JHWCR JOURNAL OF HEALTH, WELLNESS AND COMMUNITY RESEARCH 3007-0570

https://doi.org/10.61919/k0mn0218

Original Article

Mothers' Perceptions of Childhood Vaccination Barriers in Rural Communities of Pakistan: A Comprehensive Qualitative Study

Sibghat Ullah[1], Dua Tahir[2], Iqra Tahir[2], Mehak Wasif[1], Zulfiqar Ali[3], Javairia Saleh[1]

[1] Health Services Academy, Islamabad, Pakistan
[2] Quetta Institute of Medical Sciences, Quetta, Pakistan
[3] S. Tentishev Asian Medical Institute, Kyrgyzstan

***Corresponding author: Sibghat Ullah, ullahsibghat50@gmail.com**

"Cite this Article" Received: 05 January 2026; **Accepted**: 03 April 2026; **Published**: 15 April 2026

Author Contributions: Concept: SU; Design: DT, IT; Data Collection: MW, JS; Analysis: ZA; Drafting: SU, DT. **Ethical Approval**: was obtained from the respective institutional ethics review board**. Informed Consent**: Written informed consent was obtained from all participants; **Conflict of Interest**: The authors declare no conflict of interest. **Funding**: No external funding; **Data Availability**: Available from the corresponding author on reasonable request; **Acknowledgments**: N/A.

ABSTRACT

Background: Childhood immunization remains suboptimal in rural Pakistan despite established national programs. Sociocultural norms, gender dynamics, and health system constraints contribute to missed or delayed vaccination. Qualitative evidence is needed to understand maternal perspectives and decision-making processes. Objective: To explore mothers' perceptions of childhood vaccination and identify sociocultural, behavioral, and health system barriers influencing immunization uptake in rural Pakistan Methods: A qualitative interpretative endline study was conducted in rural districts of Punjab and Sindh. Data were collected through in-depth interviews (n=30) and focus group discussions (n=5) with mothers of children under five years. Interviews were conducted in local languages, audio-recorded, transcribed, and analyzed using inductive thematic analysis. Results: Six major themes emerged: knowledge gaps and misconceptions; sociocultural and community influences; gendered decision-making and limited maternal autonomy; accessibility and health system barriers; trust and communication with healthcare providers; and fear of side effects. Vaccination behavior was shaped by interacting factors rather than isolated barriers. While most mothers expressed acceptance of vaccination, constraints related to mobility, service availability, and household decision-making led to delays, partial uptake, or missed vaccinations. Conclusion: Vaccination barriers in rural Pakistan are multidimensional and context-dependent. Interventions should prioritize community engagement, improved service delivery, male involvement, and strengthened provider communication to enhance immunization uptake. Keywords: vaccination, qualitative research, maternal perceptions, rural Pakistan, immunization barriers, health systems.

INTRODUCTION

Childhood immunization is one of the most effective and cost-efficient public health interventions for reducing morbidity and mortality from vaccine-preventable diseases such as measles, poliomyelitis, diphtheria, pertussis, and tuberculosis. Globally, routine childhood vaccination has significantly improved child survival; however, inequities in vaccine access and uptake persist, particularly in low- and middle-income countries. In Pakistan, despite decades of implementation of the Expanded Programme on Immunization (EPI), complete vaccination coverage remains suboptimal, especially in rural and underserved populations (1–3). National survey data indicate that a considerable proportion of children either receive vaccines late, incompletely, or not at all, contributing to preventable disease burden and periodic outbreaks (4,5).

ISSN 3007-0570 | © 2026 The Authors | CC BY 4.0

Immunization challenges in Pakistan extend beyond service provision and reflect a complex interplay of individual, sociocultural, and health system factors. Evidence suggests that maternal education, awareness, and perceptions of vaccine safety strongly influence vaccination uptake (6,7). At the same time, structural barriers such as distance to health facilities, transportation limitations, irregular outreach services, and health workforce constraints continue to hinder access in rural areas (8,9). In addition, sociocultural dynamics—including the influence of husbands and mothers-in-law, gendered decision-making norms, and community narratives—play a critical role in shaping maternal health behaviors (10,11).

Vaccine hesitancy has been identified as a global health threat, but it is increasingly understood as a context-specific phenomenon influenced by confidence, convenience, and complacency (12,13). In rural Pakistan, vaccination decisions are embedded within broader social structures, where mothers often have limited autonomy and rely on family approval and support to seek healthcare for their children. Misconceptions regarding vaccine safety, fear of side effects such as fever or weakness, and rumors about long-term harm further contribute to delayed or missed vaccinations (7,14,15). Moreover, trust in healthcare providers and the quality of communication during service delivery significantly affect caregivers' willingness to accept vaccines (16).

While quantitative studies have documented disparities in immunization coverage and identified associated predictors, they offer limited insight into the lived experiences, beliefs, and decision-making processes of mothers. Qualitative approaches are particularly important for understanding how mothers interpret vaccines, navigate household power dynamics, and experience barriers within health systems. Such approaches also help distinguish between true vaccine hesitancy and constrained access due to structural or social limitations (13,17).

Despite growing recognition of these factors, there remains a relative lack of in-depth qualitative research exploring maternal perceptions of childhood vaccination in rural Pakistan. Existing studies often focus on specific vaccines or rely on quantitative designs that do not fully capture sociocultural context and experiential dimensions. This study addresses this gap by exploring how mothers in rural communities understand childhood vaccination, what barriers they face, and how social, cultural, and health system factors shape their decisions.

The objectives of this study were: (1) to explore mothers' perceptions of childhood vaccination; (2) to identify sociocultural, behavioral, and health system barriers affecting immunization uptake; and (3) to examine how maternal autonomy, family influence, and interactions with healthcare providers influence vaccination-related decision-making.

MATERIALS AND METHODS

This study employed an interpretative qualitative design as an endline evaluation to explore maternal perceptions, experiences, and decision-making related to childhood vaccination in rural Pakistan. A qualitative approach was selected to capture the sociocultural context, gender dynamics, and lived experiences that influence immunization behavior, which are not adequately understood through quantitative methods alone.

The study was conducted in rural districts of Punjab and Sindh provinces, characterized by limited healthcare access, low literacy levels, and traditional social structures. Data collection took place over a defined field period during which both in-depth interviews (IDIs) and focus group discussions (FGDs) were conducted in community settings to ensure contextual relevance and participant comfort.

Participants included mothers of children under five years of age who were primary caregivers and directly involved in decisions related to child health and vaccination. Inclusion criteria required participants to reside in the study area and have experience with routine childhood immunization services, whether complete, partial, or absent. Mothers who were not primary decision-makers or who

had no exposure to vaccination services were excluded. The study focused exclusively on mothers to maintain conceptual clarity and alignment with the research objectives.

Purposive sampling was used to ensure variation across maternal age, education level, parity, and distance from health facilities. Participants were identified and approached with the assistance of local community health workers and health facility staff. Recruitment continued iteratively until thematic saturation was reached, defined as the point at which no new substantive themes or codes were emerging from successive interviews and discussions. A total of 30 in-depth interviews and 5 focus group discussions were conducted. Each FGD included approximately 6–8 participants, resulting in a diverse sample reflecting different socioeconomic and experiential backgrounds. No repeat interviews were conducted. While most eligible participants agreed to participate, a small number declined due to time constraints or household responsibilities.

Data were collected using semi-structured interview and discussion guides developed based on existing literature and study objectives. The guides explored knowledge of vaccination, perceived benefits and risks, decision-making processes within households, access barriers, and experiences with healthcare providers. The tools were piloted in a similar rural setting and refined for clarity and cultural appropriateness. Interviews and FGDs were conducted in local languages by trained female researchers familiar with the cultural context, which facilitated rapport and open discussion.

Each interview lasted approximately 30–60 minutes, and FGDs lasted 60–90 minutes. Data collection took place in private or semi-private community settings to ensure confidentiality and minimize external influence. With participant consent, all sessions were audio-recorded, and detailed field notes were taken to capture non-verbal cues and contextual observations. Participants were informed of their right to withdraw at any time without consequence.

Audio recordings were transcribed verbatim in the original language and subsequently translated into English for analysis. Transcripts were de-identified to ensure participant anonymity and stored securely with restricted access. Data management procedures adhered to confidentiality and ethical standards.

Reflexivity was considered throughout the research process. The research team consisted of trained qualitative researchers with backgrounds in public health and community-based research. Researchers maintained reflexive notes to document their assumptions, interactions with participants, and potential sources of bias. Efforts were made to minimize social desirability bias by ensuring participants that there were no right or wrong answers and that their responses would not affect their access to services.

Data were analyzed using an inductive thematic analysis approach. Initial familiarization involved repeated reading of transcripts. Two researchers independently coded a subset of transcripts to develop a preliminary coding framework. Through iterative discussion, a shared codebook was established and applied to the remaining data. Coding was conducted systematically, and discrepancies were resolved through consensus. Codes were then grouped into broader categories and refined into themes through constant comparison across interviews and FGDs. An audit trail documenting coding decisions, theme development, and analytical reflections was maintained to enhance transparency and dependability.

Trustworthiness was ensured through multiple strategies. Credibility was strengthened through triangulation of data sources (IDIs and FGDs) and iterative team discussions. Dependability and confirmability were supported by maintaining an audit trail and engaging in peer debriefing. Transferability was addressed by providing detailed contextual descriptions of the study setting and participants. Although formal member checking was not conducted, findings were reviewed within the research team to ensure consistency and coherence.

Ethical approval for the study was obtained from the relevant institutional ethics review board. Written or verbal informed consent was obtained from all participants prior to data collection, including consent for audio recording. Participants were assured of confidentiality, anonymity, and their right to withdraw

at any stage. All identifying information was removed from transcripts, and data were stored securely in password-protected systems.

RESULTS

A total of 30 in-depth interviews (IDIs) and 5 focus group discussions (FGDs) were conducted with mothers of children under five years. FGDs included approximately 6–8 participants each, resulting in broad representation across rural communities in Punjab and Sindh.

Participants ranged in age from 18 to 40 years, with most having primary or no formal education. The majority were housewives and primary caregivers responsible for child health decisions, though decision-making authority often resided with husbands or elder family members. Participants varied in parity, distance from health facilities, and prior experience with immunization services (complete, partial, or missed vaccination).

Table 1. Theme Matrix: Distribution of Themes Across Participant Groups and Districts

Theme	Punjab (IDIs/FGDs)	Sindh (IDIs/FGDs)	Overall Intensity
Knowledge gaps & misconceptions	Frequent	Frequent	Frequent
Sociocultural & religious influences	Moderate	Frequent	Frequent
Gendered decision-making	Frequent	Frequent	Frequent
Accessibility & system barriers	Moderate	Frequent	Frequent
Trust & provider communication	Moderate	Moderate	Moderate
Fear of side effects	Frequent	Frequent	Frequent

Intensity definitions (used throughout results):

Frequent: reported in ≥50% of interviews/FGDs

Moderate: reported in ~25–50%

Rare: reported in <25%

Theme 1: Knowledge Gaps and Misconceptions

Knowledge gaps regarding vaccination schedules, purpose, and side effects were reported in most interviews and FGDs (frequent) across both provinces. Many mothers were aware that vaccines were "important" but lacked clarity on timing, number of doses, and disease prevention mechanisms.

Confusion about vaccination schedules was especially common among mothers with limited education or those who had lost vaccination cards. Several participants expressed uncertainty about when to return for subsequent doses.

Illustrative quotes (Table 2):

> *"They give injections, but I don't always understand which one it is or when to come again." (MWRA, Punjab, IDI-06)*

> *"We know vaccines are good, but no one explains properly what each one does." (MWRA, Sindh, FGD-02)*

Misconceptions were also reported, including beliefs that vaccines could weaken children or cause illness. These perceptions often coexisted with partial acceptance rather than complete refusal.

Theme 2: Sociocultural and Religious Influences

Sociocultural influences were frequently reported overall, with stronger expression in Sindh compared to Punjab. Community narratives, informal advice networks, and religious interpretations shaped maternal attitudes toward vaccination.

Rumors about vaccine-related harm—such as infertility or long-term weakness—were discussed in many FGDs (frequent in Sindh; moderate in Punjab). These were often transmitted through neighbors or extended family members rather than formal religious authorities.

"People in the village say too many injections can make children weak later." (MWRA, Sindh, FGD-04)

"Sometimes elders say these vaccines are not necessary or not safe." (MWRA, Punjab, IDI-11)

Religious concerns were present but less uniformly expressed; they were typically indirect and mediated through community interpretation rather than explicit doctrinal opposition.

Theme 3: Gendered Decision-Making and Maternal Autonomy

Constraints on maternal decision-making were reported in most interviews (frequent) across both provinces. Mothers often described limited autonomy in seeking vaccination services, requiring permission or accompaniment from husbands or mothers-in-law.

"I cannot go alone. I have to ask my husband, and if he is busy, then we delay." (MWRA, Punjab, IDI-03)

"My mother-in-law decides when we should take the child. I follow what she says." (MWRA, Sindh, IDI-14)

Even when mothers recognized the importance of vaccination, decision-making was often negotiated within the household. Delays were commonly attributed to lack of permission, competing priorities, or absence of a male escort. This theme was particularly salient among younger mothers and those living in extended family households.

Theme 4: Accessibility and Health System Barriers

Barriers related to access and service delivery were frequently reported overall, with somewhat greater intensity in Sindh. Key challenges included distance to facilities, transportation constraints, irregular service availability, and long waiting times.

"The center is far, and we have no transport. Sometimes we just cannot go." (MWRA, Sindh, IDI-21)

"We go there, but sometimes the vaccinator is not available." (MWRA, Punjab, FGD-01)

Some mothers reported making repeated trips due to stock-outs or staff absence, which discouraged continued engagement with services. These experiences contributed to missed or delayed vaccinations even among mothers who were willing to vaccinate their children. Access barriers were often intertwined with gender constraints, as mobility depended on male availability and financial resources.

Theme 5: Trust and Communication with Healthcare Providers

Trust in healthcare providers emerged as a moderate but influential theme, shaping mothers' willingness to return for subsequent vaccinations. Positive interactions—characterized by respectful communication and clear explanations—were associated with greater confidence in vaccination.

> *"When the nurse explains nicely, we feel comfortable and come again." (MWRA, Punjab, IDI-09)*

Conversely, negative experiences, including perceived disrespect, rushed consultations, or lack of explanation, undermined trust.

> *"They just give the injection and send us away. We don't get answers." (MWRA, Sindh, FGD-03)*

Trust appeared to mediate other factors, particularly fear of side effects and willingness to adhere to vaccination schedules.

Theme 6: Fear of Side Effects and Vaccine Hesitancy

Fear of side effects was reported in most interviews and FGDs (frequent) and was one of the most immediate concerns influencing maternal behavior. Commonly cited side effects included fever, pain, and swelling.

> *"After the injection, the child gets fever, so sometimes we feel afraid to go again." (MWRA, Punjab, IDI-12)*

> *"When the child cries a lot after vaccination, we worry something is wrong." (MWRA, Sindh, FGD-05)*

In most cases, these fears did not lead to outright refusal but contributed to delays, missed doses, or selective uptake. Fear was often amplified by lack of prior counseling and inadequate explanation from healthcare providers.

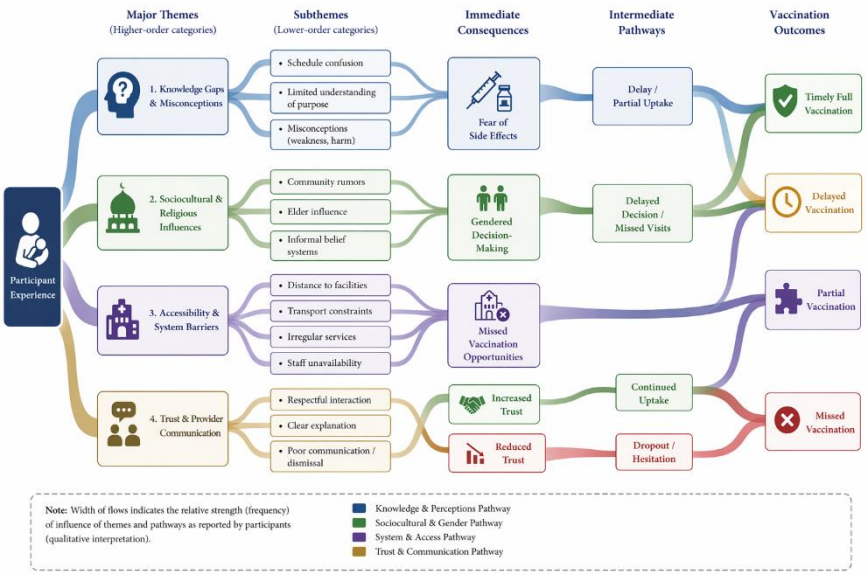
Table 2. Quote Table: Subthemes and Representative Verbatim Quotes

Theme	Subtheme	Representative Quotes
Knowledge gaps	Schedule confusion	"I don't always understand when to come again." (Punjab, IDI-06)
	Limited understanding	"No one explains what each vaccine is for." (Sindh, FGD-02)
Sociocultural influences	Community rumors	"People say vaccines can weaken children." (Sindh, FGD-04)

Theme	Subtheme	Representative Quotes
	Elder influence	"We follow what elders in the house say." (Punjab, IDI-11)
Gendered decision-making	Husband authority	"I need my husband's permission." (Punjab, IDI-03)
	Mother-in-law role	"My mother-in-law decides." (Sindh, IDI-14)
Access barriers	Distance/transport	"The center is far, we cannot go easily." (Sindh, IDI-21)
	Service inconsistency	"Sometimes staff are not available." (Punjab, FGD-01)
Trust	Positive interaction	"When they explain, we feel confident." (Punjab, IDI-09)
	Poor communication	"They don't answer our questions." (Sindh, FGD-03)
Side effects	Fever/pain	"The child gets fever, so we feel afraid." (Punjab, IDI-12)
	Emotional distress	"We worry when the child cries a lot." (Sindh, FGD-05)

Cross-Cutting Patterns Across themes, vaccination behavior was shaped by interacting factors rather than isolated barriers. Knowledge gaps amplified fear of side effects; limited autonomy constrained service access; and negative provider interactions reduced trust. Access challenges and gendered decision-making often co-occurred, particularly in more remote settings.

While most mothers expressed general acceptance of vaccination in principle, practical, social, and informational barriers collectively influenced whether children were vaccinated on time, partially vaccinated, or missed vaccinations altogether.



This Sankey-style conceptual diagram illustrates how mothers' vaccination decisions emerge from interconnected sociocultural, informational, and health system pathways rather than a single barrier. Knowledge gaps frequently feed into fear of side effects, particularly when not mitigated by provider counseling. Sociocultural influences—especially community narratives and elder authority—interact with gendered decision-making constraints, limiting maternal autonomy and delaying action. Structural

barriers such as distance, transport limitations, and irregular service availability further constrain access, even among mothers willing to vaccinate. Trust in healthcare providers operates as a cross-cutting mediator: positive communication facilitates continued uptake, whereas negative experiences reinforce hesitation and dropout. These pathways collectively lead to varied vaccination outcomes, ranging from timely completion to delay, partial uptake, or missed immunization.

DISCUSSION

This qualitative study explored mothers' perceptions of childhood vaccination barriers in rural Pakistan and demonstrates that vaccination behavior is shaped by the interaction of sociocultural norms, gendered power relations, service delivery constraints, and trust in healthcare providers. Rather than reflecting simple vaccine refusal, the findings indicate that delayed or incomplete vaccination is often the result of layered constraints operating simultaneously at individual, household, community, and health system levels.

Consistent with prior research in Pakistan and similar settings, knowledge gaps and misconceptions were widespread and contributed to uncertainty and fear (6,7,14). However, the findings suggest that limited knowledge alone does not fully explain vaccination behavior. Many mothers expressed general acceptance of vaccination but lacked clarity regarding schedules, purpose, and side effects. This distinction highlights that informational deficits interact with service delivery and communication quality, reinforcing the need for more effective, context-sensitive health education strategies.

Sociocultural influences—particularly community narratives and the role of elders—emerged as significant determinants of maternal decision-making. These findings align with existing literature indicating that informal belief systems and social networks shape health behaviors in rural Pakistan (10,11,15). Importantly, religious concerns were not uniformly articulated as doctrinal objections but were often mediated through community interpretations and rumors. This suggests that interventions should engage not only religious leaders but also broader community influencers and informal information channels.

Gendered decision-making constraints were among the most consistently reported barriers. Mothers frequently described dependence on husbands or mothers-in-law for permission, financial support, or mobility. This reflects well-documented gender norms in Pakistan that limit women's autonomy in health-related decisions (10,11). The findings underscore that improving maternal knowledge alone is insufficient if women lack the agency to act on that knowledge. Interventions must therefore incorporate strategies for male engagement, family-level communication, and empowerment of women within household structures.

Accessibility and health system barriers further constrained vaccination uptake. Distance to facilities, lack of transport, irregular service availability, and staff absence were commonly reported, particularly in more remote areas. These findings are consistent with previous studies highlighting structural weaknesses in rural health systems (8,9). Notably, even mothers who were motivated to vaccinate their children encountered repeated missed opportunities due to these constraints, indicating that demand-side willingness does not translate into uptake without reliable service provision.

Trust in healthcare providers emerged as a cross-cutting factor influencing multiple pathways. Positive interactions—characterized by respectful behavior and clear communication—enhanced confidence and facilitated continued engagement with vaccination services. In contrast, negative experiences undermined trust and contributed to hesitation or dropout. These findings reinforce evidence that interpersonal aspects of care are critical determinants of health service utilization (16). Trust also appeared to mediate fear of side effects, suggesting that effective counseling can mitigate concerns and improve adherence to vaccination schedules.

Fear of side effects was one of the most immediate and emotionally salient barriers reported by participants. While concerns about fever and pain are expected, the findings indicate that inadequate counseling and lack of reassurance amplify these fears. Importantly, fear did not always lead to outright refusal but often resulted in delayed or partial vaccination. This distinction is critical for program design, as it suggests that improving communication and follow-up could significantly reduce missed doses.

From an implementation perspective, the findings highlight several actionable priorities. First, strengthening community-based health worker programs is essential for bridging information gaps, building trust, and facilitating access. Second, ensuring consistent vaccine availability and reliable outreach services is critical to reduce missed opportunities. Third, engaging men and elder family members in vaccination awareness initiatives can help address gendered decision-making barriers. Fourth, training healthcare providers in respectful communication and counseling can improve trust and reduce fear-related delays. Finally, integrating monitoring systems to track missed doses and follow up with caregivers could enhance continuity of care.

Regarding trustworthiness, the study employed multiple strategies, including triangulation across IDIs and FGDs, iterative coding, and team-based analysis. However, several limitations should be acknowledged. Social desirability bias may have influenced participants' responses, particularly given the involvement of community-linked recruitment pathways. The absence of direct observation of service delivery limits understanding of provider behavior. Translation from local languages may have resulted in some loss of nuance. Additionally, as an endline qualitative study, the findings reflect perceptions at a single time point and cannot establish changes over time. While the study provides rich contextual insights, transferability to other regions should be considered in light of local sociocultural and health system differences.

Overall, the findings emphasize that improving vaccination coverage in rural Pakistan requires integrated, multi-level approaches that address not only awareness but also access, trust, and social dynamics shaping maternal decision-making.

CONCLUSION

Vaccination decisions among mothers in rural Pakistan are shaped by interconnected factors including knowledge gaps, sociocultural influences, gendered decision-making, service accessibility, and trust in healthcare providers. The findings indicate that most mothers are not fundamentally opposed to vaccination; rather, their ability to ensure timely and complete immunization is constrained by structural barriers, limited autonomy, and insufficient communication from health services. Interventions that combine community-based engagement, male and family involvement, improved service delivery, and strengthened provider–client communication are likely to be most effective. Sustainable improvements in immunization coverage will depend on addressing these contextual realities through culturally sensitive and system-responsive strategies.

REFERENCES

1. World Health Organization. Immunization coverage. Geneva: WHO; 2020.
2. National Institute of Population Studies (NIPS) [Pakistan], ICF. Pakistan Demographic and Health Survey 2017–18. Islamabad, Pakistan; 2019.
3. United Nations Children's Fund (UNICEF). Pakistan immunization report. Islamabad: UNICEF; 2022.
4. Expanded Programme on Immunization (EPI). Annual report. Islamabad, Pakistan; 2021.

5. Bhutta ZA, Das JK, Walker N, Rizvi A, Campbell H, Rudan I, et al. Interventions to address deaths from childhood pneumonia and diarrhoea equitably: what works and at what cost? Lancet. 2011;377(9763):403–12.

6. Hafeez A, Akram DS, Suhail A, Jan SS, Shaikh BT, Zafar S. Determinants of vaccination coverage in Pakistan: evidence from secondary data analysis. J Pak Med Assoc. 2011;61(3):210–5.

7. Sadaf A, Richards JL, Glanz J, Salmon DA, Omer SB. A systematic review of interventions for reducing parental vaccine refusal and hesitancy. Vaccine. 2013;31(40):4293–304.

8. Kok MC, Dieleman M, Taegtmeyer M, Broerse JE, Kane SS, Ormel H, et al. Which intervention design factors influence performance of community health workers? A systematic review. Health Policy Plan. 2015;30(9):1207–27.

9. Nishtar S, Boerma T, Amjad S, Alam AY, Khalid F, Haq I, et al. Pakistan's health system: performance and prospects after the 18th Constitutional Amendment. Lancet. 2013;381(9885):219–30.

10. Glenton C, Lewin S, Scheel IB. Still too little qualitative research to shed light on results from reviews of effectiveness trials: a case study of a Cochrane review on vaccination communication. Health Res Policy Syst. 2011;9:53.

11. Opel DJ, Mangione-Smith R, Taylor JA, Korfiatis C, Wiese C, Catz S, et al. Development of a survey to identify vaccine-hesitant parents: the Parent Attitudes about Childhood Vaccines survey. Pediatrics. 2011;128(5):e1120–7.

12. MacDonald NE; SAGE Working Group on Vaccine Hesitancy. Vaccine hesitancy: definition, scope and determinants. Vaccine. 2015;33(34):4161–4.

13. Larson HJ, Jarrett C, Eckersberger E, Smith DM, Paterson P. Understanding vaccine hesitancy around vaccines and vaccination from a global perspective: a systematic review of published literature, 2007–2012. Vaccine. 2014;32(19):2150–9.

14. Dubé E, Laberge C, Guay M, Bramadat P, Roy R, Bettinger JA. Vaccine hesitancy: an overview. Hum Vaccin Immunother. 2013;9(8):1763–73.

15. Brown KF, Kroll JS, Hudson MJ, Ramsay M, Green J, Vincent CA, et al. Factors underlying parental decisions about combination childhood vaccinations including MMR: a systematic review. Vaccine. 2010;28(26):4235–48.

16. Muzammil M, et al. Barriers to universal health coverage in Pakistan: a health system perspective. [Unpublished/Report]; 2025.

17. World Health Organization Strategic Advisory Group of Experts (SAGE). Report of the SAGE working group on vaccine hesitancy. Geneva: WHO; 2014.