

Investigating the Challenges Faced By Healthcare Providers and Community Informants in Acute Flaccid Paralysis Surveillance in Badin

Rajnish Gul¹, Gulzar Usman¹, Asif Ali Soomro¹ and Abdul Razzaque Nohri²

¹Liaquat University of Medical & Health Sciences Jamshoro, Pakistan

²Health Department, Government of Sindh, Pakistan

*Corresponding Author: Abdul Razzaque Nohri

Email: razaquenohri@gmail.com

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ABSTRACT

Background: Acute Flaccid Paralysis (AFP) surveillance is essential for early detection of poliovirus transmission and monitoring progress toward polio eradication. However, in endemic regions, multiple operational and socio-cultural challenges continue to affect the effectiveness of surveillance systems.

Objective: To assess the challenges faced by healthcare providers and community informants in AFP surveillance and to identify factors affecting surveillance efficiency and potential areas for improvement.

Methods: A comparative cross-sectional study was conducted in Badin district from May to November 2025. A total of 601 participants, including 273 healthcare providers and 328 community informants, were selected using multi-stage cluster sampling. Data were collected through structured questionnaires and analyzed using SPSS version 29. Descriptive statistics were used to summarize variables, and chi-square tests were applied to assess associations, with $p < 0.05$ considered significant.

Results: Cultural and social barriers (33.4%) were the most commonly reported challenges, followed by high workload (27.8%), community resistance (21.1%), and lack of training (17.6%). Approximately 60.2% of participants had received formal training, while nearly 20% reported low confidence in identifying and reporting AFP cases. Stool adequacy was high (88%), indicating good specimen handling. Significant associations were found between participant role and challenges ($p < 0.001$) and between gender and challenges ($p = 0.03$).

Conclusion: AFP surveillance in Badin is primarily constrained by socio-cultural and operational challenges despite adequate technical performance. Strengthening training, improving community engagement, and addressing workload issues are critical to enhancing surveillance effectiveness and supporting polio eradication efforts.

Keywords: Acute Flaccid Paralysis, AFP surveillance, healthcare providers, community informants, polio eradication, Pakistan

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INTRODUCTION

Acute Flaccid Paralysis (AFP) surveillance is a fundamental component of the global effort to eradicate poliomyelitis, serving as a highly sensitive system for detecting potential poliovirus transmission. The surveillance of AFP focuses on identifying all cases of sudden-onset paralysis in children under fifteen years of age, regardless of etiology, to ensure early detection of poliovirus circulation and prompt public health response. International organizations such as the World Health Organization (WHO) and the Centers for Disease Control and Prevention (CDC) have established standardized AFP surveillance frameworks that enable countries to monitor disease trends, evaluate immunization effectiveness, and implement timely containment strategies.^{1,2} As a result,

AFP surveillance has become a cornerstone of the Global Polio Eradication Initiative (GPEI), contributing significantly to the reduction of global polio incidence by over 99% since its launch in 1988.³

Despite this progress, poliovirus transmission persists in a few endemic countries, including Pakistan, where AFP surveillance remains critical to achieving eradication goals. Pakistan's unique epidemiological and socio-political context presents considerable challenges to effective surveillance, including gaps in immunization coverage, population mobility, and operational limitations within health systems.^{4,5} The continued presence of poliovirus in the country highlights the importance of maintaining a robust and responsive AFP surveillance system capable of identifying even a single case of

*Author for Correspondence: razaquenohri@gmail.com

paralysis and triggering rapid investigation and intervention.⁶

AFP surveillance in Pakistan operates through a multi-tiered system that integrates health facilities, surveillance officers, laboratories, and community networks. Healthcare providers play a central role in identifying suspected cases, initiating reporting procedures, and ensuring proper specimen collection. At the same time, community informants including teachers, religious leaders, and community health workers serve as critical links between the population and the formal healthcare system, particularly in rural and underserved areas.^{7,8} This dual structure enhances surveillance sensitivity by extending case detection beyond clinical settings into the community. However, the effectiveness of this integrated system depends heavily on coordination, communication, and the capacity of both healthcare providers and community informants.

In rural districts of Sindh province, AFP surveillance faces additional challenges that limit its efficiency. These include poor infrastructure, limited accessibility to remote areas, and inadequate transportation systems, all of which delay case detection and specimen transport.⁹ Furthermore, insufficient training and high workload among healthcare providers can lead to underreporting or delayed reporting of AFP cases.¹⁰ Community informants, while essential to surveillance, often lack formal training and resources, which affects their ability to accurately identify and report suspected cases.¹¹ These gaps highlight the need for targeted interventions to strengthen surveillance capacity at both facility and community levels.

Socio-cultural factors also play a significant role in shaping AFP surveillance outcomes. In many communities, misconceptions about polio, stigma associated with disability, and mistrust of healthcare systems contribute to resistance in reporting suspected cases.¹² Cultural beliefs and reliance on traditional healers may delay healthcare-seeking behavior, further complicating surveillance efforts.¹³ Addressing these barriers requires culturally sensitive approaches, community engagement strategies, and continuous public health education to improve awareness and trust in surveillance systems.

Another major challenge lies in the coordination between public and private healthcare sectors. In LMICs, a substantial proportion of the population seeks care from private practitioners, yet these providers are often not fully integrated into the AFP surveillance system.¹⁴ This lack of integration results in missed opportunities for case detection and contributes to underreporting. Strengthening collaboration between sectors and standardizing reporting mechanisms are therefore essential to improving surveillance coverage and data quality.

Recent advancements in technology offer promising opportunities to enhance AFP surveillance. Digital tools such as mobile reporting systems and innovations like the Auto-Visual AFP Detection and Reporting (AVADAR)

platform have demonstrated potential in improving real-time case detection and reporting, particularly in remote areas.¹⁵ However, challenges related to infrastructure, internet connectivity, and technical training limit the widespread implementation of such technologies in resource-constrained settings.¹⁶ Ensuring equitable access to these innovations is critical for maximizing their impact on surveillance efficiency.

Globally, lessons from other countries highlight the importance of continuous evaluation and adaptation of AFP surveillance systems. Studies from countries such as Sudan and Bangladesh emphasize the need for regular system assessments, integration of digital technologies, and strengthening of community-based surveillance to address context-specific challenges.^{17,18} These insights underline that achieving polio eradication requires not only maintaining high surveillance sensitivity but also addressing operational, social, and systemic barriers at the local level.

This study aims to bridge gaps between formal healthcare systems and community-based surveillance by identifying operational and socio-cultural barriers that hinder effective AFP case detection and reporting in endemic settings.

The primary objective of this study is to explore the challenges faced by healthcare providers and community informants in AFP surveillance. Additionally, the study seeks to assess how these challenges affect the efficiency and responsiveness of the surveillance system and to identify practical strategies for strengthening case detection, reporting mechanisms, and community engagement to support polio eradication efforts.

METHODOLOGY

This study employed a comparative cross-sectional design to assess the challenges faced by healthcare providers and community informants in Acute Flaccid Paralysis (AFP) surveillance in Badin district, Sindh, Pakistan. The study was conducted over a period of six months, from May to November 2025, within selected urban and rural Union Councils (UCs). This design was appropriate for capturing the existing gaps and variations in surveillance practices across different participant groups at a single point in time. A multi-stage cluster sampling technique was used to ensure representative participation. Initially, UCs with no reported AFP cases in 2024 were identified and randomly selected to focus on potential surveillance gaps. In the second stage, health facilities within these UCs were selected proportionately. Subsequently, healthcare providers (doctors, nurses, paramedics, and vaccinators) were randomly sampled from these facilities, resulting in a final sample of 273 participants. In parallel, 328 community informants including teachers, religious leaders, traditional healers, and community health workers were selected using randomized sampling from surveillance records to ensure diverse representation. Data were collected using a structured, pre-tested questionnaire designed to capture demographic characteristics, training status, confidence levels, and challenges related to AFP

surveillance. Healthcare providers were approached through facility visits and surveillance meetings, while community informants were engaged within their respective communities. Ethical approval was obtained from the relevant institutional review board, and informed consent was secured from all participants prior to data collection, ensuring confidentiality and voluntary participation. Data analysis was performed using SPSS version 29. Descriptive statistics, including frequencies and percentages, were used to summarize categorical variables, while means and standard deviations were calculated for continuous variables. Inferential analysis was conducted using the chi-square test to assess associations between demographic factors and reported challenges, with statistical significance set at $p < 0.05$. This analytical approach enabled identification of key

factors influencing AFP surveillance effectiveness in the study setting.

RESULTS

A total of 601 participants were included in the study, comprising 273 healthcare providers (HCPs) and 328 community informants (CIs). The results are presented to reflect the study objectives: (1) identifying key challenges in AFP surveillance, (2) assessing their impact on surveillance efficiency, and (3) highlighting potential areas for improvement.

As mentioned in Table 1, the majority of participants were male (74%) and from rural areas (55.4%), indicating a strong rural representation. Most respondents were in the 29–38 age group (33.9%) and had 2–5 years of experience (42.8%), reflecting a moderately experienced workforce involved in AFP surveillance.

Table 1: Demographic Characteristics of Participants (n = 601)

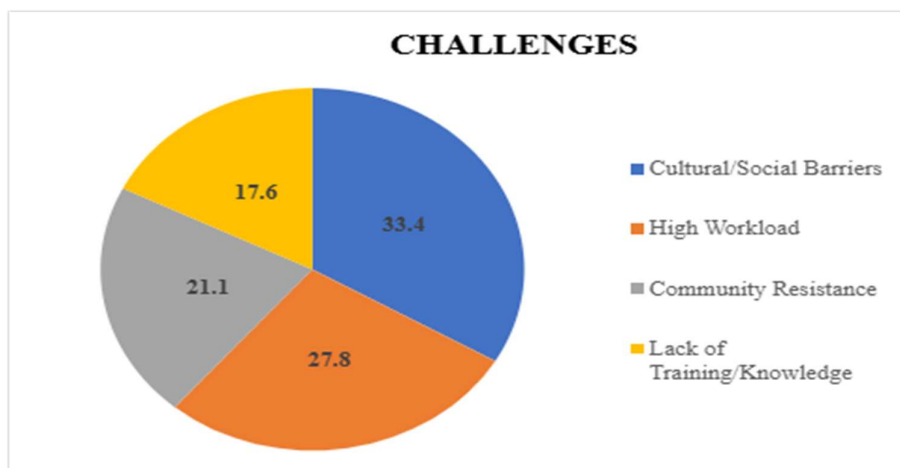
Variable	Category	HCPs n (%)	CIs n (%)	Total n (%)
Age Group (years)	19–28	72 (26.4)	90 (27.4)	162 (26.9)
	29–38	88 (32.2)	116 (35.4)	204 (33.9)
	39–48	59 (21.6)	72 (22.0)	131 (21.8)
	49–58	54 (19.8)	50 (15.2)	104 (17.3)
Gender	Male	195 (71.4)	250 (76.2)	445 (74.0)
	Female	78 (28.6)	78 (23.8)	156 (26.0)
Residence	Urban	25 (9.2)	30 (9.1)	55 (9.2)
	Semi-Urban	88 (32.2)	125 (38.1)	213 (35.4)
	Rural	160 (58.6)	173 (52.7)	333 (55.4)
Experience	0–1 year	54 (19.8)	92 (28.0)	146 (24.3)
	2–5 years	129 (47.2)	128 (39.0)	257 (42.8)
	≥6 years	90 (32.9)	108 (32.9)	198 (32.9)

Cultural and social barriers emerged as the most significant challenge (33.4%), followed by high workload (27.8%). Community resistance and lack of training were

also notable, highlighting both structural and socio-behavioral constraints affecting AFP surveillance effectiveness.

Table 2: Key Challenges Affecting AFP Surveillance (n = 601)

Challenge	HCPs n (%)	CIs n (%)	Total n (%)
Cultural/Social Barriers	83 (30.4)	118 (35.9)	201 (33.4)
High Workload	73 (26.7)	94 (28.6)	167 (27.8)
Community Resistance	65 (23.8)	62 (19.0)	127 (21.1)
Lack of Training/Knowledge	52 (19.0)	54 (16.5)	106 (17.6)



Although 60.2% received formal training, a considerable proportion lacked training, affecting confidence levels nearly 20% were not confident in identifying/reporting AFP cases. Stool adequacy was relatively high (88%),

indicating good specimen handling, but gaps remain. The most recommended improvement was enhanced training (45.1%), followed by stronger community engagement.

Table 3: Surveillance Performance, Capacity, and Improvement Needs (n = 601)

Variable	Category	HCPs n (%)	CIIs n (%)	Total n (%)
Training Received	Yes	162 (59.5)	200 (61.0)	362 (60.2)
	No	111 (40.5)	128 (39.0)	239 (39.8)
Confidence Level	Very Confident	90 (32.9)	100 (30.5)	190 (31.6)
	Somewhat Confident	142 (52.0)	150 (45.7)	292 (48.6)
	Not Confident	41 (15.0)	78 (23.8)	119 (19.8)
Stool Adequacy	Adequate	234 (85.7)	295 (89.9)	529 (88.0)
	Inadequate	39 (14.3)	33 (10.1)	72 (12.0)
Suggested Improvements	Better Training	128 (46.9)	143 (43.6)	271 (45.1)
	Community Engagement	98 (35.9)	111 (33.9)	209 (34.8)
	Feedback Systems	47 (17.2)	74 (22.6)	121 (20.1)

The chi-square analysis demonstrates statistically significant associations between gender ($p = 0.03$) and role ($p < 0.001$) with the types of challenges encountered in AFP surveillance. Male participants reported higher exposure to cultural and social barriers, whereas female participants experienced relatively higher levels of community resistance.

A highly significant association was observed between participant role and challenges, indicating that healthcare providers and community informants face distinct

operational barriers. Healthcare providers reported higher community resistance and training gaps, while community informants reported greater cultural and social barriers, reflecting their closer interaction with community-level dynamics.

In contrast, age group was not significantly associated ($p = 0.45$) with challenges, suggesting that barriers in AFP surveillance are more influenced by role and contextual factors rather than age.

Table 4: Association Between Demographic Factors and Key Challenges in AFP Surveillance (Chi-Square Analysis, n = 601)

Variable	Category	Cultural/Social Barriers n (%)	High Workload n (%)	Community Resistance n (%)	Lack of Training n (%)	p-value
Gender	Male (n=445)	158 (35.5)	120 (27.0)	85 (19.1)	82 (18.4)	0.03
	Female (n=156)	43 (27.6)	47 (30.1)	42 (26.9)	24 (15.4)	
Role	HCP (n=273)	83 (30.4)	73 (26.7)	65 (23.8)	52 (19.0)	<0.001
	CI (n=328)	118 (35.9)	94 (28.6)	62 (19.0)	54 (16.5)	
Age Group	19–28 (n=162)	52 (32.1)	45 (27.8)	35 (21.6)	30 (18.5)	0.45
	29–38 (n=204)	70 (34.3)	58 (28.4)	42 (20.6)	34 (16.7)	
	39–48 (n=131)	45 (34.4)	33 (25.2)	29 (22.1)	24 (18.3)	
	49–58 (n=104)	34 (32.7)	31 (29.8)	21 (20.2)	18 (17.3)	

DISCUSSION

This study found that AFP surveillance in study setting is being implemented largely through a male, rural, and moderately experienced workforce. This pattern is broadly consistent with surveillance realities in Pakistan and other high-risk settings, where community-based detection and field reporting depend heavily on workers deployed in rural and hard-to-reach areas.¹⁹ WHO's Pakistan polio report also notes the importance of expanding AFP focal persons and community-based surveillance in difficult-access and reservoir areas, which supports the rural-heavy profile seen in the present study.²⁰

The most prominent finding was that cultural and social barriers were the leading challenge for both healthcare providers and community informants. This is in line with existing literature from Pakistan and broader polio-endemic contexts showing that mistrust, social norms, misinformation, and culturally rooted hesitancy can undermine surveillance and reporting as much as they undermine vaccination itself. Reviews of polio eradication efforts in Pakistan and systematic evidence on polio barriers have repeatedly shown that religious, political, and socio-cultural concerns reduce cooperation with frontline programs.^{21,22,23}

The second major finding was high workload, particularly among healthcare providers. This also correlates with prior studies showing that frontline workers in surveillance and immunization programs often manage multiple responsibilities simultaneously, which weakens timeliness, active case search, documentation, and follow-up. System-level analyses of Pakistan's immunization and polio programs have highlighted human-resource strain, fragmented responsibilities, and operational overload as recurring barriers.²⁴

Community resistance was another important challenge identified in the results. This finding aligns with studies showing that families may resist contact with health teams because of low awareness, suspicion of health authorities, or local beliefs about disease and disability. The literature suggests that refusal and resistance are not limited to vaccination rounds; they also affect reporting, referral, and investigation processes. The finding that community informants and healthcare providers both encounter resistance therefore agrees with existing studies, especially those emphasizing the need for trusted local actors and social mobilization to improve surveillance responsiveness.^{25,26}

The study also showed that formal training was incomplete, with about two-fifths of respondents reporting no formal training, and this was reflected in confidence levels, especially among community informants. This finding clearly correlates with WHO guidance and empirical studies showing that regular training of health workers and community informants is essential for timely AFP detection and reporting. Evidence from AVADAR and community-based surveillance initiatives further shows that when informants and health workers are trained and supported, case notification improves substantially.^{27,28}

A notable positive finding was the high stool adequacy rate (88%). This suggests that once cases enter the surveillance pathway, specimen collection and handling are functioning relatively well. Existing AFP surveillance literature and WHO standards emphasize stool adequacy as a core quality indicator, and many successful surveillance systems report strong performance in this domain when reporting and follow-up are timely.¹⁹

The advanced statistical findings further strengthen the interpretation. The significant association between role and type of challenge suggests that healthcare providers and community informants experience surveillance barriers differently, which is plausible. The significant association with gender may reflect differences in field access, social interaction, or role expectations, although this issue is less directly explored in AFP-specific literature. By contrast, the non-significant association with age suggests that these barriers are more structural and contextual than age-dependent.

These findings imply that improving AFP surveillance in study setting will require more than technical compliance. Program strengthening should prioritize regular role-specific training, community-sensitive communication,

workload management, and stronger feedback loops between surveillance teams and local actors. Because the main barriers are social and operational, interventions should target both the health system and the community environment simultaneously.

This study has some limitations. Its cross-sectional design limits causal interpretation, and the findings reflect one district only, which may reduce generalizability to other parts of Pakistan. In addition, the data were based on self-reported responses, so recall bias and social desirability bias may have affected reporting of challenges, training, and confidence. Nevertheless, the inclusion of both healthcare providers and community informants offers a useful and balanced view of AFP surveillance barriers in the local context.

Conclusion

AFP surveillance in Badin is mainly hindered by social barriers, workload, community resistance, and training gaps. Strengthening training, community engagement, and reporting support is essential to improve surveillance effectiveness and support polio eradication.

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Conflict of Interest

The authors declare that there is no conflict of interest.

Ethical Approval

Ethical approval for this study was obtained from the Research Ethics Committee of Liaquat University of Medical and Health Sciences (LUMHS), Jamshoro.

Informed Consent

Written informed consent was obtained from all study participants before data collection.

Authors' Contribution

All authors contributed to the conception and design of the study, data collection, analysis and interpretation, and manuscript writing and approved the final version of the manuscript.

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