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Defeating Polio in its ultimate Strongholds-Pakistan and Afghanistan

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ABSTRACT

Poliomyelitis is a disabling and highly contagious disease caused by the poliovirus. The virus can infect a person's spinal cord, leading to partial or full paralysis. In 1988, when polio was widespread in 125 countries worldwide, it disabled about 350,000 people annually. The use of polio vaccines has prevented nearly 24 million cases from 1988 to 2021. Global immunization efforts, along with extensive surveillance systems, have led to the certification of the last wild poliovirus type 2 case in 2015 and the last wild poliovirus type 3 case in 2019. As polio nears elimination globally, Pakistan and Afghanistan remain the only two countries where continuous endemic transmission of poliovirus type 1 persists. Despite early successes in the polio eradication program established in 1994, Pakistan has been unable to control polio transmission, facing a range of challenges. The success of this initiative, however, would largely depend on commitment to immunization, adequate funding, sufficient vaccine supplies, the security arrangements for health-care workers, and public awareness campaigns. Even routine polio vaccination in these countries is far less than 90%, which is an essential requirement for herd immunity. The situation is creating a vast pool of children that may lead to more polio outbreaks in these countries. This study evaluates the factors hindering the polio eradication efforts in Pakistan and Afghanistan and proposes solutions to prevent ongoing transmission and potential outbreaks.

Keywords: Poliomyelitis, Poliovirus, Poliovirus Vaccines, Vaccination, Immunization Programs

Introduction

Poliomyelitis is a life-threatening/ incapacitating disease caused by the poliovirus. It is highly contagious and spreads through person-to-person contact with infected feces, phlegm from the nose or mouth, droplets from a sneeze or cough, and infected mucus. The virus may live in patients' intestines for many weeks and contaminate food – water. The virus can infect a person's spinal cord, leading to partial or total paralysis. Between 2 to 10 % who have paralysis die because the poliovirus specifically affects

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patients' muscles, helping them breathe. Mostly, patients infected with poliovirus have no visible symptoms. They can still pass the virus to others. Only 25% of them develop flu-like symptoms (Centers for Disease Control and Prevention, 2024).

Background

The Global Polio Eradication Initiative (GPEI) is a remarkable success story. It began in 1988, when polio was widespread in 125 countries worldwide, incapacitating about 350,000 people annually. Since then, immunization has become a major focus in public discussion, yielding extraordinary results globally. The disease has been significantly reduced in European countries, North America, and other regions. The use of polio vaccines prevented nearly 24 million cases from 1988 to 2021, compared to a world with inadequate vaccination (Badizadegan, Kalkowska, & Thompson, 2022). Global immunization campaigns, along with extensive surveillance systems, led to the certification of the last wild poliovirus type 2 case in 2015 and the last wild poliovirus type 3 case in 2019. As polio nears elimination worldwide, Pakistan and Afghanistan remain the only two countries where endemic transmission of poliovirus type 1 persists uninterrupted. They have yet to halt its transmission, posing the greatest challenge to authorities. Urgent action is needed to develop strategies to address this situation and eliminate the remaining poliovirus from the world. This study aims to evaluate the factors hindering the polio eradication efforts in Pakistan and Afghanistan and to propose solutions to prevent ongoing transmission and potential outbreaks.

The Literature Review

97% of the world's unimmunized children live in South Asia, with a more significant number of them presenting in Pakistan and Afghanistan**.** Pakistan is spending less than 2% of its GDP on health (Khan et al., 2023). Due to the meager investment in health services, many vaccines and preventable diseases, including polio, are still endemic in both territories. In the last five years,100% of wild poliovirus cases, i.e.,67.5% in Pakistan and 32.5% in Afghanistan, were reported in these countries (Rana et al., 2022b).

Year	Pakistan n (%)	Afghanistan n (%)	Total n (%)
2017	8 (3.1)	14 (11.2)	**22 (5.7)**
2018	12 (4.6)	21 (16.8)	**33 (8.5)**
2019	147 (56.5)	29 (23.2)	**176 (45.7)**
2020	84 (32.3)	56 (44.8)	**140 (36.3)**
2021	1 (0.38)	4 (3.2)	**5 (1.3)**
2022	8 (3.1)	1 (0.8)	**9 (2.3)**
Total	**260 (67.53)**	**125 (32.47)**	**385 (100)**

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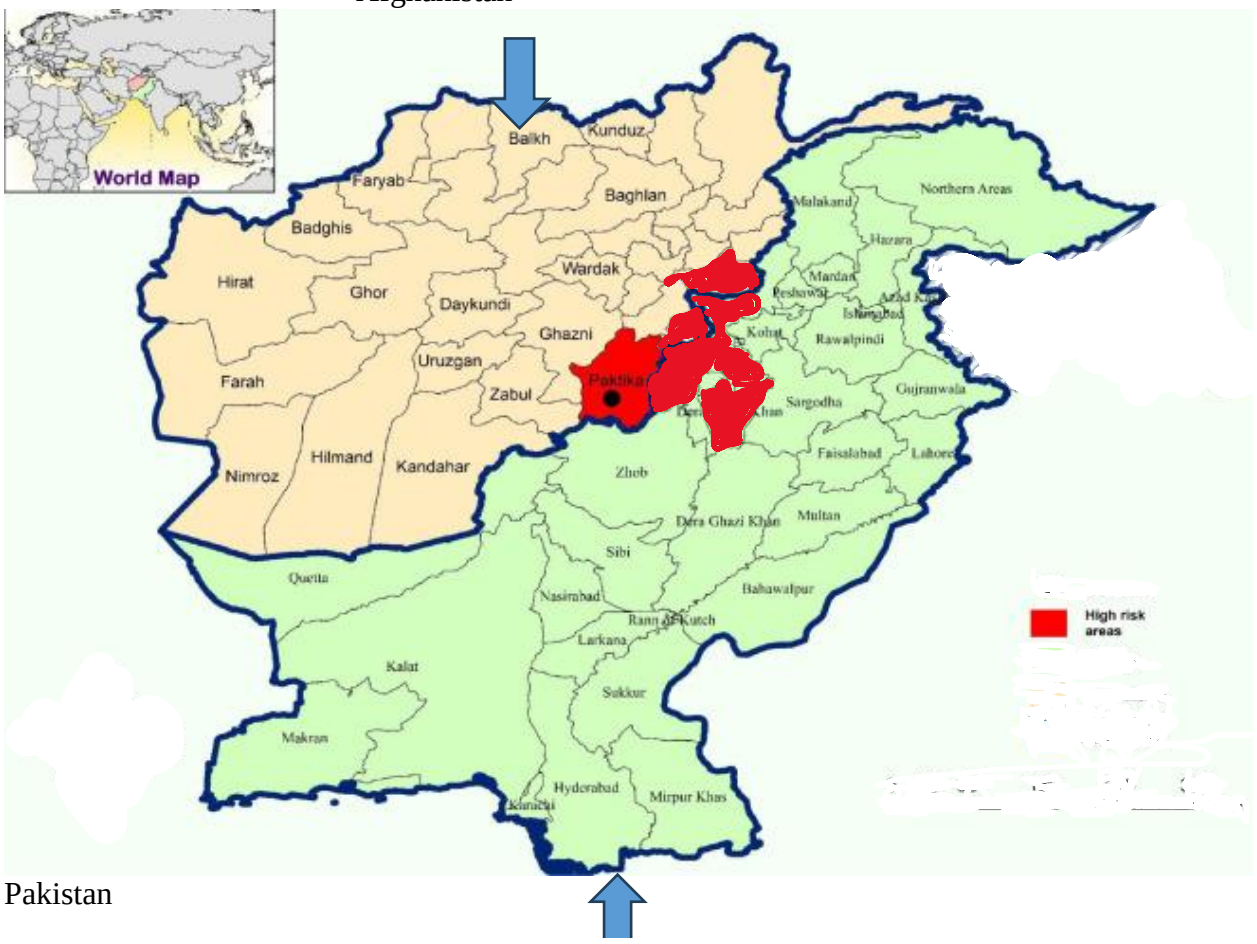
Due to the remaining source of continued polio transmission, Pakistan and Afghanistan have come under international scrutiny as the surviving bastion of Poliovirus and are setting the stage for the WHO polio eradication efforts. (Rana et al., 2022b). Complicated political, religious, and complex security situations in both countries confer one of the world's most complex polio eradication environments. They share a 2,600 km-long border that has been quite freely traveled across by highly mobile populations. Their border area has become a polio high-risk region for the last many years due to a variety of issues that are the focus of this study to be explored.

Afghanistan



Pakistan

Why the Polio Eradication Prog

Despite early successes in the polio eradication program established in 1994, Pakistan has been unable to achieve its ambition of controlling polio transmission. Wild Poliovirus type 1 still lives in this country. Incompetent governance, insufficient and or delayed vaccine supplies, and poor law and order have constantly impeded the success of poliovirus elimination. Insecurity, community fears, and misbeliefs about polio vaccinations remain prevalent (Ataullahjan, Ahsan, Soofi, Habib, & Bhutta, 2021).

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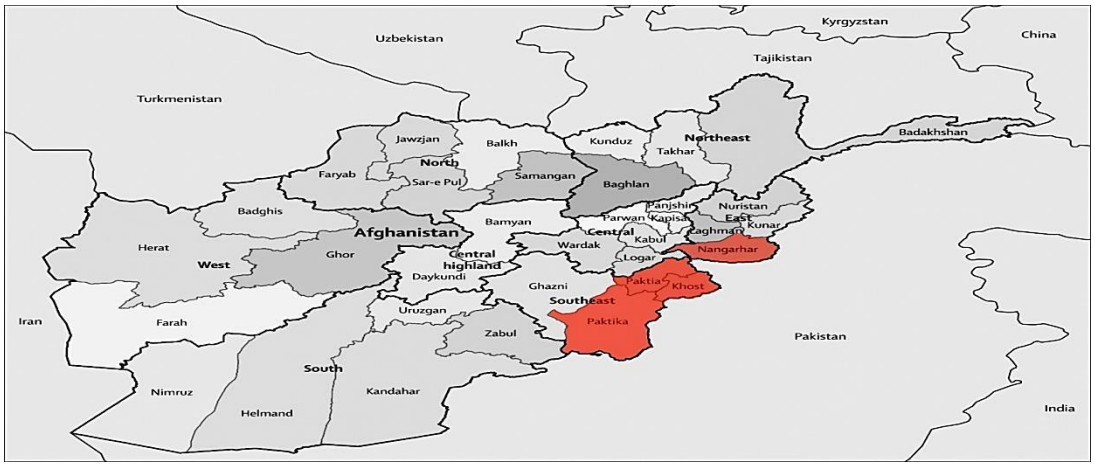

FIGURE 03

Misinformation prevalent on social media has been recognized as one of the most significant barriers to polio eradication. Misinformation claims that polio vaccination has dangerous health effects on children play a highly damaging role in shaping people's beliefs. It has adversely affected public polio vaccination acceptance, which is much needed in the polio eradication program (Ittefaq, Abwao, & Rafique, 2021). A reliable study revealed that 79% of parents were unwilling to vaccinate their offspring, believing that polio vaccine ingredients are prohibited in their religion; consequently, attacks on polio workers are rampant. 70 polio workers have lost their lives since 2012 in the discharge of their duties. (Wahid, Kumari, Saifullah, & Idrees, 2023). As a result, Pakistan has consistently fallen short of its milestones in polio eradication programs.

The most affected region in neighboring countries

Polio transmission remains particularly active in D.I. Khan, Bannu, and North Waziristan districts in northwestern Pakistan, where they have been generating wild poliovirus cases for many years. As of late October 2025, 30 wild poliovirus cases have been reported across several provinces in Pakistan, with 19 cases in this region, 9 in Sindh, and 1 each in Punjab and Gilgit-Baltistan.

As regards Afghanistan, its southern and eastern provinces were controlled by subversive regimes before the resumption of complete control by the existing government in August 2021. The geographic distribution of recurring polio cases in this country has narrowed down to this region, primarily due to prolonged combat engagement, insecurity, and recurring population movements, which have gravely hindered children's access to vaccinations. House-to-house vaccination has remained banned here since May 2018 (Sadigh et al.,2022). Consequently, the Nangarhar, Kunar, Khost, and Paktika provinces of this country, as well as the neighboring Pakistan-affected region, have been identified as a historical high-risk reservoir for poliovirus transmission. It is sustaining poliovirus transmission unabated due to inadequate immunization activities, the presence of refugees/ internally displaced people, and restrictions on immunization.

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Afghanistan's polio eradication program has categorized its territory according to its accessibility, i.e., fully accessible, partially accessible, accessible with limitations, and entirely inaccessible districts. Accessibility, however, worsened, particularly in the eastern and northeastern regions, due to many sociopolitical reasons. A substantial number of children, specifically those living in these hard-to-reach and security-compromised areas, are inaccessible to vaccination, which is a challenge in stopping poliovirus transmission. (Soofi et al., 2022). 99 cases were formally reported in the area in 2024. It is feared that many more unreachable children from the adjoining areas of both countries may be affected due to the unchecked cross-border movement of people.

Methods

It is a descriptive cross-sectional study the prevalence of absolute/relative polio outbreaks from the most threatened territory in South Asian countries. The survey material was retrieved through extensive peer-reviewed literature to identify risk factors in the targeted population and beyond. Google Scholar has been the web-based academic search engine for this research to reach out to the gray literature documents and case studies containing data generally gathered through fieldwork. It has helped to investigate the possibilities of the outbreaks and determine appropriate remedial measures in the scenario of the ground realities. Using the universal linear models of polio transmission, the economics of interventions, and immunity drive dynamics, estimates of polio incidence and numbers of paralytic cases can be prevented.

The recent upsurge in polio recurrence is a tragedy for the families of the infected children. It presents a problematic situation for both countries in particular and the world in general. The polio eradication program was considered to be a great success,

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with the identification of only five cases in the year 2021; it was the lowest toll of polio cases in a decade. This success in polio control, however, could not be maintained as the COVID-19 pandemic severely disrupted immunization dynamics in this period. As a result, cases of wild poliovirus rose in Pakistan and Afghanistan between 2019 and 20. According to reliable research work, the pandemic has left more than 50 million children unimmunized in Pakistan (Rana et al., 2022a) and 23 million children in Afghanistan (Rana et al., 2022a). Such interruptions in usual immunization services can lead to secondary public health crises. Even routine polio vaccination in these countries is far less than 90%, which is an essential requirement for herd immunity. The situation is creating a vast pool of children that may lead to more polio outbreaks in these countries (Tharwani et al., 2022). It is a warning call to step up efforts for its control to avoid undermining the worldwide success in eradicating polio.

Analysis

Despite enormous efforts, Afghanistan has not been able to eradicate polio from its population. Their inadequate healthcare system, politics, and socioeconomics have constantly challenged these endeavors. The success of their polio eradication program is mainly dependent on vaccinating high-risk mobile populations who are unable to avail consistent access to healthcare.

About 74% of the Afghan population lives in rural areas where primary health care and vaccination facilities are hardly available. Millions of children are thus unable to get the polio vaccine.

The political instability and COVID-19 pandemic have aggravated the situation even further. Door-to-door polio vaccination was prohibited by the Taliban regime in 2018; resultantly, 3·4 million children could not be vaccinated. Polio vaccination was almost shut down during the first half of 2020 due to COVID-19 spreading, denying vaccination to about 23 million children. However, in November 2021, the Afghan government resumed polio eradication by permitting door-to-door vaccinations across the country. This is allowing WHO, the UN Children's Fund, and other NGOs to reach out to more than 3 million children in parts of the country that had been inaccessible earlier (Tharwani et al., 2022).

Polio cannot be cured but can indeed be prevented by immunizing every child in the region through an effective polio vaccination. The success of this initiative, however, would largely depend on commitment to immunizations, adequate funding, sufficient vaccine supplies, the security arrangements of the health-care workers, and the awareness campaigns of the masses. Security is essentially vital in a scenario of frequent violence against healthcare workers since the year 2021. The situation can be improved by deploying security forces at vaccination centers and keeping local elders on board to prevent violence against healthcare workers. A serious effort is required to build a public health response through an awareness campaign about the symptoms and health hazards of polio and the requirement for vaccination. It can best be conducted through their school systems with the help of well-informed teachers to the students and their homes and families.

Pakistan is the most populous and one of the least developed countries in the WHO's Eastern Mediterranean Region. It is critical to reach out to more than 18.61 million

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children under five years of age in the endemic and outbreak districts and save thousands of them paralyzed by the poliovirus. According to the Global Polio Eradication Initiative (GPEI), this country has been the reservoir of the highest number of polio cases in the world (Rehman, Sahir, Yaqoob, & Zulfiqar, (2020).

Intensifying polio eradication and vaccine management

Pakistan is facing a range of challenges in its polio eradication due to poor health infrastructure and managerial and operational deficits. Poor governance, insecure environment, illiteracy, and false vaccination reporting are the common issues. Public misconceptions that polio vaccination affects children's fertility are the primary reasons for Pakistan's failure to eradicate polio. This suspicion has led to the highest vaccine refusal rates in polio eradication campaigns, especially in the most threatened areas of the northwestern part of the country. Polio teams and lady health workers have even been mortally attacked many times to prevent vaccination campaigns in these areas. With all the challenges in view, Pakistan needs to formulate an efficient surveillance system to identify places where poliovirus transmission is actually occurring. It is central to the timely assessments of missed populations and designing a polio eradication strategy, ensuring the safety of polio workers. It should be followed by an emergency vaccination campaign to limit the spread of the wild poliovirus by establishing well-equipped transit points in the most affected areas. The misconceptions about the polio vaccine need to be dealt with through awareness on social media platforms and the tribal notables, especially in the most endangered areas. The involvement of influential religious leaders can also help mitigate vaccine hesitancy. Vaccination campaigns should engage community volunteers and establish public-private health partnerships to ensure uninterrupted polio vaccination through supplementary immunization and correct misinformation online.

Improving security protocols for the vaccinators in coordination with law enforcement agencies would remain the key priority in the high-risk areas. It will help handle security issues, improve vaccination coverage, and maintain herd immunity.

Polio elimination requires widespread coordinated immunization across all areas in these countries to stop this highly contagious virus. Immunization of children in border regions and those in transit also needs to be synchronized, mainly because of both countries' shared epidemiological situation. Complete data on vaccination recipients must be kept to track progress and meet annual vaccination targets. Unfortunately, children in both countries are missing vaccines for well-known reasons. The virus is very contagious, and its eradication is an all-or-nothing effort. Failing to eradicate polio from these last strongholds could lead to a resurgence of the disease.

Inadequate attention to protocols for vaccine supply and storage is a critical governance issue that affects timely vaccine delivery for campaigns in remote areas. They must ensure regular replenishment of vaccines and related facilities by operating regional administration and temperature-controlled storage. Both countries, supported by WHO, UNICEF, and donors, should do their best to achieve a poliovirus-free Pakistan- Afghanistan as soon as possible.

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Conclusion

The success of the polio eradication program is still the biggest challenge for the Pakistani and Afghan governments, the WHO, and international donor agencies. These countries are struggling to eradicate polio, and any disruption in immunization may provide an environment for a polio outbreak beyond their territories and undermine the worldwide success in eradicating polio.

Global polio eradication campaign largely depends on Pakistan-Afghanistan's abilities to address religious, socioeconomic, and political challenges to immunization, improve health infrastructure and vaccination coverage, and manage conflicts in polio-endemic regions. Studies in both countries should also continue exploring prospective modeling and updating changes in overage to make polio elimination a historical legacy. According to the Express Tribune's latest report dated 10 February 2024, the Federal Secretary of Health reiterated Pakistan’s commitment to eliminating this disease in the UNICEF executive board meeting.

The world cannot afford to face this threat after the disastrous impact of the COVID-19 pandemic. Until 2012, polio in Africa accounted for the most cases worldwide. Since the discovery of polio, they have performed the highly commendable task of successfully vaccinating over 220 million children. By August 25, 2020, the continent was declared free of the Wild Poliovirus. The polio eradication program in the African region is an excellent example to follow.

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