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Factors Contributing to Polio Vaccine Refusal among Families in Kabul, Kunduz, Faryab, and Jawzjan Provinces, Afghanistan, 2024

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Abstract

Background

Vaccine refusal remains a major challenge to polio eradication in Afghanistan, one of the two remaining countries endemic for wild poliovirus type 1. Understanding the factors influencing vaccine refusal is essential for designing effective interventions to improve vaccination uptake.

Methods

A descriptive cross-sectional study was conducted in 2024 among 698 caregivers or household decision-makers from families that refused polio vaccination in Kabul, Kunduz, Faryab, and Jawzjan provinces. Participants were selected from refusal household lists maintained by the Expanded Programme on Immunization (EPI). Data were collected using a structured questionnaire assessing sociodemographic characteristics, routine immunization status, knowledge of poliomyelitis and polio vaccination, and reasons for vaccine refusal. Descriptive statistics were used to summarize the findings.

Results

Among the 698 respondents, 62.2% were male and 65.5% were aged 21–40 years. A total of 1,658 children were identified, of whom 89.8% had not received polio vaccination despite 97.6% of households reporting visits by house-to-house vaccination teams. Routine immunization coverage was low among refusal households, with overall coverage ranging from 40% to 48% across vaccine antigens. Although 57.3% of respondents reported knowledge of poliomyelitis and 71.3% were aware of the polio vaccine, only 38.1% believed that vaccination was useful for disease prevention. The most common reasons for vaccine refusal were family opposition (41.8%), vaccine mistrust (34.2%), religious concerns (31.4%), safety concerns (27.8%), fear of side effects (27.5%), and perceived vaccine ineffectiveness (25.8%). Misconceptions regarding infertility, immune-system effects, premature puberty, and illness following vaccination were also frequently reported. Access-related barriers were uncommon (6.3%).

Conclusion

Polio vaccine refusal in Afghanistan is driven primarily by family decision-making, mistrust, religious concerns, safety perceptions, and misinformation rather than access to vaccination services. Strengthening community engagement, risk communication, and trust-building initiatives while addressing misconceptions through culturally appropriate interventions may improve vaccine acceptance and support polio eradication efforts.

Introduction

Poliomyelitis (polio) is a highly infectious viral disease caused by poliovirus, primarily affecting children younger than five years of age. Although most infections are asymptomatic, a small proportion result in irreversible paralysis and, in some cases, death. Before the introduction of effective vaccines, polio caused substantial morbidity and mortality worldwide. Following the launch of the Global Polio Eradication Initiative (GPEI) in 1988 and the widespread use of oral poliovirus vaccine (OPV) and inactivated poliovirus vaccine (IPV), the global burden of poliomyelitis declined by more than 99%, and wild poliovirus types 2 and 3 were successfully eradicated. Despite this remarkable progress, transmission of wild poliovirus type 1 (WPV1) persists in Afghanistan and Pakistan, the only two countries where polio remains endemic (1–5).

Vaccination remains the cornerstone of global polio eradication efforts. The availability and widespread use of OPV and IPV have dramatically reduced disease incidence worldwide and prevented millions of cases of paralysis (4, 5). However, maintaining high vaccination coverage remains a significant challenge in endemic countries. To better understand delays in vaccine acceptance and outright vaccine refusal, the World Health Organization Strategic Advisory Group of Experts (SAGE) established the Vaccine Hesitancy Working Group in 2012, defining vaccine hesitancy as the delay in acceptance or refusal of vaccines despite the availability of vaccination services (6).

Afghanistan has made considerable progress toward polio eradication through routine immunization services and supplementary immunization activities. Improvements in access to previously unreachable populations have increased OPV coverage and contributed to reductions in poliovirus transmission. Nevertheless, the country continues to face persistent challenges including insecurity, population displacement, geographic barriers, weak health infrastructure, and difficulties in reaching all eligible children during vaccination campaigns. Additionally, continuous population movement across the Afghanistan-Pakistan border sustains transmission within a shared epidemiological reservoir, complicating eradication efforts in both countries (1, 2, 7–10).

Vaccine refusal and hesitancy remain among the most important barriers to achieving and sustaining population immunity against poliovirus. Studies from Afghanistan and Pakistan have shown that vaccine refusal is a complex and multifactorial issue influenced by social, cultural, religious, behavioral, and health system-related factors (2, 11–17). Commonly reported reasons include concerns about vaccine safety and effectiveness, misconceptions that OPV causes infertility or other health problems, distrust of vaccination campaigns, and fears regarding vaccine ingredients and their compatibility with religious beliefs (2, 12–17). In some communities, repeated vaccination campaigns have generated fatigue and skepticism, while misinformation disseminated through social networks and informal communication channels has further undermined public confidence in vaccination programs (14–17).

Religious beliefs and community perceptions also play a critical role in caregivers' decisions regarding vaccination. Studies conducted in Afghanistan and Pakistan have reported that some families question the necessity of repeated OPV doses or believe that vaccination campaigns are inconsistent with their religious values. In settings where community and religious leaders strongly influence public opinion,

such concerns can significantly affect vaccine acceptance (12, 14, 16–18). Furthermore, distrust of government institutions, international organizations, and frontline health workers has been associated with increased resistance to immunization activities and lower participation in vaccination campaigns (13–17).

In addition to attitudinal factors, structural and socioeconomic barriers contribute to vaccine refusal and missed vaccinations. These include limited access to health services, shortages of trained female vaccinators, restrictions on women's mobility and decision-making authority, low educational attainment, poverty, insecurity, and inadequate health infrastructure (8, 9, 19, 20). Families living in underserved communities often prioritize immediate socioeconomic needs over preventive health measures, which may reduce participation in vaccination activities. Previous studies have also highlighted the influence of maternal autonomy, caregiver knowledge, and household decision-making dynamics on childhood vaccination uptake (19, 20).

Although several studies have examined polio vaccine hesitancy and refusal in Afghanistan, most have focused on provinces in the southern and eastern regions of the country, particularly Kandahar and Kunar, or in neighboring Pakistan (12, 14, 18, 21). Limited evidence exists regarding the factors influencing vaccine refusal in northern Afghanistan, including Kabul, Kunduz, Faryab, and Jawzjan provinces. These provinces differ in their demographic composition, sociocultural characteristics, security conditions, and access to health services, all of which may affect vaccination behaviors and community perceptions.

Understanding the underlying reasons for polio vaccine refusal in these provinces is essential for developing targeted interventions, strengthening risk communication and community engagement strategies, and improving vaccination coverage among underserved populations. Therefore, this study aimed to identify the reasons for polio vaccine refusal among families in Kabul, Kunduz, Faryab, and Jawzjan provinces of Afghanistan during 2024. The findings will provide evidence to support policymakers and immunization program managers in designing context-specific strategies to address vaccine hesitancy, improve community acceptance of polio vaccination, and contribute to the achievement of polio eradication in Afghanistan.

Materials and Methods

Study Design and Setting

A descriptive cross-sectional study was conducted in 2024 to assess factors associated with refusal of polio vaccination among families residing in four provinces of Afghanistan: Kabul, Kunduz, Faryab, and Jawzjan. Study sites were identified based on lists of families who had refused polio vaccination during vaccination campaigns, provided by the Expanded Programme on Immunization (EPI) and relevant stakeholders.

The selected areas included districts, 7, 8, 10, 12 and Bagrami in Kabul Province; Kunduz City and Imam Sahib district in Kunduz Province; Maimana City, Kohistan, Gorziwan, and Dawlat Abad districts in Faryab Province; and Khamab, Mardyan, Qush Tepa, Khwaja Du Koh, Darzab, Sheberghan, Khan Aqa, Mingajik, and Aqcha districts in Jawzjan Province. Kabul and Kunduz represented predominantly urban settings, whereas Faryab and Jawzjan were mainly rural provinces. The selected provinces encompass diverse sociocultural, geographic, and demographic characteristics, providing a broad representation of communities experiencing vaccine refusal.

Study Population

The study population consisted of caregivers or heads of households whose children had refused oral polio vaccination during National Immunization Days (NIDs), Sub-National Immunization Days (SNIDs), mop-up campaigns, or case-response vaccination activities. Eligible participants were adult caregivers or heads of households who were responsible for making healthcare decisions for eligible children and who provided informed consent to participate in the study. Families that could not be located after repeated visits or declined participation were excluded.

Sample Size and Sampling Procedure

According to EPI records, a total of 6,647 children were reported as missed because of vaccine refusal during the November polio campaign 2023, including 5,960 in Kabul, 540 in Kunduz, 30 in Faryab, and 117 in Jawzjan provinces. Although the exact number of households was not available, each family was estimated to have one to three children who had refused vaccination.

Sample sizes for Kabul and Kunduz provinces were calculated using Epi Info version 7.2.5.1, assuming a 95% confidence level, 50% expected frequency, and 5% margin of error. The calculated sample sizes were 373 participants for Kabul and 222 participants for Kunduz. Given the relatively small number of refusal cases in Faryab and Jawzjan, all accessible refusal households were approached whenever feasible, resulting in sample sizes of 15 and 88 participants, respectively.

The final sample consisted of 698 caregivers or heads of households across the four provinces. Participants were selected using simple random sampling from refusal household lists obtained from provincial EPI offices.

Study Instrument

Data were collected using a structured interviewer-administered questionnaire developed following a review of relevant literature and previous studies related to vaccine hesitancy and polio vaccination refusal. The questionnaire consisted of four sections: Sociodemographic characteristics, including age, sex, residence, district, province, marital status, educational level, and occupation. Routine immunization

history, assessed through vaccination cards when available and caregiver recall. Knowledge regarding poliomyelitis and polio vaccination, including awareness of disease transmission, prevention, and vaccination benefits. Reasons for polio vaccine refusal, including behavioral, cultural, religious, logistical, and health system-related factors. The questionnaire was developed in English, translated into local languages, and pretested before data collection. Necessary modifications were made following pilot testing to improve clarity, relevance, and comprehensibility.

Data Collection Procedure and Training

Data collection was conducted by residents of the Afghanistan Field Epidemiology Training Program (AFETP) Cohort five(V), who were working in their respective provinces as public health professionals. Prior to data collection, official authorization letters were obtained from provincial public health directorates and district health authorities. Data collectors received standardized training on study objectives, interview techniques, ethical considerations, informed consent procedures, questionnaire administration, and quality assurance measures.

Questionnaire was finalized after pilot testing was conducted. Selected households were visited by trained data collectors. The purpose of the study was to explain to participants and written or verbal informed consent was obtained before the interview. Completed questionnaires were reviewed daily by supervisors for completeness, consistency, and accuracy. Any identified errors or missing responses were verified whenever possible during the field visit.

Data Management and Analysis

Completed questionnaires were checked for completeness and consistency prior to data entry. Data were entered into a pre-designed database using Epi Info version 7.2.5.1 and subsequently cleaned for duplicate records, missing values, and data entry errors.

Descriptive statistical analyses were performed to summarize participant characteristics and study variables. Frequencies and percentages were calculated for categorical variables, while means and standard deviations were used for continuous variables where appropriate. Associations between selected independent variables and polio vaccine refusal-related factors were assessed using the chi-square test. A p-value of less than 0.05 was considered statistically significant.

Ethical Considerations

Ethical approval

for the study was obtained from the Institutional Review Board (IRB) of the Ministry of Public Health of Afghanistan before commencement of field activities.

Participation was voluntary, and informed consent was obtained from all study participants prior to data collection. Participants were informed of the purpose of the study, their right to refuse participation, and their right to withdraw at any stage without consequences. All collected information was treated confidentially and anonymized during data entry, analysis, and reporting. No personal identifiers were included in the final dataset, and data were accessed only by authorized members of the research team.

Results

Sociodemographic characteristics

The study included 698 respondents from four provinces of Afghanistan. Kabul contributed the highest proportion of participants (53.4%), followed by Kunduz (31.8%), Jawzjan (12.6%), and Faryab (2.1%). The majority of respondents were male (62.2%), and nearly two-thirds were aged 21–40 years (65.5%). The average age of care givers was 34.33 years with standard deviation (SD) of 12.44 years. Most participants were unemployed (61.5%), while freelance work was the predominant occupation among employed respondents. Overall, 60.3% of respondents received formal education, with high school education being the most commonly reported level of educational attainment.

Table 1
Sociodemographic characteristics of respondents included in the polio vaccination refusal survey, Afghanistan, 2024 (N = 698)

Variables	Categories	Frequency	Percentage
Age Group			
	< 20	80	11.46
	21–40	457	65.47
	41–60	130	18.62
	> 60	31	4.44
Sex			
	Male	434	62.18
	Female	264	37.82
Education			
	Yes	421	60.32
	No	277	39.68
Level of Education			
	High School	103	22.20
	14th grade	64	13.79
	Madrasa	101	21.77
	Bachelor	82	17.67
	Higher than bachelor	8	1.72
	Other	106	22.84
Employment Status			
	Employed	269	38.54
	Unemployed	429	61.46
Profession			
	Nurse	6	1.55
	Engineer	12	3.10
	Health Worker	18	4.65
	Teacher	22	5.68

Variables	Categories	Frequency	Percentage
Age Group			
	Religious	34	8.79
	Freelance job	124	32.04
	Other	171	44.19

Child vaccination characteristics

A total of 1,658 children were identified in the households surveyed. Among vaccine-eligible children aged < 5 years, 1,489 (89.8%) had not received polio vaccination, compared with 169 (10.2%) who had been vaccinated. Almost all respondents reported receiving vaccination services through house-to-house visits by polio teams (97.6%). Fathers were the most common respondents (42.8%), and slightly more than half of the children were male (53.2%). Routine immunization cards were available for 55.3% of children.

Table 2
Vaccination status and characteristics of children from households refusing polio vaccination, Afghanistan, 2024 (N = 698 households; 1,658 children)

Variables	Categories	Frequency	Percentage
Number of children < 5 years in family			
	Vaccinated for polio	169	10.19
	Not vaccinated for polio	1489	89.81
Visit of Polio Campaign Team			
	House to House	681	97.56
	In Masjid	2	0.29
	Not came to my home	9	1.29
	Site to Site	6	0.86
Relation to the child			
	Father	299	42.84
	Mother	191	27.36
	Grand parents	60	8.60
	Brother	44	6.30
	Sister	21	3.01
	Other	83	11.89
Sex of child			
	Male	371	53.15
	Female	*327*	*46.85*
Having Routine Immunization Card			
	Yes	386	55.30
	No	312	44.70

Routine Immunization Coverage

Routine immunization coverage was low among children from households refusing polio vaccination (Table 3). Overall coverage was highest for BCG (48.0%) and OPV0 (46.0%), while coverage for vaccines administered later in infancy ranged from 40.0% to 44.0%. A declining trend in coverage was observed across successive vaccine doses, with the lowest uptake reported for OPV4 and Measles 2 (40.0%

each). Vaccination coverage estimates derived from vaccination cards were consistently higher than those based on caregiver recall.

Table 3
Routine immunization coverage among children from households refusing polio vaccination in four provinces of Afghanistan, 2024

SN	Antigens	By Card		By Recall		Overall Coverage	
		Number	%	Number	%	Number	%
1	BCG	390	56.60	279	40.49	669	97.10
2	OPV 0	378	54.86	262	38.03	640	92.89
3	OPV 1	354	51.38	254	36.87	608	88.24
4	Rota 1	346	50.22	260	37.74	606	87.95
5	Penta1	343	49.78	261	37.88	604	87.66
6	OPV 2	322	46.73	245	35.56	567	82.29
7	Rota 2	322	46.73	250	36.28	572	83.02
8	Penta2	319	46.30	252	36.57	571	82.87
9	OPV 3	316	45.86	244	35.41	560	81.28
10	Penta3	312	45.28	252	36.57	564	81.86
11	OPV 4	316	45.86	241	34.98	557	80.84
12	Measles 1	317	46.01	252	36.57	569	82.58
13	Measles 2	308	44.70	252	36.57	560	81.28

Knowledge of Polio Disease and Vaccination

Table 4 presents respondents' knowledge and awareness regarding poliomyelitis and polio vaccination. Overall, 400 (57.3%) respondents reported having knowledge of poliomyelitis, while 298 (42.7%) indicated no knowledge of the disease. Awareness of the polio vaccine was higher, with 498 (71.3%) respondents reporting knowledge of the vaccine compared with 200 (28.7%) who were unaware of it.

Health workers and polio vaccination volunteers were the primary source of information on polio vaccination, cited by 252 (36.1%) respondents, closely followed by television (34.5%). Village elders were reported as a source of information by 17.0% of respondents, whereas religious leaders were the least frequently mentioned source (2.0%).

Regarding vaccine administration, nearly two-thirds of respondents (64.2%) correctly identified oral administration as the route for polio vaccination, while very few (0.6%) believed that the vaccine is

administered by injection only. In contrast, 28.7% reported that polio vaccines can be administered through both oral and injectable routes.

Despite relatively high awareness of the disease and vaccine, perceptions of vaccine benefits were limited. Only 266 (38.1%) respondents believed that the polio vaccine is useful for preventing poliomyelitis, whereas 432 (61.9%) did not recognize its usefulness.

Table 4
Knowledge of poliomyelitis and polio vaccination among households refusing polio vaccination in four provinces of Afghanistan, 2024.

Variables	Categories	Number	Percentage
Knowledge of polio diseases			
	Yes	400	57.31
	No	298	42.69
Knowledge of polio Vaccine			
	Yes	498	71.35
	No	200	28.65
Source of knowledge of polio vaccine			
	Health worker/Polio vaccine volunteer	252	36.10
	Television	241	34.53
	Village elder	119	17.05
	Religious Person	14	2.01
	Radio	27	3.87
	Others	45	6.45
Polio vaccine administration Knowledge			
	Oral	448	64.18
	Injection	4	0.57
	Both	200	28.65
Knowledge of polio vaccine usefulness			
	Yes	266	38.11
	No	432	61.89

Reasons for Polio Vaccine Refusal

Table 5 presents the reasons reported by households for refusing polio vaccination. During the November polio campaign in 2023, a total of 2,530,596 children less than 5 years were approached for vaccination in four provinces of Kabul, Kunduz, Jawzjan and Faryab. Overall, the total number of children successfully vaccinated was 2,523,949 (99.74%) while 6647 (0.26%) refused the vaccination. At provincial level the refusal rates were 0.44%, 0.14%, 0.01% and 0.03% in Kabul, Kunduz, Faryab, and Jawzjan accordingly.

Family refusal was the most frequently reported reason, cited by 292 (41.8%) respondents. Other commonly reported reasons included vaccine mistrust (239; 34.2%), religious concerns (219; 31.4%), safety concerns (194; 27.8%), fear of side effects (192; 27.5%), and perceptions that the vaccine is ineffective (180; 25.8%). Repeated vaccination during supplementary immunization activities was also reported as a reason for refusal by 133 (19.1%) respondents.

Several respondents reported concerns related to misinformation about the vaccine, including fears that vaccination could cause illness in children (16.1%), affect the immune system (14.6%), lead to infertility (13.5%), result in premature puberty (13.6%), or have moral and cultural consequences (14.3%). Additionally, 18.9% believed that the vaccine is not used in Western countries, reflecting misconceptions about its global use.

Programmatic and access-related barriers were less frequently reported. Dissatisfaction with vaccinators accounted for 6.6% of refusals, while limited access to vaccination services was the least commonly cited reason (6.3%).

Table 5
Reported reasons for polio vaccine refusal among households in Kabul, Kunduz, Jawzjan, and Faryab provinces, Afghanistan, 2024.

Variables	Categories	Number	Percentage
Limited access to services			
	Yes	44	6.30
	No	654	93.70
Family refusal			
	Yes	292	41.83
	No	406	58.17
Repeated vaccination concerns			
	Yes	133	19.05
	No	565	80.95
Safety concerns			
	Yes	194	27.79
	No	504	72.21
Fear of side effects			
	Yes	192	27.51
	No	506	72.49
Religious concerns			
	Yes	219	31.38
	No	479	68.62
Vaccine mistrust			
	Yes	239	34.24
	No	459	65.76
Misconceptions about global use			
	Yes	132	18.91
	No	566	81.09
Fear of infertility			
	Yes	94	13.47

Variables	Categories	Number	Percentage
Limited access to services			
	No	604	86.53
Concerns about immune system effects			
	Yes	102	14.61
	No	596	85.39
Concern about premature puberty			
	Yes	95	13.61
	No	603	86.39
Fear of illness after vaccination			
	Yes	112	16.05
	No	586	83.95
Dissatisfaction with vaccinators			
	Yes	46	6.59
	No	652	93.41
Perceived ineffectiveness			
	Yes	180	25.79
	No	518	74.21
Moral or cultural concerns			
	Yes	100	14.33
	No	598	85.67
Other reasons			
	Yes	103	14.76
	No	595	85.24

Discussion

This study assessed factors associated with polio vaccine refusal among households in Kabul, Kunduz, Jawzjan, and Faryab provinces of Afghanistan. The findings demonstrated that vaccine refusal was driven primarily by family opposition, vaccine mistrust, religious concerns, safety-related fears, and misconceptions regarding vaccine effectiveness. Although most respondents had heard about

poliomyelitis and polio vaccines, a substantial proportion lacked confidence in the benefits of vaccination. Furthermore, routine immunization coverage among children from refusal households was suboptimal, suggesting that vaccine hesitancy extends beyond polio campaigns and may influence the uptake of other childhood vaccines. It is noteworthy, that the level of refusal was low as compared to such study conducted in Quetta, Pakistan (14).

One of the most important findings of this study was that family refusal was the most frequently reported reason for non-vaccination. This finding is consistent with previous studies conducted in Afghanistan and Pakistan, which have highlighted the critical role of household decision-making, parental beliefs, and social influences in determining vaccine acceptance (11, 13, 14). Bennett and Smith reported that parental attitudes and social influences substantially affect childhood immunization decisions and may outweigh factual knowledge alone (11). Similarly, Soofi et al. and Zarak et al. identified family concerns and resistance as major determinants of polio vaccine refusal in Pakistan (13, 14). These findings suggest that interventions focused solely on individual caregivers may be insufficient, and that family-centered approaches targeting fathers, elders, and other influential household members are essential.

Vaccine mistrust was another major reason for refusal, reported by more than one-third of participants. Similar findings have been reported in studies from Pakistan, where distrust toward vaccination campaigns, government institutions, and external organizations has contributed significantly to vaccine hesitancy and refusal (14–16). The persistence of mistrust in Afghanistan may be linked to prolonged conflict, misinformation, and limited trust in public institutions. A global systematic review by Larson et al. identified lack of confidence in vaccines, healthcare systems, and policymakers as key drivers of vaccine hesitancy worldwide (22). Likewise, Dubé et al. emphasized that trust is one of the most important determinants of vaccine acceptance across diverse settings (23). Strengthening trust through transparent communication, community engagement, and sustained interactions between health workers and communities may therefore be essential to improving vaccine uptake.

Religious concerns were reported by nearly one-third of respondents and represented another important barrier to vaccine acceptance. Similar findings have been documented in Afghanistan and Pakistan, where some caregivers questioned the religious permissibility of vaccination or perceived polio campaigns as inconsistent with their beliefs (12, 14, 16, 18, 21). Religious misconceptions have been observed repeatedly in areas where local religious leaders exert substantial influence over community behaviors. Evidence suggests that engagement of religious scholars and faith leaders can contribute to increased vaccine acceptance by addressing misconceptions and reinforcing positive health messages (16, 18). In the present study, religious leaders were among the least frequently reported sources of vaccine information, indicating a missed opportunity for strengthening community trust and support for vaccination programs.

Concerns related to vaccine safety and fear of side effects were reported by approximately one-quarter of respondents. Similar findings have been reported in several studies from Pakistan, where concerns

about adverse events, vaccine safety, and vaccine quality were among the leading reasons for refusal (13–17). These perceptions persist despite extensive evidence demonstrating the safety and effectiveness of OPV and IPV in preventing poliomyelitis and reducing transmission of poliovirus (3, 4). Therefore, risk communication strategies should prioritize direct discussion of safety concerns and provide communities with clear, evidence-based information regarding vaccine benefits and risks.

The study also found widespread misconceptions regarding polio vaccination. Some respondents believed that vaccination could cause infertility, weaken the immune system, induce premature puberty, or result in illness following administration. Similar misconceptions have been documented in Afghanistan and Pakistan and continue to undermine vaccine acceptance (13–17, 21). Notably, although more than two-thirds of respondents were aware of polio vaccines, only 38% believed that vaccination was useful in preventing poliomyelitis. This discrepancy highlights the distinction between awareness and acceptance. Larson et al. noted that knowledge alone is often insufficient to improve vaccine uptake when concerns related to trust, safety, and social norms remain unresolved (22). Dubé et al. further emphasized that vaccine hesitancy is influenced by complex psychological, social, cultural, and political factors beyond simple awareness of vaccination (23).

Health workers and polio volunteers were identified as the leading sources of information regarding polio vaccination. This finding is encouraging because frontline health workers are generally regarded as one of the most trusted sources of vaccine-related information. Similar observations have been reported in Afghanistan, where interactions with healthcare providers were positively associated with routine immunization uptake (8). The World Health Organization's Behavioral and Social Drivers framework identifies healthcare workers as a critical factor influencing vaccination decisions and emphasizes the importance of provider communication skills in addressing community concerns (24). Strengthening the capacity of vaccinators and community health workers to address misconceptions and communicate effectively may therefore contribute substantially to reducing vaccine refusal.

A noteworthy finding was the coexistence of polio vaccine refusal and low routine immunization coverage among study households. Coverage declined progressively across successive vaccine doses, suggesting dropout throughout the immunization schedule. Similar challenges have been reported in Afghanistan, where incomplete vaccination remains common among underserved populations and communities with limited trust in health services (8, 9). The findings suggest that vaccine refusal should not be viewed solely as a campaign-related issue, but rather as part of broader challenges related to childhood immunization and healthcare utilization.

Interestingly, access-related barriers and dissatisfaction with vaccinators were reported less frequently than attitudinal factors. Nearly all respondents reported that vaccination teams visited their households, indicating that most families had physical access to vaccination services. This finding suggests that refusal in the study setting is primarily driven by confidence and acceptance issues rather than service availability. Similar observations have been reported in high-risk areas of Pakistan, where demand-side barriers become increasingly important once vaccination services are broadly accessible (13, 14). This

interpretation is consistent with contemporary vaccine hesitancy frameworks, which emphasize confidence, perceived vaccine benefits, and social influences as key determinants of vaccine uptake when access barriers have been minimized (22, 24). In addition, the findings of this study are similar with a study in Herat province Afghanistan. This study identified several interrelated reasons for polio vaccine hesitancy. Key themes included religious concerns and opposition to vaccination, perceptions that vaccines could harm children's growth or weaken their immunity, fears of infertility or sterility, concerns about the presence of haram (forbidden) ingredients, and limited trust in vaccines. Participants also expressed concerns about financial exploitation, the lack of domestic vaccine production, and inadequate government attention to broader economic needs (25). These findings suggest that vaccine hesitancy was shaped by a combination of religious beliefs, perceived health risks, mistrust, and broader socioeconomic and governance-related concerns.

This study has several strengths. First, it included a relatively large sample of vaccine-refusing households from four provinces representing diverse geographical and sociocultural contexts. Second, participants were selected directly from documented refusal households, allowing for focused assessment of factors underlying vaccine rejection. Third, the study examined multiple dimensions of vaccine hesitancy, including knowledge, attitudes, routine immunization status, and specific reasons for refusal. Finally, it provides important evidence from northern Afghanistan, where published data on polio vaccine refusal remain limited.

Several limitations should be considered. First, the cross-sectional design limits the ability to establish causal relationships between identified factors and vaccine refusal. Second, the study relied on self-reported information, which may be subject to recall and social desirability bias. Third, households accepting vaccination were not included for comparison, limiting the ability to identify independent predictors of refusal. Fourth, the relatively small sample size from Faryab Province may restrict province-specific interpretation. Finally, qualitative methods were not employed, limiting deeper exploration of the social and cultural factors underlying vaccine refusal.

Programmatic Recommendations

The findings suggest that interventions to reduce polio vaccine refusal should prioritize community engagement and trust-building. Vaccination programs should actively involve fathers, elders, and other influential family members, while strengthening partnerships with religious leaders to address religious misconceptions. Targeted communication strategies are needed to counter misinformation regarding vaccine safety, side effects, infertility, and effectiveness. In addition, enhancing the counseling and communication skills of frontline vaccinators and integrating polio messaging with routine immunization services may help improve overall vaccine acceptance. Community-based behavioral interventions and qualitative research in high-refusal areas are also recommended to better understand and address the underlying drivers of vaccine hesitancy.

Conclusion

Polio vaccine refusal among households in Afghanistan is largely influenced by family decision-making, vaccine mistrust, religious concerns, safety perceptions, and misinformation, while access-related barriers appear less important. Routine immunization coverage among refusal households was also substantially low, indicating broader challenges related to vaccine acceptance. Addressing misinformation, strengthening risk communication, engaging influential family and community members, and building trust in vaccination programs are essential for reducing vaccine refusal and advancing polio eradication efforts in Afghanistan.

Abbreviations

AFETP Afghanistan Field Epidemiology Training Program

ANPHI Afghanistan National Public Health Institute

BCG Bacilli Calment Guerin

CDC Centers for Disease Control and Prevention

DHIS2 District Health Information System

EPI Expanded Programme of Immunization

EMPHNET Eastern Mediterranean Public Health Network

HPV Human papillomavirus

LMICs Low- and middle-income countries

MCV Measles conjugate vaccine

MoPH Ministry of Public Health

OPV Oral Polio Vaccine

PCV Pneumococcal Vaccine

UNICEF United Nation Children Fund

WHO World Health Organization

Declarations

Ethics approval and consent to participate

The study protocol, conducted as a group research project, was reviewed and approved by the Institutional Review Board (IRB) of the Afghanistan National Public Health Institute (ANPHI), Ministry of

Public Health, Afghanistan A-8-24-452 dated 08 August 2024. The study was conducted in accordance with the ethical principles of the Declaration of Helsinki for research involving human participants. Written informed consent was obtained from the heads of households and caregivers prior to data collection, and participation was voluntary. Confidentiality and anonymity of all participants were maintained throughout the study.

Consent for publication

Not applicable.

Competing interests

The authors declare no competing interests.

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Author Contribution

Khwaja Mir Islam SAEED(KMIS), Shoaib Naeemi (SN), Mir Salamuddin Hakim (MSH), Ghulam Jailani Ataee (GJA), Atiqullah Mohammadi (AM), Homayoun Aahee (HA) Aminulhaq Karim (AK), Mohammad Asef Rasouli (MAR) conceptualized the study, developed the study protocol, and led the study project implementation. GJA, AM, HA, AK and MAR developed the first draft of report. KMIS, MSH and SN reviewed, reanalyzed and developed and manuscript. All worked on study methodology and implementation and contributed to data curation. KMIS, MSH and SN reviewed the final manuscript reviewing and editing.

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Data Availability

The datasets used and/or analyzed during the current study are available from the corresponding author on reasonable request with permission of ANPHI and EMPHNET.

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