

*The End of Polio Is in Sight. What Have We Learned?* By Richard Conniff author of *Ending Epidemics: A History of Escape From Contagion*.

The fight to eradicate polio has been long and difficult. It's been nearly 50 years since vaccines eliminated the disease in the United States. But polio continues to this day disabling or killing children in some harder to reach parts of the world. The good news is that we are now on the cusp of eradicating this terrible disease everywhere and forever.

The Global Polio Eradication Initiative is a consortium of major players in the fight — the Gates Foundation, Rotary International, the World Health Organization, the Centers for Disease Control and Prevention and Gavi, the Vaccine Alliance. The group has the ambitious aim to end transmission of the virus that causes the disease, wild poliovirus, by the end of the year in Afghanistan and Pakistan, the two countries where it is still actively infecting humans. If the initiative succeeds, it will be the culmination of a campaign that has reduced the incidence of paralytic wild poliovirus from an estimated 350,000 cases in 1988 to just 12 known cases last year.

It will also be a result of what may seem like a counterintuitive strategy: Knowledge about the disease flows not just from medical experts in great research centers to people in developing nations, but the other way as well, with workers on the front lines providing crucial information to stop the disease in their own areas and beyond. The lesson here: The medical tools needed to detect and contain any disease work best in the hands of the people most directly affected by it. Having used this strategy to stop polio, people in developing nations are already looking to apply those same tools against other diseases, both familiar and emerging.

Along the remote, mountainous Afghanistan-Pakistan border, the people on the front lines of the polio eradication effort are mostly women, and mostly members of the communities they serve. Each team is responsible for up to 75 houses, going door to door (or sometimes mosque to mosque), providing a dose of oral polio vaccine to every child in every five-day campaign. Because the communities are poor, and because families can lose patience with repeated visits focused only on polio, the workers also bring nutritional supplements,

health information and other resources. Their job is to build trust in villages where people are prone to distrust, and to keep parents engaged in the fight. (In 2011, the fake vaccination campaign reportedly staged by the Central Intelligence Agency in its hunt for Osama bin Laden served only to deepen that distrust.)

The intensity of the national programs — with about 400,000 workers in Pakistan and 86,000 in Afghanistan — has recently reduced 12 genetic clusters of the wild poliovirus in the region to just two, and one of the two hasn't been seen since November. "From a medical perspective, the virus is gasping in these last corridors," says Dr. Ananda Bandyopadhyay of the Gates Foundation.

The virus could, of course, spread outside these regions, as it did in 2022, when international air travel carried polio to a handful of other countries, including the United States. But frontline workers in Pakistan and Afghanistan serve as a network for tracking its possible escape routes, as families move back and forth across the border.

Sheeba Afghani, a communication specialist for UNICEF's polio program, said that when local health workers make a home visit, for instance, and find a family member absent, they ask questions, such as: "If the child is not at home, where are they? Are they out of the district? If out of the district, is it in the same city or another city?" These are questions outsiders could never ask. If the family member has crossed the border, the information gets relayed to polio workers at the reported destination, to locate newcomers in their own 75-house networks.

New tools also help track the virus as it moves in these areas. When India was struggling to eliminate polio in 2010, it had fewer than 10 sites routinely monitoring for the virus in sewage and surface water, said Dr. Hamid Jafari, the World Health Organization's director of polio eradication in the Eastern Mediterranean region. Back then, to spot an outbreak, health officials had to wait for children to turn up with paralysis. Now, Pakistan has monitoring sites in 84 districts. Over nine months last year, that monitoring alerted the city of Peshawar to 30 separate introductions of the virus. But the Peshawar district's 4.7 million people did not suffer a single case of polio, said Dr. Jafari. Knowing where to look for the virus and maintaining a high level of vaccination among permanent residents kept them safe.

A big part of this success is due to the use of the Sabin oral vaccine rather than the Salk injectable vaccine. The oral vaccine, containing a weakened live virus, is easier to deliver and has the critical advantage of inducing immunity not just in recipients' bloodstream, as the Salk vaccine does, but also in their intestines. That means it stops transmission of the virus in the unsanitary conditions that are common in affected areas (and universal in children). Instead, the live vaccine itself spreads and protects children who might otherwise go unvaccinated.

According to the Global Polio Eradication Initiative, the Sabin vaccine has protected more than three billion children in the past 10 years. But using it involves a trade off: In places with very low levels of polio immunity the vaccine-derived virus can evolve as it spreads, and in rare instances it can revert to a paralytic form. Over the five years through 2023, about 3,600 people, mostly unvaccinated children, have suffered vaccine-derived poliovirus. But the number of cases has already begun to decline thanks to a novel version of the oral vaccine, genetically modified to sharply reduce the risk of reverting.

In Pakistan and Afghanistan, the women on the front lines see the end of polio in sight. This fight has given them the opportunity to work outside the home, earn money and make a lifesaving difference to their villages. When the government of Pakistan recently surveyed them about their experience, one big question they asked was: What can we work on next? Public health workers everywhere already have the answer. Give them the tools, and developing nations will apply the lessons learned in this fight against infectious diseases like tuberculosis, malaria, measles, typhoid fever and others yet unknown. The end result will be a world that's safer for all of us.