own.

Our strategy supports investments to identify at least two inexpensive, stable, orally administered antiviral drugs that are safe for individuals of all ages and effective against all poliovirus types and strains. Supporting parallel development of antiviral compounds will increase the likelihood that at least one product will be available for use in the post-eradication phase. In addition, the availability of two different classes of drugs will address possible viral resistance issues.

PROGRESS

Eradication is hard, painstaking work. GPEI's overall achievement of reducing the incidence of disease by 99 percent and interrupting transmission nearly globally is remarkable. The operational achievement is likewise impressive. Those involved in the effort have a remarkable ability to find and reach nearly all children and ensure they are immune to the effects of polio. In India, more than 1 billion doses of OPV were administered during polio vaccination campaigns in 2008.⁷ More than 222 million children were immunized in 22 at-risk countries in the last 10 days of May 2009.⁸

In Nigeria, the primary African country where the polio problem persists, there is renewed support from all levels of leadership to tackle polio. There has been substantial progress in many northern states where the virus has been active in the past several years. The Sultan of Sokoto, the supreme Muslim authority in the country, is facilitating discussions with important traditional leaders to engage their support for the national polio program, routine immunization, and revitalization of public health services.

In 2009, the prime minister of Pakistan announced a new Polio Eradication Initiative. Also, U.S. President Obama has committed to working with the Organisation of the Islamic Conference to help eradicate polio in Afghanistan, Pakistan, and Nigeria.

CHALLENGES

While the global health community has had great success in addressing many of the elements required for polio eradication—such as effective vaccines and robust delivery systems—constraints in countries where the disease is endemic have proved difficult to address, especially by external parties. Lack of security and lack of access to children in Pakistan and Afghanistan have made it tough to maintain successful vaccination activities in the region.

Despite significant progress in Nigeria this year, many children are still not getting vaccinated against polio or other vaccine-preventable diseases. Epidemiologically, the

situation is more complex than ever, with the continued spread of poliovirus to the once polio-free southern states, and ongoing circulation of types 1 and 3 disease in the north. Nigeria also has prolonged and worrisome transmission of type 2 cVDPV due to the low levels of routine immunization coverage, particularly in the northern states.

The international spread of polio from northern India and Nigeria, and the persistence of some of these outbreaks for more than 12 months, especially in Angola, Chad, and southern Sudan, is another challenge. We hope that our investments in supplemental immunization activities will help stem the reemergence of polio in these areas.

The current economic climate also makes it difficult to spend significant resources on polio—the cost per case in these final stages is very high. However, the permanent protection of all generations to come against the devastating effects of polio is highly cost-effective. We need enough political will to ensure polio eradication efforts get the funding needed until the virus is eradicated.

WHAT WE'RE LEARNING

Polio vaccines have been used successfully for decades, but we are learning that it's critical to continue investing in innovative new tools in order to reach and maintain eradication. Even the weakened poliovirus used in the OPV can adapt and mutate into a deadlier version that causes polio in the very children it was meant to protect. This is why we've invested significantly in the WHO-led **Polio Research Committee**. Composed of scientific experts, this committee reviews polio eradication-related research, identifies remaining gaps in knowledge, and engages new collaborators and funders as the world prepares for the post-eradication era.

We are also learning that polio efforts can be a robust platform for other public health interventions. Our fight against polio has taught us how to have a real impact on health in the developing world—whether through political engagement, funding, new strategies, or research. Polio efforts have demonstrated how to bring these elements together to achieve success. In addition, the polio network has been used for other public health activities, including the fights against measles, meningitis, and H1N1 flu. We need to continue identifying and taking advantage of the areas where the existing infrastructure can be used to support other health programs.

In the post-eradication period, it will be important to understand the various choices available to countries to vaccinate against polio, and the types of vaccines to use.

To this end, we are learning about the economic and epidemiological costs and benefits of these choices so countries can determine the steps they should take to minimize risk at a reasonable price.

THE WAY FORWARD

Tremendous progress has been made in polio eradication, and the end is in sight. The vaccines, the global mandate, and the commitment from many in the global health community are in place.

Successful eradication will demonstrate that improving health on a global scale is truly feasible. It will also give us confidence that investing in other efforts to reduce major health burdens in the poorest countries in the world is an effective use of international resources. Investments in polio eradication have saved millions of children from crippling paralysis and death, and continue to protect millions more. We are at risk of unraveling all the gains of the past if we stop now. We simply cannot afford to fail.

Strong partnerships are the key to success. We look forward to our ongoing collaboration with such partners as WHO, Rotary International, UNICEF, and the U.S. Centers for Disease Control and Prevention.

TO LEARN MORE

About the Global Health Program:
www.gatesfoundation.org/global-health

About Polio:
www.gatesfoundation.org/polio

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Guided by the belief that every life has equal value, the Bill & Melinda Gates Foundation works to help all people lead healthy, productive lives. In developing countries, it focuses on improving people's health and giving them the chance to lift themselves out of hunger and extreme poverty. In the United States, it seeks to ensure that all people—especially those with the fewest resources—have access to the opportunities they need to succeed in school and life. Based in Seattle, Washington, the foundation is led by CEO Jeff Raikes and Co-chair William H. Gates Sr., under the direction of Bill and Melinda Gates and Warren Buffett.

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