

ORIGINAL ARTICLE

Determinants of vaccine hesitancy among parents: A cross-sectional analytical study.

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ABSTRACT... Objective: To determine frequency and socio-demographic determinants of vaccine hesitancy among parents visiting a tertiary care hospital in Bahawalpur. **Study Design:** Analytical Cross-sectional study. **Setting:** Department of Pediatric Outpatient, Bahawal Victoria Hospital, Bahawalpur. **Period:** March 2025 to December 2025. **Methods:** A total of 151 parents who have children between 6 months and 2 years were included. Non-probability consecutive sampling method was used to enroll participants. Data was collected by using structured questionnaire that included the Parental Attitudes about Childhood Vaccines scale. Binary logistic regression analysis was used to find out the factors for vaccine hesitancy after controlling for any potential confounding variables. SPSS version 23.0 was used for analysis. **Results:** The overall frequency of vaccine hesitancy was 18.5%. Parents with low trust in healthcare providers had 4.2 times higher odds of hesitancy. Reliance on social media (AOR=3.8), primary-level education (AOR=3.1), and history of adverse events following immunization (AOR=2.9) were independently associated with hesitant attitudes. Socioeconomic status and parental age showed no significant association. **Conclusion:** Vaccine hesitancy is driven primarily by psychological and informational factors rather than access barriers. Interventions must prioritize rebuilding provider parent trust, combating digital misinformation and enhancing health literacy among populations.

Key words: Bahawalpur, Determinants, Hesitancy, Immunization, Parents, Vaccines.

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INTRODUCTION

One of the cost effective public health measures that has led to near elimination of poliomyelitis and the eradication of smallpox is vaccination.¹ Despite these achievements, the 21st century has seen a major disruption to the momentum of immunization campaigns. Immunization Agenda 2030, which highlights the need to address behavioral and societal drivers of uptake, reiterates the World Health Organization's (WHO) ranking of vaccine hesitancy as one of the top ten threats to global health.² Although vaccines are proven to be biologically effective, human element of acceptance varies. According to recent international survey, confidence in vaccination varies significantly across geopolitical boundaries and is influenced by false information and declining faith in health authorities.³

In developing countries, national immunization coverage rates have stagnated or reduced, despite of free vaccine availability.¹ This coverage gap is not primarily driven by supply chain failures but

increasingly by demand side constraints. Parents are primary gatekeepers for childhood immunization, making final decision to present their children for vaccination services.⁴ Parental perception serve as critical filter between vaccine availability and actual administration. However, drivers of parental decision making are embedded in cultural, religious and socio-economic contexts. What constitutes barrier in one community may be irrelevant in another, suggesting that global data often masks regional variances required for effective intervention.⁵

The region specific data about why people hesitate regarding vaccination is limited, especially when it comes to how things like demographic variables interact with psychological factors like trust and convenience.⁴ This study used the WHO SAGE Working Group's "3Cs" model. It breaks down hesitancy into three parts: Confidence, which is about trust in safety and the provider; Complacency, which relates to how people perceive their risk and Convenience, which looks at access and availability.

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This model helps us analyze hesitancy in a more nuanced way, rather than just seeing it as a simple yes or no to vaccines. This study aimed to determine frequency of vaccine hesitancy among parents visiting pediatric outpatient department of tertiary care hospital and identify associated socio-demographic and psychological determinants.

METHODS

This analytical cross sectional study was conducted within pediatric outpatient department of Bahawal Victoria Hospital Bahawalpur from March to December 2025 after taking approval from Institutional Ethical Review Board (Reference No. 47/DME/QAMC, BAHAWALPUR Dated. 22-02-2025) and informed consent from individual participant. Based on estimate of 11.6%⁶ vaccine hesitancy prevalence among parents, 95% confidence level and 5% margin of error, the calculated sample size for study was 151 participants. Participants were enrolled using a non-probability consecutive sampling technique. The study population comprised parents and legal guardians accompanying children aged 6 months to two years. Eligibility criteria were individuals who had maintained residency in the City for at least 12 months prior to enrollment. Exclusion criteria were parents of children with documented medical contraindications to vaccination as defined by national immunization guidelines.⁷

Data was collected by using structured questionnaire comprising of three sections. The first section consisted of socio-demographic data including parental age, educational attainment, monthly income and parity. The second part comprised of vaccination history and source of health information. Then, it moved on to the Parental Attitudes about Childhood Vaccines (PACV) scale, which is a tool used to measure how hesitant parents might be about vaccines. The PACV scoring system sorts people into categories based on a set cut-off. If someone shows safety worries or tends to delay vaccinations, they get labeled as 'hesitant.' Those who don't show these concerns are called 'acceptant.' On the other hand, factors like socioeconomic status, trust in healthcare providers and past experiences with vaccine side effects were considered as independent variables.

Data was entered and analyzed by using Statistical Package for Social Sciences (SPSS) Version 25.0. Mean and standard deviation was calculated for numerical variables while frequencies and percentages were calculated for qualitative variables. Chi Square test was used to assess the association between independent variables and vaccine hesitancy. To find independent determinants while controlling for confounders, variables that had significant association at the bivariate level ($p < 0.05$) were entered to multivariate binary logistic regression analysis and p-value less than 0.05 was considered significant.

RESULTS

A total of 151 eligible parents were included. Mean age of parents was 28.4 ± 5.2 years and 132 (87.4%) respondents were mothers. The vaccine hesitancy was in 28 (18.5%) parents. Among hesitant parents, the most frequently cited concerns were fear of adverse effects 21 (75.0%) and misinformation acquired through digital platforms 15 (53.6%).

Parents with primary education or less demonstrated significantly higher odds of hesitancy compared to those with graduate level education ($p = 0.015$). Similarly, low trust in healthcare providers ($p < 0.001$) and reliance on social media as the primary source of health information ($p = 0.007$) were associated with hesitant attitudes. History of adverse events following immunization also showed significant association ($p = 0.012$). Variables including parental age, parity and gender of child did not show statistically significant associations ($p > 0.05$). Multivariate binary logistic regression was performed to identify independent determinants while controlling for potential confounders. Four variables retained statistical significance in the adjusted model (Table-IV).

Parents reporting low trust in healthcare providers had 4.2 times higher adjusted odds of vaccine hesitancy (AOR = 4.2; 95% CI: 1.5–11.8; $p = 0.006$). Reliance on social media for health information remained an independent predictor (AOR = 3.8; 95% CI: 1.4–10.3; $p = 0.009$). Educational attainment at the primary level or below was associated with 3.1 times higher odds of hesitancy (AOR = 3.1; 95% CI: 1.1–8.9; $p = 0.035$). Finally, a history of adverse

events following immunization independently ($p = 0.048$).
 predicted hesitancy (AOR = 2.9; 95% CI: 1.0–8.4;

TABLE-I**Socio-demographic and clinical characteristics of study participants (n = 151)**

Variable	Category	Frequency (n)	Percentage (%)
Respondent gender	Mother	132	87.4
	Father	19	12.6
Parental age (years)	Mean $\pm$ SD	28.4 $\pm$ 5.2	—
Educational attainment	No formal/Primary	35	23.2
	Secondary/Higher secondary	83	55.0
	Graduate and above	33	21.9
Monthly household income (PKR)	< 30,000	45	29.8
	30,000 – 60,000	67	44.4
	> 60,000	39	25.8
Parity	Primiparous	38	25.2
	2–3 children	78	51.7
	$\geq$ 4 children	35	23.2
Primary source of health information	Healthcare provider	89	58.9
	Family/friends	34	22.5
	Social media/internet	28	18.6
Trust in healthcare system	High	98	64.9
	Moderate	35	23.2
	Low	18	11.9
History of AEFI	Yes	18	11.9
	No	133	88.1
Child's vaccination status	Up to date	138	91.4
	Delayed/Incomplete	13	8.6

TABLE-II**Prevalence and reported reasons for vaccine hesitancy among parents (n = 151)**

Variable	Category	Frequency (n)	Percentage (%)
Vaccine hesitancy status (PACV scale)	Acceptant	123	81.5
	Hesitant	28	18.5
Mean PACV score (range 0–100)	Overall sample	24.3 $\pm$ 18.7	—
	Hesitant subgroup	68.4 $\pm$ 12.1	—
Reasons for hesitancy ^a (n = 28)	Fear of side effects or safety concerns	21	75.0
	Misinformation from social media/digital platforms	15	53.6
	Belief that natural infection provides better immunity	12	42.9
	Religious or cultural beliefs	8	28.6
	Previous negative experience with healthcare system	6	21.4
	Perceived low disease risk in community	5	17.9

^a Multiple responses permitted, percentages calculated among hesitant subgroup (n=28)

TABLE-III

Bivariate analysis of factors associated with vaccine hesitancy (Chi-square tests)

Independent Variable	Category	Hesitant n (%)	Acceptant n (%)	P-Value
Educational attainment	No formal/Primary	14 (40.0)	21 (60.0)	0.015
	Secondary/Higher secondary	11 (13.3)	72 (86.7)	
	Graduate and above	3 (9.1)	30 (90.9)	
Monthly income (PKR)	< 30,000	12 (26.7)	33 (73.3)	0.019
	30,000 – 60,000	11 (16.4)	56 (83.6)	
	> 60,000	5 (12.8)	34 (87.2)	
Trust in healthcare system	Low	11 (61.1)	7 (38.9)	<0.001
	Moderate	9 (25.7)	26 (74.3)	
	High	8 (8.2)	90 (91.8)	
Primary information source	Social media/internet	11 (39.3)	17 (60.7)	0.007
	Healthcare provider/Family	17 (14.5)	106 (85.5)	
History of AEFI	Yes	7 (38.9)	11 (61.1)	0.012
	No	21 (15.8)	112 (84.2)	
Parental age	≤ 25 years	8 (22.2)	28 (77.8)	0.55
	26–30 years	11 (17.5)	52 (82.5)	
	> 30 years	9 (18.0)	41 (82.0)	
Parity	Primiparous	6 (15.8)	32 (84.2)	0.67
	2–3 children	15 (19.2)	63 (80.8)	
	≥ 4 children	7 (20.0)	28 (80.0)	

TABLE-IV

Multivariate binary logistic regression analysis of independent determinants of vaccine hesitancy (n = 151)

Independent Variable	Adjusted Odds Ratio (AOR)	95% Confidence Interval	P-Value
Trust in healthcare system			
High (Reference)	1.0	—	—
Moderate	2.1	0.7–6.3	0.18
Low	4.2	1.5–11.8	0.006
Primary information source			
Healthcare provider/Family (Reference)	1.0	—	—
Social media/internet	3.8	1.4–10.3	0.009
Educational attainment			
Graduate and above (Reference)	1.0	—	—
Secondary/Higher secondary	1.6	0.5–5.2	0.42
No formal/Primary	3.1	1.1–8.9	0.035
History of AEFI			
No (Reference)	1.0	—	—
Yes	2.9	1.0–8.4	0.048
Monthly income (PKR)			
> 60,000 (Reference)	1.0	—	—
30,000 – 60,000	1.4	0.5–4.1	0.51
< 30,000	1.8	0.6–5.7	0.29

DISCUSSION

The study results revealed that vaccine hesitancy was among one fifth of parents attending pediatric outpatient department which is consistent with regional estimates but remains lower than some post pandemic peaks reported in urban centers. A multicenter study conducted in Punjab during 2022 reported hesitancy rates approaching 24%, suggesting rural peri-urban dynamics.⁸ Global systematic reviews, on the other hand, show a growing disparity between high-income and low-income settings, where reluctance is frequently motivated by complacency rather than access.⁹ The disparity between the results of this study and the higher rates seen in Karachi could be due to variations in the catchment populations of community clinics and tertiary care institutions, as well as variations in community involvement strategies.¹⁰

Hesitancy was predicted by level of trust in the healthcare system by the parents; those with low trust were more than four times more likely to refuse. This is in line with the results of a countrywide survey conducted in Pakistan, which found that the main cause of vaccination delays was poor provider-parent communication.¹¹ Reliance on social media increased hesitancy odds by 3.8-fold which is consistent with global research indicating that safety concerns are disproportionately amplified by uncontrolled internet content as opposed to official health messages.¹² Anecdotal adverse events that lack scientific validation are frequently shared in Facebook groups and WhatsApp groups in Pakistan.¹³

Educational attainment was significant determinant, consistent with health literacy hypothesis where lower education limits ability to critically evaluate risk benefit ratios of vaccination.¹⁴ Parents with primary education or less has low functional literacy to understand immunization schedules, making them susceptible to misinformation.¹⁵ Association between history of adverse events following immunization (AEFI) and hesitancy indicates lasting psychological impact of negative experiences. Even single perceived adverse event can break down confidence in entire immunization program as found in safety surveillance studies in South Asia.¹⁶ Unlike previous studies emphasizing religious barriers,

findings of the study showed that safety and trust concerns now supersede cultural objections in this demographic.¹⁷

Consecutive sampling minimizes the risk of selection bias and validated PACV scale use enables comparability with global data.¹⁸ Conclusions about the causal relationship between trust and hesitancy cannot be drawn by cross sectional study.¹⁹ Findings from tertiary care setting has limited generalizability to remote rural areas where access hurdles are different from behavioral ones.¹⁹ An underestimating of hesitancy may also have resulted from social desirability bias, since parents may hide refusal behaviors during face to face interviews.²¹

Instead of focusing solely on vaccination availability, interventions should prioritize trust rebuilding through improved provider communication training.²² Misinformation on social media should be addressed by parent targeted digital health literacy campaigns. Transparent reporting systems and AEFI monitoring should be strengthened.

CONCLUSION

Vaccine hesitancy is driven by low trust in healthcare providers, reliance on social media and low education level. Interventions focusing on provider communication and digital health literacy are necessary to improve immunization coverage.

CONFLICT OF INTEREST

The authors declare no conflict of interest.

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REFERENCES

1. Mwale M. **Persistent measles immunization gaps in LMICs: Insights from the 2024 revision of the WHO/UNICEF estimates of National Immunization Coverage.** Vaccine. 2026 Mar 7; 75:128298.
2. No AG. **"Immunization Agenda 2030" A Global Strategy To Leave No One Behind.** WHO Member State Information Session. 8 April 2021.
3. Lazarus JV, Ratzan SC, Palayew A, Gostin LO, Larson HJ, Rabin K, et al. **A global survey of potential acceptance of a COVID-19 vaccine.** Nat Med. 2021; 27(2):225-8.

4. Fadl N, Al Awaidey ST, Elshabrawy A, Makhlof MS, Ibrahim SA, Abdel-Rahman S, et al. **Determinants of parental seasonal influenza vaccine hesitancy in the Eastern Mediterranean region: A cross-sectional study.** *Frontiers in Public Health.* 2023; 11:1132798.
5. Wilson SL, Wiysonge C. **Social media and vaccine hesitancy.** *BMJ Global Health.* 2020; 5:e004206.
6. Domek GJ, O'Leary ST, Bull S, Bronsert M, Contreras-Roldan IL, Ventura GA, et al. **Measuring vaccine hesitancy: Field testing the WHO SAGE Working Group on Vaccine Hesitancy survey tool in Guatemala.** *Vaccine.* 2018 Aug 23; 36(35):5273-81.
7. World Health Organization. **Global vaccine safety blueprint 2.0 (GVSB2.0)** 2021-2023.
8. Sikander B, Avais MA, Shah H, Abrar M, Haider N, Rashid R, et al. **Prevalence of vaccine hesitancy among parents of children under five: A cross-sectional study.** *Insights J. Life Soc. Sci.* 2025; 3(4):77-83.
9. Alabadi M, Aldawood Z. **Parents' knowledge, attitude and perceptions on childhood vaccination in Saudi Arabia: A systematic literature review.** *Vaccines.* 2020 Dec 10; 8(4):750.
10. Khan YH, Rasheed M, Mallhi TH, Salman M, Alzarea AI, Alanazi AS, et al. **Barriers and facilitators of childhood COVID-19 vaccination among parents: A systematic review.** *Front Pediatr.* 2022 Nov 24; 10:950406.
11. Memon Z, Ali A, Habib S, Ahmed W, Ansar F, Kalwar M, et al. **Strengthening the immunization system through private provider engagement to improve vaccine uptake in Urban Settlements of Karachi, Pakistan: A before-after study.** *Vaccines.* 2026 Feb 26; 14(3):205.
12. Puri N, Coomes EA, Haghbayan H, Gunaratne K. **Social media and vaccine hesitancy: New updates for the era of COVID-19 and globalized infectious diseases.** *Hum Vaccin Immunother.* 2020 Nov 1; 16(11):2586-93.
13. Al-Regaiey KA, Alshamry WS, Alqarni RA, Albarrak MK, Alghoraiby RM, Alkadi DY, et al. **Influence of social media on parents' attitudes towards vaccine administration.** *Hum Vaccin Immunother.* 2022; 18(1):1872340.
14. Saitoh A, Oku H, Katsuta T, Kamiya H, Ishikawa Y, Takaku M, et al. **Vaccination education deficits and vaccine hesitancy among healthcare students in Japan: A cross-sectional study.** *Vaccines.* 2024 Nov 22; 12(12):1310.
15. Haider F, Haider K, Ullah S, Rizvi AH, Zia MS, Ashfaq A. **Exploring the status and determinants of routine EPI Immunization among children in Southern District of Punjab.** *Pak Armed Forces Med J.* 2018 Feb 1; 68(1):165-70.
16. Inam A, Mushtaq A, Zaman S, Wasif S, Noor M, Khan HA. **Vaccine hesitancy and post-vaccination adherence to safety measures: A mixed-method study.** *Front Public Health.* 2023 Mar 31; 11:1072740.
17. Khan MA, Ali E, Hussain M, Wazeer T, Khan S, Arif M, et al. **Exploring maternal vaccine hesitancy: A qualitative study of mothers' beliefs.** *IRJAHSS.* 2025 Sep 15; 3(1):171-81.
18. Cao A, Ueta M, Uchibori M, Murakami M, Kunishima H, Kumar RS, et al. **Trust in governments, public health institutions, and other information sources as determinants of COVID-19 vaccine uptake behavior in Japan.** *Vaccine.* 2024 Jun 20; 42(17):3684-92.
19. Loomba S, de Figueiredo A, Piatek SJ. **Measuring the impact of COVID-19 vaccine misinformation on vaccination intent in the UK and USA.** *Nat Hum Behav.* 2021; 5(3):337-48.
20. Monday SC. **Strategies global virtual team leaders use to improve trust and communication.** *Walden University;* 2022.
21. Verger P, Scronias D, Dauby N. **Attitudes of healthcare workers towards COVID-19 vaccination: A survey in France and French-speaking parts of Belgium and Canada.** *Euro Surveill.* 2021; 26(3):2002047.
22. Herbst M. **The State of the World's Children 2024: The Future of Childhood in a Changing World.** *UNICEF.* 2024 Nov.

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1	Wajahat Hussain: Conception of idea, study design, manuscript drafting.
2	Faryal Waheed: Acquisition of data.
3	Nousheen Fatima: Data analysis.
4	Summaira Hassan: Interpretation.
5	Muhammad Ahmed: Data collection.
6	Muhammad Saad: Data collection.