Am. J. Trop. Med. Hyg., 109(1), 2023, pp. 6–9
doi:10.4269/ajtmh.23-0154

Perspective Piece

Vaccine Refusal: A Major, Underestimated Obstacle for the Poliomyelitis Eradication Initiative

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Abstract. In 1988, the WHO launched the Global Poliomyelitis Eradication Initiative with the goal of eradication by 2000. Not only has this goal, which has been repeatedly postponed, still not been achieved, but while the wild polio virus is still endemic in two Asian countries, a new epidemic caused by a vaccine-derived virus is spreading and is now affecting numerous developing and industrialized countries, including the United Kingdom and the United States. In addition to biological explanations for the failure of eradication, vaccination refusal by communities in mainly two regions of Africa and Asia has prevented mass vaccination campaigns from achieving their immunization coverage targets. The way these campaigns have been deployed has contributed to mistrust and hostility. The negative reactions of some communities, expressed from the first vaccination campaigns, were belatedly considered, which gave time for rumors to flourish and settle permanently. This failure underscores the importance of taking into account, before any vaccination campaign begins, the "health culture" of target populations—meaning their representations of the vaccines and the health authorities that promote vaccination, as well as their knowledge, fears, and hopes.

INTRODUCTION

On May 13, 1988, the World Health Assembly launched the Global Poliomyelitis Eradication Initiative (GPEI) with the target of eradication by 2000. This target was not met and consequently postponed to 2004, 2008, 2012, 2018, and finally 2026. Poliomyelitis is still endemic in two countries and vaccine-derived or wild polio viruses have been reimported in almost three dozen developing and industrialized countries. In a recent article, the GPEI director emphasized that "the number of cases worldwide has been reduced by more than 99% since 1988," a fact already stated by the WHO in 2000.[1] Why has it not been possible to eliminate the remaining $<1\%$ of cases over the past 21 years? Some analyses focusing on biological or virological explanations have been published in recent years.[2] However, vaccine distrust and refusal, frequently included under the general concept of "vaccine hesitancy," have also contributed to the failure of the eradication campaign.

A STRATEGY THAT DID NOT FIT INTO LOCAL REALITIES

After the success of the polio eradication campaign in South America, the WHO decided to unfold the same strategy in the developing countries: targeting young children with the oral polio vaccine (OPV) through routine vaccination and with mass vaccination during National Immunization Days (NIDs).[3] Memories of devastating polio epidemics, with adult patients lined-up in iron lungs, were still vivid in industrialized countries, along with the successful polio vaccines that brought them to an end. The situation was different in developing countries, where polio was still a childhood disease with few complications and relatively rare. According to the WHO, there were approximately 350,000 poliomyelitis cases in the world in 1988. That same year the number of deaths in children under 5 years of age from various diseases was 600,000 in Pakistan, 820,000 in Nigeria, and 3.6 million in India, to cite just a few examples.[4]

How were populations in these countries supposed to understand the GPEI slogan "Kick polio out of …" (followed by the name of the country) for a disease most people were not even aware of? Deprived of the most elementary health facilities, with very limited access to modern medicine, what did people in the poorest communities of these countries think of NIDs, during which vaccination teams used noisy advertising techniques to attract children, including 4-wheel-drive trucks with loudspeakers, drums, music, and large banners, to offer them free products provided by Western countries? How could they make sense of the vaccinators who went door-to-door to find and vaccinate their children, when no effort was made to address ubiquitous diseases or to provide drinking water and sanitation? As stated in 2007, it was "about as unusual as a stranger's going door to door in America and handing over $100 bills."[5] "Why don't they go to the hospital and help people who are sick, not just focus on polio?" and "Why are they insisting only in polio?" were among the questions that the vaccination teams heard.[6]

Besides this global strategy, certain implementation methods hurt the population. For example, a common practice involved preparatory teams visiting households to count the number of children and then marking that number on their door. This could be perceived as lacking respect if the inhabitants were not informed and did not explicitly give consent. It could also create misunderstandings. Among the Kitawala communities in Democratic Republic of Congo (DRC), for example, it was interpreted as "the mark of the beast" and an announcement of the Apocalypse.[7]

It is no surprise, then, that vaccine refusals occurred in response to the launch of NIDs in many countries in Africa and Asia. In poor, often Muslim communities, a rumor spread that the OPV contained products to sterilize children to limit the population.[8] In most of these countries, the scope of the refusals was limited and repeated NIDs succeeded in eliminating polio cases in a few years. However, in certain countries divided by political, ethnic, or religious conflicts, mainly Nigeria, India, Pakistan, and Afghanistan, the refusals turned into a wave of hostility, with massive refusal of vaccination and even cases of murder of the vaccinators.

Three northern Nigerian states banned polio vaccination in 2003, with explanations such as "Since September 11, the

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Muslim world is beginning to be suspicious of any move from the Western world; our people have become really concerned about polio vaccines" and "We believe that modern-day Hitlers have deliberately adulterated the oral polio vaccines with anti-fertility drugs."[9] UNICEF and the WHO involved traditional and Muslim leaders in the GPEI, taking some to OPV production sites in a Muslim country, Indonesia, which delivered the vaccines for their countries. In September 2004, they organized a meeting in northern Nigeria with approximately 150 Muslim clerics and traditional chiefs from seven central and western Africa countries with significant vaccine resistance. Vaccination resumed in 2004 in the three Nigerian states, yet vaccine refusals persisted, and new cases caused by the wild polio virus were detected up until 2016 in Nigeria, reaching a peak of 798 cases in 2008.

A similar story unfolded in the India/Pakistan/Afghanistan region. Vaccination resistance developed in poor Muslim communities, reinforced in India by the memory of the mass 1976 campaign to sterilize men. The Indian government, ruled by Hindu parties, was suspected of using OPV to sterilize children, with U.S. support. In 2003, the director of the GPEI recognized that in India, "a substantial proportion of children has never been immunized, primarily in Muslim communities, … we must overcome a century of distrust."[10] In 2005, the India Expert Advisory Group of the GPEI considered that "high risk minority population groups" were "young children and Muslims."[11] Here also, UNICEF and the WHO reached out to Muslim leaders and organized visits to production sites in Muslim countries to win their support. Vaccine resistance persisted among Muslim communities, however, especially in the Uttar Pradesh and Bihar Indian states. In Pakistan, in 2019, the polio vaccination campaign was placed on hold for several months after a mob attacked and set fire to a hospital in the Peshawar district, after the spread of a rumor that the vaccine had resulted in sickness and death of children.[12]

Although the last polio case caused by the wild virus was reported in India in 2011, polio remains endemic in Pakistan and Afghanistan, with 20 cases reported in 2022 in Pakistan and two cases in Afghanistan.[13] Among the three types of polio viruses, types 2 and 3 are considered eradicated; the 2022 cases in Afghanistan and Pakistan were caused by type 1. If one applies the estimation that 200 children are infected for one paralytic case, in Pakistan and Afghanistan, 4,000 and 400 persons, respectively, carried the virus in 2022.[14] In 2022, the type 1 polio virus from Pakistan was reintroduced to Mozambique, where it was considered eliminated 30 years earlier, and caused eight cases.[15]

It is worth noting that major vaccine refusals developed in countries where Muslim communities have been in conflict with the central authorities. In contrast, the GPEI did not encounter significant difficulties in gaining adherence of the populations in mainly Muslim countries, such as those of North Africa and the Middle East. Vaccine refusal is concentrated in "high-conflict areas."[16]

The live-attenuated virus of the OPV used for mass immunization reverts to virulence and causes approximately one poliomyelitis case per 2.6 million doses distributed.[17] Consequently, besides the two remaining endemic countries, an epidemic has developed since 2016 due to circulating vaccine-derived viruses (cVDPVs), with 698 polio cases or the detection of cVDPVs in the environment in 36 countries in 2021.[18]

The cVDPVs outbreak primarily involves type 2 cVDPVs due to the removal of type 2 from OPV in 2016, which allowed cVDPV2 to infect nonimmunized children.[2] Two cases of cVDPV2 poliomyelitis were reported in 2016 in Pakistan and Nigeria.[19] In 2017, cases were reported in DRC, as well as in Syria, where the epidemic was halted through vaccination. In 2018, 64 of the 71 reported cases were in DRC, Nigeria, and Niger, where the epidemic has not yet been controlled. From 2019 onward, the cVDPV2 epidemic spread around the world, to reach Israel, the United Kingdom, and the United States, where it was detected in sewage and caused one case of poliomyelitis in New York State in July 2022. The countries where the epidemic spread during the first 3 years are those with the wild polio virus still in circulation (Pakistan, Afghanistan) or in circulation up to 2011 (Nigeria, DRC) or 2012 (Niger). By comparison, countries where the wild polio virus had been eliminated in a few years of mass vaccination campaigns remained free from the cVDPVs epidemic until 2019.

Failure to meet the deadlines for polio elimination in countries where the GPEI met with a high level of refusal had two consequences. First, the repetition of OPV vaccination campaigns for 10 years, even 20 years in some countries, with an average of one billion doses used worldwide per year for at least 10 years multiplied the chances of cVDPVs to occur.[20] For example, in 2005, children under 5 years old received an average of 15 doses of OPV in the Indian states of Uttar Pradesh and Bihar.[21] Second, it contributed to the nonimmunization of a proportion of children in the population, with the result that the lower polio immunization coverage provided an opportunity for cVDPVs to occur.[15,22,23]

The causes of low immunization can be multifactorial, including improper management or the limitation or postponing of NIDs due to the lack of available vaccines or armed conflicts. However, the GPEI, with more than 30 years of experience, deployed intense efforts in the concerned regions, and such difficulties did not prevent the elimination of polio cases in other countries with similar challenges. Vaccine refusal therefore appears to be among the major factors contributing to the failure to attain expected vaccination coverage among certain populations, leading to the persistence of the wild virus circulation in the population and the emergence of the cVDPVs epidemic.[24]

LATE ANSWERS

In 2010, authors Larson and Heymann commented on the polio vaccination campaign in Nigeria: "The crisis could have been averted with a much earlier effort to engage communities and build trust in the areas where overall levels of mistrust were well known" (p. 272).[25] Resistance to vaccination campaigns has occurred previously in history, not due to vaccine defects but repeatedly stemming from a population's perceptions of the authorities promoting the vaccination. A 1996 article describing the drivers of vaccine refusal in Nigeria cited an example of the cancellation of a Rotary immunization project in northern Nigeria because parents refused to bring their children for vaccination.[26] Rotary International was, and still is, one of the main partners of the GPEI, which launched the first NIDs in Nigeria the same year.

GPEI reports mentioned vaccination refusal caused by rumors and recommended involving community and religious leaders as early as 1999.[27,28] Additional steps could have been taken to identify the drivers of refusal, study the community perceptions of mass vaccination campaigns, and develop a program to win the support of local traditional and religious leaders in countries torn by ethnic, religious, and political conflicts. In an analysis of the polio eradication initiative in DRC and Ethiopia, the authors of a recent article noted: "Socio-anthropological studies and health system assessments are important precursors to implementation which can help detect potential implementation barriers, e.g. issues related to community mistrust, local and national politics, and governance and accountability" (p. 13).[8] The GPEI instead tried to push through and multiplied NIDs, reinforcing mistrust among the population. It took years to truly address the drivers of vaccination refusal. According to UNICEF, the "inclusive strategy started gaining momentum in 2003" in India, and Muslim organizations were approached in 2004.[29] In a 2011 report, 16 years after the first NIDs, UNICEF noted that "community-level engagement is beginning to show results," mentioning a "partnership" in Pakistan that "is a very promising and critical start to expanding local support" and a "program" in northern Nigeria that "is piloting several bottom-up approaches to mobilization."[30] The same report mentions existing "pockets of refusal" in Nigeria, DRC, Pakistan, Afghanistan, and Chad. In Nigeria, 18,000 imams received training and information on polio between 2010 and 2014.[31]

Local Muslim leaders of reluctant communities were finally convinced of the safety and efficacy of OPV and became promoters of the vaccination. However, it is easier to lose people's trust than it is to win it back. The distrust had spread among the population over 10 years. It never completely vanished and has been used by radical movements such as Boko Haram in Nigeria or the Taliban in Pakistan and Afghanistan, especially after the 2011 use of a fake vaccination campaign by the CIA to try and locate Osama bin Laden.

CONCLUSION

Causes of low levels of immunization are multifactorial, and it is not possible to measure the specific impact of vaccine refusal. However, preventing and addressing vaccine refusal should have been a GPEI priority, with studies to evaluate the drivers of refusal launched at the onset of the eradication campaign.[32] First, it was crucial to avoid fueling vaccine refusal. Second, once deeply rooted in some communities, vaccine refusal has a lasting effect and might never be fully eliminated, making it the most challenging barrier to high immunization levels. Third, foreseeing and managing refusal does not require substantial financial resources. Delaying immunization campaigns to study and then address the drivers of refusal would have made these campaigns much more efficacious, avoiding the need to carry out repeated campaigns for years, while saving resources.

Vaccination campaigns are not only a matter of furnishing the vaccines, logistics, and financial and human resources. Populations must agree to be vaccinated or to allow their children to be vaccinated. Vertical strategies of vaccination and communication are doomed to fail. To win vaccination adherence, national and international public health authorities and organizations must take into consideration what we propose to call the "health culture" of the target population. This new concept is a framework to design an adapted public health communication strategy and includes health literacy, which has been linked with adherence to public health policies, and perceptions concerning both the health issue at stake and the promoters of the public health policy within the local historical, ethnic, religious, social, and political contexts.[33]

Received March 9, 2023. Accepted for publication April 12, 2023.

Published online May 15, 2023.

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