The Factors and Implications of Polio Vaccine Hesitancy among Pashtuns in the Polio-Endemic Countries of Pakistan and Afghanistan

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Abstract

This project will be a literature review analysis of the impact of vaccine hesitancy upon polio cases in South Asian countries like Pakistan and Afghanistan, specifically regarding the Pashtun ethnic population. This paper will study socio-cultural (such as societal perceptions), political, educational, and regional factors contributing to vaccine hesitancy in South Asia, as well as evaluate public health implications on efforts to combat this resistance to vaccination. It will also discuss parallels between polio vaccine hesitancy and uncertainty surrounding other vaccines such as the Covid-19 vaccines, showcasing a recurring global theme amongst disease or pandemic outbreaks. By synthesizing findings from existing sources, this paper aims to provide insights on how lessons learned from polio-eradicating campaigns among Pashtun people in South Asia can support further strategies for current and future global health initiatives.

Introduction

In our interwoven world today, people are linked by families, cultures, religions, ethnicities - but also, in an unexpected way, by epidemics. In cases like this, it requires endurance and persistence from a population to combat an infectious outbreak, and to take steps towards the eradication of a pathogen. Poliomyelitis, commonly referred to as polio, is defined as an acute neurological condition that primarily affects children under the age of five (Faizan et al., 2024). Up to 70% of polio infections remain asymptomatic, referring to having no symptoms. However, about 25% of infections give rise to symptoms such as muscle weakness, muscle stiffness, fever, and fatigue (ECDC, 2023). This disease is highly infectious, often transmitted via the fecal-oral route, which is when pathogens in feces are ingested by another person. This can occur through the consumption of contaminated food or water, as well as direct and indirect contact, contributing to the bulk of cases in areas with a lack of quality sanitation and poor hygiene (Hussain et al., 2016). Polio is caused by three serotypes, also referred to as Wild Poliovirus (WPV) types 1, 2, and 3. WPV2 and WPV3 were considered expunged in 2015 and 2019, but a strain of WPV1 continues to circulate in South Asia. (Centers for Disease Control and Prevention [CDC], 2024b). Today polio has neared eradication and is no longer endemic to most countries due to the introduction of vaccines except for two: Pakistan and Afghanistan.

Pakistan and Afghanistan are the last two polio-endemic countries in the world, meaning an infection within a geographical location occurs perpetually (Deb Balzer, 2016). These countries differ from outbreak regions where polio cases surge unexpectedly at one time (Deb Balzer, 2016). This disease is most prominent among the Pashtun population, and therefore where eradication is particularly challenged. This is an ethnic group of people located in Northern Pakistan and Southern Afghanistan. A primary reason for the difficulty to eradicate polio in this population is the reluctance of communities in accepting vaccinations, a culmination of socio-political, cultural, governmental, and educational factors that will be further explored in this review. This concept is referred to vaccine hesitancy, or “a delay in acceptance or refusal of a vaccination, despite available vaccination services” for oneself or one’s children (Macdonald & SAGE Working Group, 2015).

To combat Polio, two versions of vaccinations exist and have been distributed worldwide, eliminating the spread of this disease outside of Pakistan and Afghanistan. The primary vaccine to be developed was the inactivated poliovirus vaccine (IPV) in 1955. The composition of this vaccine entails inactivated, or "killed" poliovirus particles. Typically administered through injection, this vaccine is utilized in many non-endemic countries as part of routine vaccinations. In the United States, the IPV promoted a sharp decrease in viral transmission and diagnoses of the disease from approximately 20K per year in the 1950s to less than 1K cases by the 1960s (Hussain et al., 2016). Several years later, the live-attenuated oral poliovirus vaccine (OPV) was created in 1963, containing live but "weakened" poliovirus particles administered orally through drops in the mouth (CDC, 2024a). The OPV has remained the immunization method most prominently used by developing countries, as it has proven to be the more cost-effective as it is cheaper to produce and distribute, and efficiently reduces polio spread, and is the more easily administered option (Hussain et al., 2016). While it is not without its benefits, there are situations where the OPV vaccine has not been fully effective, and has instead facilitated poliovirus-induced poliomyelitis among vaccinated cases.

There are two distinct types of such outbreaks: circulating vaccine-derived poliovirus (cVDPV) and vaccine-associated paralytic poliomyelitis (VAPP) (CDC, 2024a). These are both risks of the OPV vaccine, but differ in how the virus behaves and spreads. VAPP occurs in about one out of every 2.7M doses of OPV, and results when the weakened virus in the OPV mutates within an individual, directly causing paralysis. It affects the recipient and possibly close contacts, but does not lead to widely spread infections nor sustained transmission within a community (Lai et al., 2022). On the other hand, with cVDPV, the weakened virus in the OPV circulates in a population with low immunity. Unlike VAPP, cVDPV can spread and cause outbreaks in under-immunized populations. Between 2000 and 2021, less than 1K cases have been recorded of VAPP worldwide, as opposed to over 1K confirmed cases of cVDPV in just 2020 alone - this was caused by vaccine programs being wound down during the 2020 Covid-19 pandemic (Lai et al., 2022). Occurrences such as this have further worked to catalyze the resurgence of vaccine hesitancy among the Pashtun people.

Historically, global experiences with polio have affected countries including the United States. While in the early 20th century, when major outbreaks of polio were on the forefront of minds, such as the New York outbreak (1907) with more than 2K recorded cases, now almost a century later are barely common knowledge (Serfling & Sherman, 1953). However, with countries like Pakistan and Afghanistan, this disease still remains a pressing reality. Recognizing the urgency to take action, organizations such as the Global Polio Eradication Initiative (GPEI) and U.S. Aids Organization are working to inform those affected/potentially affected by Polio, and providing them with accessible and effective vaccinations.

The objective of this paper is to ascertain the degree in which socio-political, regional, and healthcare factors contribute to the vaccine hesitancy for polio-endemic countries such as Pakistan and Afghanistan, and how targeted interventions address these challenges.

Regional Influence On Transmission

Within the geographical setting of South Asia, there is a populace that is situated primarily on the Southern border of Afghanistan and northern border of Pakistan: the Pashtuns. This is an ethnically diverse group of about 40M to 50M people who speak their native language of Pashto (Bullard, 2025). While they are the largest ethnic group in Afghanistan, they happen to be the minority group relative to Punjabis in Pakistan that is predominantly affected by polio,

specifically by WPV1. This strain is spread in the provinces/cities of Peshawar, Khyber PakhtunKhwa (KPK), and Balochistan, which are in Pakistan, as well as Kabul and Mazar-i-Sharif in Afghanistan (Figure 1). The health challenges of these countries have been compounded by a harsh landscape, with northern Himalayan glaciers and tough terrain in the south, presenting barriers to inefficient access to healthcare resources (Basharat & Shaikh, 2017).

Figure 1
Regional Map of Pashtun Population

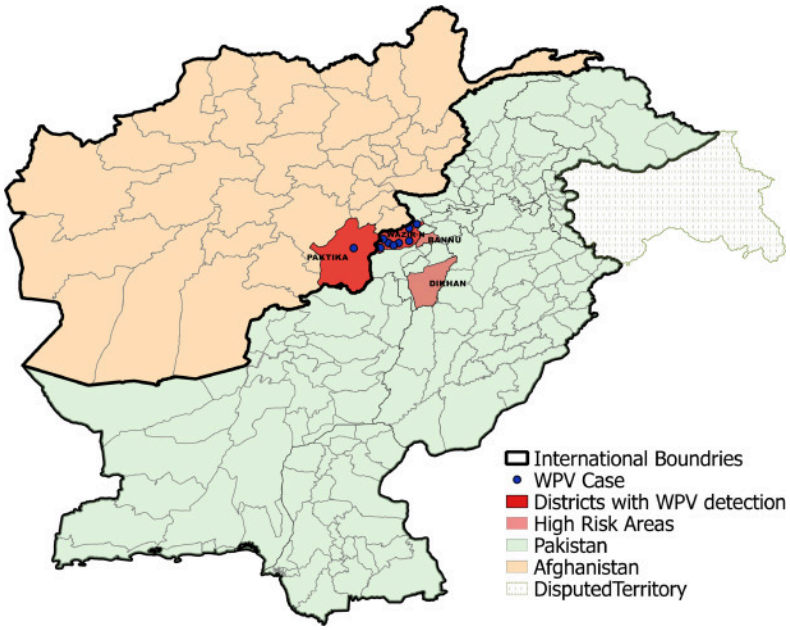
Note. Adapted from Morris (2017).

Overcrowding and a limited access to clean water in many Pashtun inhabited areas in Pakistan and Afghanistan are also factors in advancing the spread of polio. In cities like Peshawar and Kabul, where the majority of Pashtuns are situated, these densely populated areas suffer from overflowing sewage, contaminated water pumps, and poor waste disposal systems (Hussain et al., 2016). In both Pakistan and Afghanistan, many rural and urban slums do not have access to clean drinking water, and coupled with flooding and droughts, exacerbate water contamination (Morris, 2017).

A lack of quality environmental sanitation makes for surroundings where WPV thrives, given that WPV spreads through fecal-oral transmission. In the urban slums of areas such as Peshawar and Kabul, the high population densities and open sewage systems contribute to increased WPV transmission. In Afghanistan, only about 50% of the population has access to basic sanitation services such as flush toilets, as well as working showers and sinks with clean water (World Health Organization [WHO], 2023). Similarly, a 2022 report indicated that 60% of rural populations in Pakistan had access to hygienic amenities, suggesting that a significant portion of the population still lacks adequate facilities (United Nations, 2022). An absence of hygiene infrastructure also contributes towards the spread of this disease, with many schools,

houses, and infrastructures being deprived of access to sanitation facilities, exposing people (children especially) to infection.

Figure 2
Regional Map of Polio-Affected Areas



Note. Adapted from Rana et al. (2022).
"Disputed Territory" refers to Pakistan's disputed territory with India.

Regional barriers also include cross-border contamination of the WPV disease across Afghanistan and Pakistan. Regular travel, often unmonitored, allows the poliovirus to proliferate in both countries. In 2015, a prominent number of poliovirus cases in Afghanistan's Nangarhar province, which borders Pakistan, were found to be genetically linked to Pakistani cases (Khan et al., 2017). Cross-border zones are increasingly significant spots for polio transmission, as thousands of people cross the Durand line (the 2,600 km border) daily, which facilitates frequent movement (Figure 2). Areas along this border have low vaccine-immunization coverage as well, due to security threats and poor infrastructure. Finally, the terrain and mistrust of authorities make environmental and clinical surveillance difficult, further worsening the access to adequate vaccination resources (Rana et al., 2022). Inadequate sanitation and cross-border transmission remain major barriers towards polio eradication, as environmental and healthcare issues in the regions of Pakistan and Afghanistan provide the building blocks for the virus to spread.

Socio-Cultural Factors

Parental and Cultural Motives

Among the Pashtun people, there lies several reasons other than environmental hindrances that promote vaccine hesitancy. Parental refusal and family hierarchies are two that evidently impede polio vaccination efforts. Factors associated with this include parents' low health awareness, which will be explored in later sections, as well as low financial status and the number of children per household (Shah et al., 2019). Among many Pashtun communities, there is a presence of conservatism, in that women are not necessarily the ones to participate in

health initiatives or decision-making (Khowaja et al., 2012). Women are seen as the traditional caregivers of children, promoting hesitancy to vaccinations among women as they are often not given the privilege to judge for their kids. In Pakistan's Khyber Pakhtunkhwa province, which houses the majority of the Pashtun population, more than one million parents refused for their children to be vaccinated due to fears such as infertility and heightened illnesses ("Over a Million K-P Parents Refused Polio Vaccination in 2019", 2019). More than that, in tribal areas, Pashtun men are the "heads" of their households; this gives them a more prominent role in familial matters and mandates them to live by their "Pashtunwali code" (Hawkins, 2009). Pashtunwali is a traditional series of tenets that "define how the tribe interacts and provide guidelines for normative behaviours in living a Pashtun lifestyle" (Hawkins, 2009). This includes hospitality, justice, honor, bravery, dignity, respect, a council-of-elders, patience, and strength. However, these revered principles are also ones that have vehemently contributed to vaccine hesitancy among Pashtuns in particular. Their fundamentals of honor and reciprocity often intersect within the broader mistrust of the government and foreign bodies, contributing to vaccine hesitancy (Bullard, 2025).

Religious Influence

Religious figures also play an integral role in shaping the perception of vaccine distribution, as their views either facilitate or promote vaccine hesitancy depending on their stance. Studies have shown that various religious clerics in Pashtun society propagate skepticism to polio immunization campaigns, framing them as Western intercessions meant to impede Islamic law (Hawkins, 2009). This is true, as in the Khyber Pakhtunkhwa (KPK) area of Pakistan, extremist clerics disseminate information through mosque loudspeakers and radio stations to portray polio vaccinations as a plot to sterilize Muslim kids; such propaganda has been deemed by the World Health Organization as attributing to 60% of vaccine refusals due to "religious reasons" (Walsh, 2007). According to Farivar et al. (2024), some Afghan and Pakistani clerics argue that medical treatment from non-Muslim countries should be approached with caution as per religious interpretations regarding bodily purity. However, to argue with this narrative, many Islamic scholars have issued fatwas (rulings) affirming the necessity and validity of vaccinations to promote public health. In fact, there are also instances where targeted public health interventions, including community-based educational initiatives and advocacy from trusted community leaders, have improved the vaccination rates in the Khost province, Afghanistan (Zaman, 2021, p. 21). In 2022, UNICEF reported that despite challenging circumstances, routine immunization coverage aided 94% of the population, with over 1.4M children per year receiving vaccinations. This was attributed to the efforts of local community leaders such as Juma Khan in working towards organizing mosque meetings, visiting families, and publicly vaccinating their children to encourage vaccine acceptance (Hamidi, 2024; Afghanistan UNICEF, 2022). Similarly, in 2015, religious leaders were imperative in reducing OPV and IPV vaccine refusals in Pakistan from 25,000 to 219 in recent years (Saeed, 2024).

Cultural Misinformation

A prominent cultural misconception that has circulated in the Pakistan-Afghanistan region and that has promoted polio vaccine hesitancy is the belief that the OPV and IPV vaccines cause infertility. This myth is rooted in broader biases that Western powers control the efforts targeting Muslim-populated countries. Misinformation of this nature has been widely disseminated by extremist groups, such as the Taliban, who take part in leveraging

socio-political tensions to enforce anti-immunization beliefs (Soofi et al., 2023). This distrust is further amplified by instances such as the United States Central Intelligence Agency's (CIA) use of a fake hepatitis B vaccination campaign in order to locate Osama Bin Laden in 2011, fueling conspiracy theories that such campaigns serve as tools of espionage (Zaman, 2021, p. 20-21). Even after a decade, the Pashtuns have remained apprehensive of vaccinations particularly because of this incident, and don't appear to move past these sentiments (Zaman, 2021, p. 21). This occurrence is another example of how the trust in healthcare professionals has dwindled among Pashtuns, who believe healthcare schemes to be government propaganda, often opting to listen to religious and internal figures.

Governmental Factors & Political Unrest

Like many Asian countries, Pakistan's political system is founded on Islamic principles. This Islamic state retains a prime minister, a president as chief of state, and a bicameral parliament representing a federal and supreme legislative branch (Zaman, 2021). Islamic beliefs such as believing in a single God provides for Islamic institutions in the government, such as the Council of Islamic Ideology (CII), which advises legislature on which laws align with Islamic principles. Like Pakistan, Afghanistan is a unitary Islamic state and has a deputy of state rather than president, but it is similar in that Afghanistan retains a prime minister as head of the government (Afghanistan UNICEF, 2022). Being a theocratic country, Islamic scholars hold great authority in the government. However, as observed in recent decades, the political state of Afghanistan has been increasingly unstable with the rule of the Taliban, an extremist terrorist group that is based upon "Islamic" principles, and this civil unrest has been a prime contributor to the vaccine hesitancy in the Pashtun population along the Afghanistan border (Soofi et al., 2023). In these situations, the government often remains silent to maintain religious and political legitimacy, especially as powerful clerics or madrasa networks oppose vaccinations.

Religious ideology often intersects with public policy in both countries, further complicating vaccination intervention movements. In conservative Pashtun areas where anti-vaccine rhetoric circulates with the belief that polio campaigns are Western conspiracies meant to harm and sterilize children, these narratives gain traction particularly when echoed or disregarded by political leaders. For instance, amidst the Taliban's earlier control of areas of Afghanistan prior to 2021, they banned polio vaccinations in regions completely under their influence, accusing health workers of being foreign spies and claiming that the vaccine was "un-Islamic" (Soofie et al., 2023). Despite regaining control in 2021, the Taliban effectively delayed house-to-house vaccination campaigns, disregarding the urgency of polio eradication and endorsing public uncertainty (Hamidi, 2024). Alternatively, in Pakistan, former Prime Minister Imran Khan publicly supported both the IPV and OPV as part of Pakistan's polio eradication efforts (Zaman, 2021). Nevertheless, government instability and political dissent have promoted the hesitancy that stems from distrust in these government systems. According to Hussain et al. (2016), the lack of a centralized, transparent health policy has led to public distrust, especially in rural Pashtun-dominated areas where misinformation is rampant.

The fragility of the healthcare systems in both countries also exacerbates polio vaccine hesitancy. As of 2022, Afghanistan allocated about $80.65 per capita on healthcare, while Pakistan spent approximately $39 per capita (WHO, 2022a). These underfunded systems lead to inconsistent healthcare services, poorly trained workers, as well as a lack of outreach in underprivileged communities. As a result, the accessibility and credibility of healthcare services

in Pakistan and Afghanistan suffer, with citizens more likely to believe misinformation rather than evidence-based guidance from medical professionals.

This issue is further intensified in conservative Pashtun communities, where religious leaders and local political figures often hold greater social jurisdiction than healthcare workers (especially female experts). Despite their influence, the majority of religious and political leaders refrain from actively consulting with medical professionals, allowing for vaccine myths - like infertility or Western conspiracies - to circulate unchecked (Farivar et al., 2024). The lack of endorsement from leaders coupled with chronic underinvestment in healthcare all work towards promoting the marginalization of professional medical voices within Pashtun society.

Moreover, violent resistance to campaigns continues to undermine vaccination efforts. In both Pakistan and Afghanistan, militants have targeted health workers and contributed to over 100 deaths reported since 2012 in Pakistan alone (Afghanistan UNICEF, 2022). These attacks not only discourage participation in immunization initiatives but also erodes institutional trust. When communities view vaccinators accompanied by armed guards, it reestablishes the perception that public health is a militarized, foreign agenda rather than a community-driven effort.

Education & Misinformation

A lack of education has also proven to be an obstacle in acquiring vaccination approvals from Pashtun families. In regions like KPK and the Federally Administered Tribal Areas (FATA), lower literacy rates - estimated at 33% overall - have contributed to widespread falsification and mistrust of vaccination campaigns (*Khyber Pakhtunkhwa Education Sector Analysis*, 2019, p.31). This absence of education has also prompted Pashtun families to be more susceptible towards conspiracy theories and religious misinformation, as mentioned previously. The intersection of limited education and clerical influence continues to pose a barrier towards polio vaccination efforts in many Pashtun communities.

As stated before, women play the role of traditional caregivers and with their limited education, prompts them to be more skeptical about medical initiatives possibly affecting their children. In tribal areas where female literacy is as low as 8% and with many households having limited access to education, misconceptions about the vaccine persist (Khan & Salarzai, 2024). Misconceptions about the OPV vaccine in particular flourish, such as the beliefs that it causes infertility, paralysis, and long-term health complications. Beyond health-specific knowledge, there is a deeper rooted problem of limited science literacy. In underfunded school systems, subjects such as biology, immunology, and disease transmission are rarely taught in detail, providing for people to not understand how viruses spread and the benefits of vaccinations to the immune system (Hussain et al., 2016). This gap in scientific education allows for misconceptions to take root in an already-mistrustful society. A 2021 qualitative study in Karachi, Pakistan found that several parents believed that the OPV vaccine was linked to children “becoming weak” or “poisoned”, likely due to a lack of knowledge in this subject area (Khowaja et al., 2012).

These assumptions are often intensified by the negative use of social media, including the application of Whatsapp as well as local radio stations working to circulate fear about polio vaccinations. For example, in April 2019, a false video showing school children allegedly fainting after receiving the vaccine in Peshawar prompted mass hysteria; more than 25K children were rushed to hospitals, in turn vandalizing various healthcare facilities (Sirajuddin, 2019). This incident prompted a halt in vaccination campaigns in several Pakistani districts. While these

campaigns did resume in the months following this event, the government first halted such efforts in multiple KPK districts. This was due to many health workers being attacked, and the surge in vaccination refusal rates, particularly in Pashtun communities prone to mistrust (Sirajuddin, 2019). The combined factors of low education, a fear of harmful vaccine effects, and a negative use of social media to rapidly disseminate misinformation have thoroughly entrenched vaccine hesitancy across the majority of the Pashtun belt.

Prior Solutions & Interventions

To address persistent vaccine hesitancy in the Pashtun regions of Pakistan and Afghanistan, a bevy of public health interventions have been endorsed - some with measurable success, and others with limited impact. A commonly utilized strategy has been the deployment of Female Community Health Volunteers (CHVs), who engage women in conservative households where male workers are not welcome. In Afghanistan, the employment of over 70,000 trained female polio workers - who are often from the same local community they are sent to work in - has led to heightened trust and an access to children that was previously unattainable with the practice of male workers (Afghanistan UNICEF, 2022). A similarly targeted approach saw success in Pakistan through the Lady Health Worker Program (LHW), an organization that was imperative in reaching rural Pashtun communities, and that provided routine immunization coverage in other low-performing districts (WHO, 2021). These initiatives can also be attributed to the work of the Global Polio Eradication Initiative (GPEI), an organization working since 1988 to target polio outbreaks and supply countries struggling with this disease to combat it effectively (Hussain et al., 2016).

Conversely, several interventions have failed due to poor community participation due to threats towards campaign workers. In both countries, efforts to enforce mandatory vaccinations without establishing community trust have often been futile, with misinformation spread and even the threat of violence. In Afghanistan, the repeated banning of house-to-house polio vaccination campaigns by the Taliban (2018-2021) severely impaired GPEI-led initiatives. During this time period, over 3.4 million Afghani children were not reached by polio vaccination efforts each year (Saif, 2022). This distrust is further complicated by past events such as the CIA's fake vaccination initiative, which severely damaged trust in Pashtun areas (Zaman, 2021).

Relevance Today

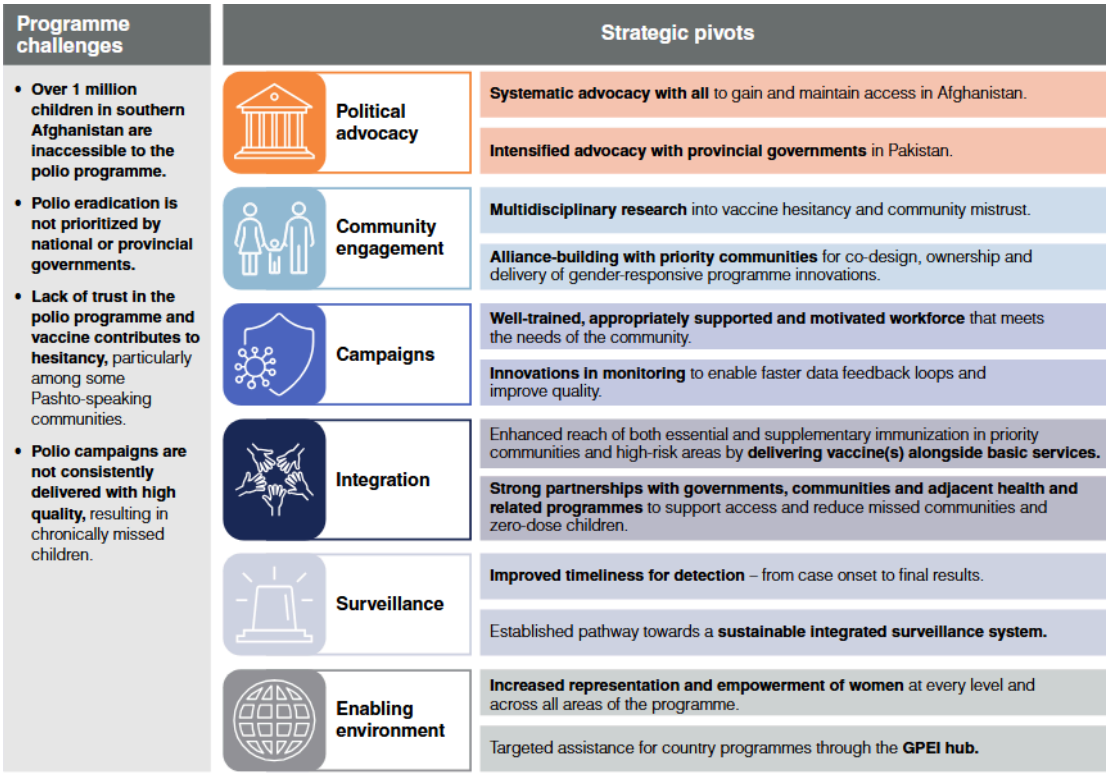
The urgency of eradicating polio in the Pashtun communities of Pakistan and Afghanistan remains increasingly relevant in today's global health context, particularly in the aftermath of the Covid-19 pandemic. The Covid-19 pandemic has significantly impacted global vaccination efforts, leading to decreased coverage for many diseases, including polio. Lockdowns and the reallocation of healthcare resources have disrupted routine immunizations, resulting in millions of children missing essential vaccines. UNICEF estimates that 67 million children missed out on at least one vaccine from 2019-2021, equating to a global decline in vaccination rates (Afghanistan UNICEF, 2023). In countries like Afghanistan, polio immunization coverage dropped to 76% among children 12-23 months old by 2022, leaving thousands vulnerable to disease contraction (Bjork et al., 2023).

Vaccine hesitancy has also increased globally since the pandemic, with factors such as widespread information and political polarization contributing to this rapid development. In many countries, studies show that confidence in routine childhood vaccines has declined in over 50% of countries post-Covid, including Afghanistan and Pakistan (Afghanistan UNICEF, 2023). In the

United States, geopolitical influences have further affected vaccination efforts. For instance, under Health Secretary Robert F. Kennedy Jr., the United States has ceased more than one billion of their annual contribution to Gavi (The Vaccine Alliance) in regards to immunization funding for children and the appointment of vaccine workers in highly affected areas (Tanis, 2025). These foreign aid cuts in recent years have affected both polio-specific funding and additional health infrastructure in affected regions, as well as undermined public trust in American society. These actions have also coincided with outbreaks of preventable diseases such as measles and malaria, highlighting the consequences of deficient vaccine confidence. For instance, nearly 61 million measles vaccine doses were delayed due to Covid-19 disruptions, as well as cuts to global health aid programs (WHO, 2022b).

Figure 3

Structured Plan by GPEI to Combat Polio Vaccine Hesitancy



Note. Adapted from WHO (2021).

While the GPEI has continued its efforts to eradicate polio, including a $2.6 billion plan to end polio by the year 2026, these goals have been put at risk due to pandemic setbacks and diminishing prioritization in public health by political administrations (Figure 3). The legacy of past pandemics such as Covid-19 have had negative implications upon the polio vaccination campaign, including a resurgence of unvaccinated children and heightened skepticism toward related public health campaigns. This is especially relevant in Pashtun communities affected by polio, as their evident reluctance requires renewed, locally-credible, and trust-based interventions to make a lasting impact.

Discussion

This literary analysis aimed to examine the underlying causes of vaccine hesitancy among Pashtun communities in the polio-endemic regions of Afghanistan and Pakistan. This highlights the crossroads between regional, socio-cultural, governmental, political, and educational influences. Through this review, it becomes evident that the presence of vaccine hesitancy in this population is not due to one cause but rather a complex interchange of historical mistrust, societal figures, misinformation, educational disparities, as well as gaps in healthcare infrastructure. The analysis also revealed that while various interventions have been proposed and implemented - ranging from religious leader engagement to female health workers - their effectiveness remains limited without extensive societal change. These findings relatively align with global vaccine hesitancy, highlighting the necessity of culturally sensitive and community-driven initiatives in combating resistance to immunization.

Among the most prominent themes identified in the literature are the geographic and educational disparities that shape vaccine perceptions in Pashtun communities. Prominent regional issues include overpopulation, a lack of sanitation, as well as minimal access to water - all of these issues further the transmission of polio that then promotes hesitancy to immunization. To reduce the prevalence of vaccine hesitancy, these living conditions suggest the prospect of targeted healthcare sanitation strategies towards circumstances that facilitate the spread of WPV1. Furthermore, the regional landscape provides for harsh climates where healthcare access is limited, and the occurrence of cross-border polio transmission is increased among the Pashtun population. These details necessitate the consideration of policymakers in working towards monitoring cross-border interactions between Pakistan and Afghanistan, as well as providing adequate healthcare resources to all citizens. Pashtun-inhabited cross-border zones are at the heart of the polio problem. These regions will continue to serve as reservoirs and exporters of the virus without coordinated and mobile-focused vaccine efforts.

When observing education, low literacy rates paired with minimal access to quality education contribute significantly to polio vaccine hesitancy by limiting the awareness of vaccine safety and efficacy (*Khyber Pakhtunkhwa Education Sector Analysis*, 2019, p.31). Coupled with the negative use of social media to promote vaccine uncertainty, this lack of education makes Pasthun communities more susceptible to misinformation, particularly about the scientific nature of polio. This implies that governmental regulators must provide polio-related education, as well as academic education, for all communities affected by such diseases, especially the Pashtuns.

Beyond geography and education, deeply embedded society norms and cultural views also emerged as critical components. This research reveals that resistance is not due to intentional ignorance or irrationality, but to a history of mistrust, religious influence, and societal norms. Rather than viewing culture as a barrier, it can serve as a powerful starting point towards mutual respect and trust. Health campaigns must work within the fabric of Pashtun society, recognizing the influence of the Pashtunwali code, religious leaders, and familial hierarchies. Doing so will not only improve the likelihood of vaccine acceptance but also promote a sense of dignity among a population that has long felt mistreated by cross-country politics. To be effective, vaccine education programs must take into account the level of mistrust and specific cultural dynamics at play. By integrating local norms into outreach, governments can work to increase vaccine support and build ever-lasting health literacy within skeptical Pashtun communities.

Political instability and distrust in governmental institutions were also found to exacerbate hesitancy, as revealed by the literature. While both Pakistan and Afghanistan have been

founded on “Islamic ideologies,” it has taken an extremist route within Afghanistan with the Taliban heading the government. This political instability is heightened by targeted militant attacks upon healthcare workers in the form of violent resistance, and also the result of a lack of education regarding polio vaccines. These factors provide government figures with the need to address such conflicts, solidifying vaccine initiatives as unharmful and helpful initiatives for those affected. However, there have been instances where political leaders support the mistrust of vaccine campaigns. This only goes to show the necessity of stabilized government structures where those affected by disease such as polio can get the access to healthcare that they need without the concern for forced vaccine measures in an area of increased illiteracy.

In response to these challenges, many initiatives have been implemented to improve vaccine immunization. These campaigns indicate a step towards the right direction, in that healthcare initiatives are working within communities to combat the lack of education and uncertainty around polio. Additionally, these campaigns foster a sense of respect for conservative Pashtun communities by providing female workers, as male workers are often unwelcome. However, many initiatives have also failed, such as one where security officials were working with health care workers during campaigns, leading to strategized attacks upon the escorts and workers. This suggests that the unyielding view of Pashtuns and communities where hesitancy is high wherein vaccine initiatives are governmental operations that must be combated by strategies where community respect and cooperation is earned and not brutally acquired by force.

Pakistan and Afghanistan are still the only polio-endemic countries in the world - while this limits the scope of this disease, it is now more imperative than ever for the issue of vaccine hesitancy to be understood by global eradication efforts. The rise in global vaccine hesitancy, as seen with Covid-19, portrays how mistrust, misinformation, and cultural divides are not unique to one region, but are relevant worldwide. These findings mirror the challenges faced by various marginalized populations around the world, making this literature review a valuable lens for considering the factors in approaching vaccine hesitancy within regions globally, and how to combat similar issues. With global confidence in vaccine initiatives declining and funding cuts threatening polio eradication efforts, it is imperative that healthcare workers and policy makers recognize the impact of vaccine hesitancy upon such efforts and work to raise their voices in bringing awareness to the prevalence of not just polio, but diseases all around the world that are faced with resistance from marginalized populations.

In observing the limitations of this research, few studies were found specifically about the government’s influence upon vaccine hesitancy. Additionally, much of the available literature is produced by international researchers and organizations, possibly limiting the representation of local perspectives, such as those of Pashtun community members. There is also a lack of longitudinal studies to evaluate the extent of polio vaccine hesitancy within particular Pashtun-dominated regions. In addition, the reliance on English-language resources may have excluded key regional publications. Security and accessibility issues also limit data collection in certain areas regarding Pasthun communities, allowing for potential gaps in geographical representation.

This review provides multiple implications for global health practitioners, policymakers, and humanitarian organizations seeking to address vaccine hesitancy in conflicted and socially-unstable regions. By deepening the understanding of how regional, political, educational, governmental, and socio-cultural factors shape healthcare perceptions of Pashtun communities, it becomes imperative to design initiatives that are emphatically informed. These

findings can guide international agencies to approach vaccine hesitancy with cultural humility rather than frustration by acknowledging the historical grievances, mistrust, and lives of these populations. Furthermore, by highlighting the patterns of misinformation and cultural bias, this review points toward the need of utilizing localized, community-driven strategies. Such an approach is not only relevant for polio vaccination campaigns, but for overall global health initiatives. This is relevant for organizations such as the GPEI that work with populations that display skepticism around routine immunizations. Ultimately, this also helps the Pashtun population by shedding light on the challenges they face - from historical marginalization to false propaganda to misinformation - and affirming their cultural experiences, voices, and concerns within public health. A shift from one-size-fits-all solutions to approaches that empower leaders, respect traditional leaders, and build trust can help ensure that Pashtun families are more informed and supported in making decisions for their own communities.

Despite the breadth of existing research, several gaps remain that future studies must address. Studies relating to this review that could be conducted include the focus on the relationship of specific figures relating to Pasthun communities and vaccine hesitancy, such as healthcare workers, religious clerics, and community elders, and how these people advance and/or limit hesitancy within communities. Another approach would be to observe specific tribes within the Pashtun population, and analyze how similar and/or different their responses to the polio disease may be. Looking towards research in alternate directions, few studies prioritize the perception of Pashtun women or explore the long-term effectiveness of community-led interventions, hinting towards the call for more qualitative and participatory research methodologies.

Conclusion

To conclude, the study of polio vaccine hesitancy in Afghanistan and Pakistan among the Pashtun population is impacted by several factors. This includes regional barriers, socio-cultural influences, educational disparities, and political effects. These issues have all worked in tandem to promote the ideology of hesitancy towards polio vaccines. This study provides findings that inform initiatives of how to approach this issue, including approaching such situations with an appeal to cultural respect and acknowledgement. This research creates the building blocks for studying specific Pashtun tribes, the relationships of those that influence Pashtuns, as well as exploring perceptions of Pashtun women. Conducting more longitudinal studies would also provide more insight into the issue at hand. Addressing vaccine hesitancy among Pashtun communities is not only essential for eradicating polio but also represents a broader commitment to health equity, cultural understanding, as well as the global struggle against preventable diseases.

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