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Polio vaccine misinformation on social media: challenges, efforts, and recommendations

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Abstract

On April 22, 2019, false rumors regarding the side effects of the polio vaccine quickly spread across various social media platforms, including Facebook, X (formerly known as Twitter), WhatsApp, and YouTube. This rapid spread of misinformation had a detrimental impact on Pakistan's efforts to eradicate polio. This essay sheds lights on two critical aspects related to polio vaccine misinformation on social media in Pakistan. First, it examines the current state of polio vaccine misinformation on social media and finds it a significant threat to public health, resulting in vaccine refusals, erosion of trust in public health institutions, distrust in science, and providing opportunities for anti-vaccination groups and individual advocates to target healthcare workers involved in polio eradication efforts nationwide. Second, it highlights the collaborative initiatives undertaken by relevant government institutions and social media companies, which have proven inadequate in effectively addressing the persistent dissemination of mis/disinformation, particularly on Facebook. Lastly, we suggest Pakistan should adopt a more inclusive approach of engaging all stakeholders, promote independent fact-checking initiatives, and increase health literacy among the target population about the risks and benefits associated with the polio vaccine.

Keywords

Health communication; Science and policy-making; Science communication in the developing world

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Background

Polio, formally known as poliomyelitis, is a devastating fatal disease capable of causing nerve damage and paralysis, posing a severe threat to public health. The inception of the Global Polio Eradication Initiative (GPEI) in 1988 marked a remarkable stride in the battle against this communicable disease. Through vigilant surveillance, monitoring, and substantial investments in expertise and resources, the initiative successfully eliminated polio worldwide [GPEI, 2020]. However,

despite this global progress, recent scholarly research has predominantly focused on Afghanistan and Pakistan, as they remain the only two countries yet to achieve polio-free status [Khan & Sahibzada, 2016; Saleem et al., 2018; Taylor et al., 2017]. The challenge of eradicating polio from its last strongholds in Pakistan has presented unique challenges for the GPEI [Ahmad, Khan, Musa & Hui, 2020; Ittefaq, Baines, Abwao, Shah & Ramzan, 2021; World Health Organization, 2020]. In response to these challenges, various national and international organizations have launched dedicated efforts and communication campaigns aimed at reaching inaccessible populations and eradicating polio. Notably, Pakistan reported 20 polio cases in 2022, compared to one case in the first nine months of 2023 [GPEI, 2023].

In regions like the Federally Administered Tribal Areas (FATA) and Khyber Pakhtunkhwa (KP) province, resistance and hesitancy toward polio vaccines are driven by socio-cultural, political, and religious factors. Recognized as high-risk areas with a heightened prevalence of polio by the World Health Organization (WHO) [Shah, Ginossar & Weiss, 2019], this challenge has prompted multidisciplinary research efforts to grasp the complexity and magnitude of this public health challenge in Pakistan [Andrade & Hussain, 2018; Habib et al., 2017; Murakami et al., 2014; Saleem et al., 2015; Saleem et al., 2018]. Recent research on the history of polio in Pakistan shows a remarkable 95% reduction in polio cases compared to the pre-vaccination era. This substantial progress is intrinsically linked to the implementation of a door-to-door vaccination strategy, which was introduced in the early 2000s and has since become an integral part of Pakistan's efforts to eradicate polio [Rahim, Ahmad & Abdul-Ghafar, 2022]. However, understanding these achievements in the broader context of healthcare challenges is essential.

Prior studies have systematically explored various dimensions of polio vaccination, shedding light on the multifaceted challenges faced by health workers [Khan & Sahibzada, 2016], the perspectives of journalists and the barriers they encounter when reporting on polio eradication efforts — recognizing the role of media in shaping public perceptions [Shah et al., 2019], and strategies to bolster public knowledge about polio, such as targeted awareness campaigns, in Pakistan [Owais, Hanif, Siddiqui, Agha & Zaidi, 2011]. Furthermore, scholars have scrutinized the influence of polio-related misinformation on social media, highlighting how online health information can significantly impact individuals' decisions regarding vaccine uptake and future responses to vaccination messaging [Betsch, Ulshöfer, Renkewitz & Betsch, 2011; Ittefaq, Abwao & Rafique, 2021]. Lastly, investigations have probed the several factors contributing to the success or failure of intervention programs, underscoring the importance of effective planning and execution. [O'Reilly et al., 2012]. Collectively, this multifaceted body of research illuminates a roadmap toward achieving effective disease control in Pakistan.

This essay focuses on two key dimensions of polio-related misinformation on social media in Pakistan: the current landscape of polio misinformation and the governmental efforts aimed at mitigating its effects. These dimensions have emerged as critical areas of study [Ahmad et al., 2020; Ittefaq, Abwao & Rafique, 2021; Martinez-Bravo & Stegmann, 2022; Ittefaq, Hussain & Fatima, 2020], recognizing their profound impact on public perceptions and, consequently, the success of vaccination campaigns. By examining these aspects, we aim to provide a comprehensive understanding of the challenges and strategies surrounding polio

vaccination in Pakistan, ultimately contributing to the broader discourse on effective disease control.

Social media platforms are crucial communication environments for those seeking health information to turn to; however, platform affordances often privilege and amplify misinformation [Ittefaq, 2023b, 2023a; Swire-Thompson & Lazer, 2020]. Recognizing the significant potential harms caused by the spread of vaccine misinformation on social media, including its role in fostering vaccine hesitancy and perpetuating false medical treatments, has motivated researchers to explore effective strategies for addressing this complex issue. Vraga and Bode's research [2017], for instance, suggests that authoritative government sources, like the Centers for Disease Control and Prevention (CDC), can play active roles in countering health misinformation online. Moreover, recent studies have indicated that people increasingly rely on official government social media pages as credible sources of health information [Kamboh, Ittefaq & Sahi, 2022].

Recent research in this domain has predominantly focused on developed Western countries, leaving a significant knowledge gap concerning Global South countries like Pakistan. Specifically, there is limited understanding of the prevalence of polio-related misinformation on social media within these regions and the extent to which governmental and non-governmental efforts are being deployed to combat it. This gap becomes more evident when we consider a recent study that indicated the emergence of online misinformation as a new challenge in eradicating polio from Pakistan [Ittefaq, Baines et al., 2021]. Let's now turn our attention to the influence of social media platforms on health information seeking behaviors.

Health information seeking on social media

The widespread availability of information and communication technologies (ICTs) has led to an increasing number of individuals utilizing social media platforms to access health information [Chen & Wang, 2021; Ittefaq & Iqbal, 2018]. Of particular importance is a survey conducted by the Pew Research Center spanning 11 countries showing that 61% of individuals now prefer using mobile phones to seek health and medical information [Silver & Huang, 2019]. This shift in information-seeking behaviour holds significance, not solely as a means of information consumption but as a digital space where users actively create, consume, and share health-related content [Seo, Houston, Knight, Kennedy & Inglish, 2014]. Beyond its utility as an information source, social media serves as a platform for individuals to connect with peers who share similar experiences, fostering peer-to-peer discussions where health concerns can be openly shared and empathetically discussed [Myneni, Cobb & Cohen, 2016; Nguyen, 2023; Zhao & Zhang, 2017].

Health information-seeking behaviours carry significant implications for individuals' mental and physical well-being, positioning social media as a valuable resource within this context [Ittefaq & Iqbal, 2018]. People use social media to access health-related information and to better comprehend and critically evaluate the information they encounter. Studies recommend that having good media and health literacy skills empower users to navigate, comprehend, analyze, and evaluate health information sources from digital spaces, thereby enabling them to make well-informed decisions [Jain & Bickham, 2014]. Yet, studies also point to online spaces where health-related misinformation is particularly prevalent. In

cases where credible health information sources are particularly absent, poor media and health literacy skills may not the only driver. For instance, Ghenai and Mejova's [2018] study highlighted a concerning trend in online forums where discussions related to cancer often promoted unverified claims, such as promoting the idea of ginger and honey possessing healing properties for cancer. Recognizing the important place of social media communication in people's lives, health organizations, including local health departments [Harris, Mueller & Snider, 2013], hospitals [Griffis et al., 2014], and state health departments [Thackeray, Neiger, Smith & Van Wagenen, 2012], actively now employ social media to disseminate credible health information. Pakistan, too, mirrors the global trend in utilizing social media for health communication-related purposes.

Research by Ittefaq and Iqbal [2018] reveals that individuals in Pakistan turn to social media platforms to seek health information, find support from peers, and explore medical treatment options. Nevertheless, several barriers persist that hinder people when accessing online health information. Research examining the motivating factors behind seeking health information on social media has emphasized the significance of information needs and accessibility [Naeem & Bhatti, 2016]. In Pakistan, limited access to health information remains a significant barrier to achieving knowledge-based healthcare. Moreover, the country's healthcare system faces several challenges, including financial constraints, inadequate infrastructure, resource shortages, insufficient trained staff, gender imbalances in the workforce, staff absenteeism, deficient health system governance, low level of trust in public health institutions, and politicization of healthcare institutions [Bossert, Mitchell & Janjua, 2015; Ittefaq et al., 2020; Kurji, Premani & Mithani, 2016]. In addition, the healthcare system's lack of financial autonomy, coupled with inefficiencies in district health management and monitoring and supervision, further exacerbates these challenges [Shaikh et al., 2012]. To combat the legacy of centralized power structures, which can be traced back to Pakistan's colonial history, government-led reform programs have been established, such as the 2001 initiative aimed at decentralizing decision making and establishing local governments. Yet, persistent challenges in infrastructure development remain [Bossert et al., 2015]. Consequently, individuals in Pakistan have developed low levels of trust in health-related institutions [Khan & Van den Heuvel, 2007], leading them to increasingly rely on new media technologies, like social media, to seek health information. Given the growing trend toward online health-seeking behaviour and online health communication initiatives targeted at eradicating polio in Pakistan, it is important to recognize the roles that online mis/disinformation efforts play in vaccine communication.

The Center for Countering Digital Hate report [CCDH, 2020] identifies four distinct communities contributing to the dissemination of vaccine-related misinformation on social media within English speaking countries, including England, the U.S.A., Canada, and Australia, where the prevalence of misinformation in English is particularly pronounced. First, there are dedicated *campaigners* who invest significant time and effort in promoting anti-vaccine ideologies. These campaigners include individuals who earn a living as spokespersons for anti-vaccine causes and engage in related activities, grassroots activists who use Facebook pages to spread misinformation, and non-profit organizations that push anti-vaccine narratives. Second, *entrepreneurs* exploit their involvement in the anti-vaccine movement to promote their businesses. They employ marketing strategies to entice users with a

progression from freely available anti-vaccine content to paid-for products and services, which can range from books to alternative medical treatments. Third, *conspiracists*, though not exclusively focused on vaccines or public health, occasionally capitalize on this topic to promote their businesses, which are often rooted in conspiracy theories. Lastly, there are *communities*, mostly on Facebook, consisting of individuals who share an interest in anti-vaccine ideas and have formed groups to discuss and exchange these beliefs [CCDH, 2020].

The tactics employed by misinformation communities in Pakistan closely mirrors those observed in Western countries. In particular, certain campaigners draw inspiration from Western anti-vaccination movements, adopting right-wing rhetoric concerning vaccines. In addition, they translate this misinformation from English to Urdu, thereby making these inaccuracies more accessible to the broader population in Pakistan. This practice is not limited to anti-vaccination propagandists; it extends to Pakistani journalists who, during the COVID-19 pandemic, translated news stories about vaccine dangers from the West into Urdu, contributing to vaccine hesitancy among local newspaper readers [Kamboh et al., 2022].

Pakistan's significant surge in internet access and usage in recent years [Kemp, 2023], has enabled anti-vaccination campaigners to compete for online attention with government-funded efforts by strategically timing the release of videos and messages to dissuade people from receiving the vaccine alongside the launch of polio vaccination campaigns. These anti-vaccination campaigns have significantly affected vaccination rates to the extent that the World Health Organization's (WHO) own initiatives encountered challenges in meeting the vaccination demand in Pakistan due to an underestimation of the number of children who repeatedly missed vaccinations in core polio-affected areas. The influence of digital communication efforts on public health outcomes becomes even more apparent when we examine the history of vaccine-related misinformation on social media in Pakistan.

Polio vaccine misinformation on social media

In 2011, the polio eradication program in Pakistan encountered particular challenges associated with the spread of online vaccine-related misinformation after online rumours circulated that a local provider, Shakeel Afridi was involved in a house-to-house hepatitis B vaccine campaign that reportedly aided the CIA in locating Osama bin Laden [Khan, 2019]. This damaging rumor had severe consequences for the polio eradication campaign, especially in northern regions of Pakistan, where militants and extremist Islamic clerics have propagated the false belief that vaccinators are foreign spies [Martinez-Bravo & Stegmann, 2022]. Tragically, these beliefs and opposition to vaccinators, have resulted in the deaths of numerous polio health workers throughout Pakistan [Morrish, 2020].

On April 22, 2019, a fake X account, falsely presenting itself as a "24-hour news service" based in Karachi, disseminated a video containing unsubstantiated claims of children falling ill after receiving the polio vaccine. This video, which also depicted young boys pretending to faint under the cameraman's direction [Ahmad et al., 2020], gained significant traction generating more than 24,000 interactions in the form of retweets and likes, sparking widespread chaos. Likewise, during the same timeframe, the then Facebook page "Da Olas Ghag" (The Voice of the People),

Figure 1. Screenshot of the video depicting a father who had allegedly lost four children due to the polio vaccine (source: Abdullah Dirojy official, screenshot taken by the first author).

affiliated with a regional news media outlet, uploaded a series of videos presenting similar unverified assertions [Bhattacharjee & Dotto, 2020]. Among the videos, one prominently featured a local father who claimed to have lost four children after their vaccination with the clickbait title "four children from the same house were killed due to polio drops" (see Figure 1). Unfortunately, this video remains accessible and has accrued over 883,000 views, 4,100 likes, and 637 comments as of September 20, 2023. It is important to emphasize that all the claims on these videos were refuted by government authorities [Bhattacharjee & Dotto, 2020].

However, the impact of these false claims was devasting for polio vaccination campaigners. As local mosques amplified warnings about the supposed dangers of the polio vaccine through their loudspeakers, thousands of parents flocked to the three main hospitals in the provincial capital, fearing that their children might suffer the same fate. This situation quickly escalated into violent protests, tragically culminating in an unfortunate incident in Peshawar — a high-risk district for polio transmission, where a hospital was set ablaze [Bhattacharjee & Dotto, 2020]. Regrettably, three lives were lost amidst the ensuing hysteria, prompting Pakistani authorities to suspend the polio vaccination campaign for a five-day period. Furthermore, a subsequent report by *The Washington Post* ["False rumors and panic hamper Pakistan's war against polio", 2019] revealed that all children admitted to the hospital on that day were found to be healthy and were released shortly after.

In the aftermath of these events, a lingering hesitancy among parents to vaccinate their children persisted. Consequently, over two million children remained unvaccinated against polio after an eight-month suspension of the polio vaccination campaign. This incident also triggered a notable surge in cases of vaccine refusal. For instance, in Nowshera, a city within the KP province, vaccine refusal cases escalated from a mere 256 in March of 2020 to a staggering 88,000 in April of the same year [Bhattacharjee & Dotto, 2020]. The ensuing decline in polio vaccination rates and the surge in vaccine refusal cases necessitated a comprehensive response from health authorities.

Pakistan's efforts to address polio misinformation

In response to the growing prevalence of polio-related misinformation, the Emergency Operations Center KP launched a targeted campaign that enlisted the expertise of medical professionals, parents, and polio health workers. This campaign aimed to confront and dispel the pervasive rumors linking the vaccine to children falling ill [Ahmad et al., 2020]. As Pakistan resumed its efforts to eradicate polio, an army of over a quarter of a million vaccinators, predominantly women, visited poor and overcrowded community living areas lacking basic amenities, ventured into rural areas, braved monsoon floodwaters, and climbed to remote mountain villages, all to reach the country's 40 million children under the age of five.

Over the past four years, Pakistan (i.e., Polio Eradication Initiative) has implemented several initiatives to tackle the issue of polio misinformation. One pivotal step was the appeal to Facebook's owner Meta to remove harmful polio-related content from their platform ["Pakistan demands Facebook remove polio vaccine misinformation", 2019]. This action became necessary as the dissemination of such misinformation posed a significant risk to the success of polio eradication efforts and even endangered the lives of polio health personnel, particularly female health workers, employed through the Lady Health Workers Program (LHWP). Meta responded to this issue by committing to remove specific false claims about vaccines from Facebook, including posts that propagated the idea that vaccines are ineffective or dangerous [Ishtiaq, 2019]. Meta had already been deleting Facebook content that could potentially lead to offline harm, such as posts falsely identifying polio healthcare workers as CIA agents. Since 2021, Meta also owns other social media platforms such Facebook, messaging app WhatsApp, image-centric social platform Instagram, X rival Threads, and the Horizon metaverse ["Who owns Facebook? Meta CEO Mark Zuckerberg", 2023]. However, simply removing or hiding false vaccine-related content may not constitute the optimal solution. Meta and other social media companies need to adopt more comprehensive approaches, as suggested by existing literature [Iosifidis & Nicoli, 2020; Rochefort, 2020]. These approaches might include engaging expert sources, establishing partnerships with journalists, civil society organizations, and academic institutions to develop a comprehensive strategy for promoting accurate health information and implementing more stringent policies preventing the circulation of online mis/disinformation.

The Pakistani government has actively supported the country's vaccination drive and has recently collaborated with Meta to block or manage the dissemination of anti-vaccination propaganda on their platforms within Pakistan. The government has also taken steps to counter polio-related misinformation through its Perception Management Initiative (PMI). Furthermore, official polio Facebook pages like End Polio Now (https://www.facebook.com/EndPolioNow/) have played a significant role in addressing vaccine-related misinformation on Facebook. End Polio Now has taken inspiration from Henrietta Fore, the head of UNICEF by sharing a quote from her on their Facebook page, "misinformation about vaccines is as dangerous as a disease". They also emphasized the ongoing efforts of Rotary International and their partners to ensure that all children receive the polio vaccine. The page highlighted the importance of bridging the gap between the established science behind vaccines and the behavior of anti-vaccination groups and individual advocates, acknowledging the role of misinformation in fueling vaccine refusals. They reiterated that the polio vaccine is safe, effective, and essential for

ending polio in Pakistan. These efforts, combined with videos and messages shared by the regional division of the Pakistan Tehreek-e-Insaf (PTI) party in KP, as reported by the Atlantic Council Digital Forensic Lab in 2019, represent significant steps in addressing polio-related misinformation on Facebook.

Barriers and potential recommendations

Misinformation, both historically and practically, has demonstrated its detrimental impact on public health initiatives. However, tackling the proliferation of misinformation on social media presents a multifaceted challenge hindering the effectiveness of dedicated efforts [Keselman, Smith & Wilson, 2022]. First, a significant portion of the information circulating on social media is not explicitly labeled as misinformation; instead, it is characterized by misleading language choices or exaggerations. This subtle obfuscation complicates efforts to detect and effectively mitigate it [Nan, Wang & Thier, 2022] particularly in developing countries. These reasons encompass a range of factors, including, but not limited to, the proliferation of false health claims regarding traditional remedies, low health literacy, limited access to trustworthy health-related data, and inadequate technical and informational infrastructure [Schiffrin & Cunliffe-Jones, 2022]. Second, misinformation often relies on anecdotal evidence or personal narratives, making it challenging to refute. This reliance on subjective experiences underscores the difficulty in identifying and correcting such misinformation [Guidry, Carlyle, Messner & Jin, 2015]. Third, the use of automated bots to spread misinformation presents yet another formidable obstacle in countries like Pakistan with low levels of education, internet, and health literacy [Jamil, Iqbal, Ittefaq & Kamboh, 2022; Kamboh & Yousaf, 2020]. Because bots can rapidly amplify the dissemination of false information at minimal cost, posing significant challenges for human users attempting to distinguish them from genuine human accounts [Memon & Carley, 2020]. Fourth, another significant challenge faced by local authorities and social media companies in removing false content is the predominant consumption of such content in Urdu (i.e., national language of Pakistan) and Pashto (i.e., regional language widen spoken in KP province) languages. These languages carry a strong connection with the local populations, making content presented in them more relatable and trustworthy. Misinformation is often tailored with precision to align with the cultural and linguistic sensitivities of specific communities [Moran, Nguyen & Bui, 2023]. This level of nuance adds complexity to the task of authorities and social media companies in identifying and countering false narratives effectively.

Fifth, maintaining a balance between content removal and the freedom of expression is particularly challenging. Some scholars argue that widespread content removal and de-platforming of accounts could jeopardize freedom of speech, raising concerns about censorship [Armitage, 2021], particularly in Pakistan where the state of freedom of expression is highly deteriorated [Jamil, 2020]. Furthermore, de-platforming or removing content from accounts with a substantial number of followers might exacerbate mistrust among their followers. This action may also inadvertently incentivize anti-vaxxers to seek refuge on alternative platforms (i.e., Parler or Truth Social) [Baines, Ittefaq & Abwao, 2021], making it considerably challenging to monitor their activities and effectively moderate the harmful content [Armitage, 2021]. Sixth, the collaborative initiatives between the government and social media companies have focused on simplistic strategies of merely deleting content and accounts linked to misinformation. This

approach overlooks the potential benefits that can be gained from engaging diverse stakeholders (particularly opinion leaders from Pashto speaking Pakhtun community, local journalists, and civil society activists) [Shah et al., 2019] in a more comprehensive way to effectively combat online misinformation regarding the polio vaccine. Lastly, the Ministry of Law and Justice in Pakistan has introduced amendments to the Prevention of Electronic Crimes Act of 2016 with the aim of countering mis/disinformation on mainstream and social media. These proposed changes could potentially lead to individuals being charged with offenses related to fake news carrying sentences of up to five years of imprisonment [Gul, 2022]. However, this move to criminalize the dissemination of fake news has sparked intense criticism from proponents of free speech, who have deemed it "unwarranted and deplorable", asserting that it threatens the fundamental freedoms of the media [Gul, 2022, para. 7]. The current stage of implementation and the overall effectiveness of this legislative amendment remain uncertain. There is an ongoing debate and observation regarding its impact on mis/disinformation regulation and its implications for freedom of expression.

In Pakistan, the barriers mentioned above have significantly hindered attempts to eradicate harmful vaccine-related content from social media. Consequently, the critical challenge lies in formulating efficient strategies to counter the spread of misinformation. In this essay, we propose various potential approaches as a pathway forward. First, Pakistani authorities need to consider embracing a more inclusive approach by engaging multi-stakeholders including academics, scientists, researchers, educators, political parties, government entities, digital rights groups, civil society activists, Pashtun community leaders, religious scholars, journalists, fact-checkers, and media advocacy groups to devise comprehensive strategies for combating misinformation [Ittefaq et al., 2020]. To achieve this, the Pakistan Polio Eradication Programme (PPEM) needs to strengthen the capacity of the Perception Management Initiative (PMI). Launched in 2019 to counter "negative perceptions against the polio eradication program in resistant communities" [Masood, 2019, para. 13], the PMI initially worked with Facebook to combat misinformation. Second, it is imperative to meticulously analyze the specific target populations when formulating interventions to boost awareness and improve health literacy regarding anti-vaccination propaganda associated with polio in Pakistan. To accomplish this, PPEM needs to conduct a thorough analysis of the target population to identify potential interventions and subsequently communicate the recommendations to PMI. This institutional collaborative approach will empower PMI to effectively implement the suggested interventions. Third, acknowledging that children, especially those from working-class and lower-middle-class backgrounds, often act as facilitators for their parents' access to technology due to their potential tech literacy limitations, emphasizes the urgency for educational interventions aimed at protecting them from the harmful impacts of misinformation [Naeem & Rehmat, 2023]. In order to do this, educational materials need to be designed through a collaborative effort among the aforementioned stakeholders and presented in multiple languages, including Pashto. By incorporating best practices in media information literacy and health literacy, the PMI could create understandable flyers, infographics, and brochures [Hernandez-Sanchez et al., 2021] to increase awareness among the target population about the risks and benefits associated with the polio vaccine. Lastly, the PMI could actively promote independent fact-checking initiatives to join government efforts in combatting misinformation. Organizations like

sochfactcheck.com have been independently contributing to this cause [uz Zaman, 2022]. However, the PMI can enhance its capacity by providing technical and informational resources, thereby expanding the reach and impact of fact-checking initiatives [Naeem & Rehmat, 2023]. While these suggestions are not exhaustive of the best practices for addressing the complex issue of misinformation, they represent potential strategies that could be valuable [Ittefaq et al., 2020]. This underscores the importance of adopting a multi-stakeholder approach rather than relying solely on Pakistani authorities collaborating with social media companies to tackle this challenge.

Conclusion

In conclusion, this essay has thoroughly examined the prevalence of polio vaccine misinformation on social media in Pakistan, a trend that has significantly contributed to the rise in vaccine refusal cases. Our analysis suggests that resistance to the polio vaccine cannot be solely attributed to the prevalent online mis/disinformation. However, this misinformation has significantly contributed to the increase in polio vaccine refusal in the Pakhtun community since the 2019 incident. The online mis/disinformation campaign not only mirrors but also reinforces public distrust in government-led public health initiatives. This skepticism is rooted in various factors, including Pakistan's historical experiences with colonialism and its rigid government structures, widespread perceptions of U.S. government interference in public health campaigns, parental concerns about their children's wellbeing, and the influence of religious groups. The spread of misinformation in the Urdu language may have a greater impact on local audiences compared to English-language mis/disinformation. This underscores the importance of addressing language-specific misinformation and tailoring communication strategies to effectively counteract false narratives in the local community.

While we have explored the collaborative efforts undertaken by government institutions and social media companies in tackling online mis/disinformation, a stark reality remains: misinformation about the polio vaccine continues to persist on platforms like Facebook. This persistent presence of misinformation is not merely a digital nuisance; it poses a substantial threat to public health in general and polio eradication initiatives in particular. It increases vaccine hesitancy, undermines trust in public health institutions, and provides fertile ground for anti-vaccination groups to target and endanger polio healthcare workers throughout the country. In a broader context, this essay sheds light on the major challenge of public distrust in science in the digital media landscape in a country in the Global South. It is crucial to emphasize that relying solely on government partnerships with online platforms to remove mis/disinformation content is insufficient for effectively tackling the complex issue of misinformation. Successful initiatives demand the active involvement of all stakeholders. Hence, engaging fact-checkers plays a pivotal role in this comprehensive approach. Moreover, this essay emphasizes the importance of inviting scholars to conduct more research on polio misinformation. It's critical not to view it solely as a problem confined to Pakistan and Afghanistan because the presence of the polio virus in these two countries holds the potential to escalate into a pandemic, posing a significant threat that could challenge global health systems.

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