ORIGINAL ARTICLE

Parental Knowledge, Attitude And Perceived Barriers To Infant Immunization: An EPI Center Based Cross-Sectional Survey

Dr. Anwar Bibi, Dr. Asifa Afzal, Dr. Aashi Ahmed, Dr. Sidra Farooq, Dr. Raima Siddiqui, Mooed Azwar Bhatti
Department of Community Medicine, HITEC-IMS, Taxila

ABSTRACT

Objectives: This study aimed to assess parental knowledge and attitudes regarding infant immunization, identify barriers to timely vaccination, and their influence on parental perspectives at EPI centers of THQ and HIT Hospitals, Taxila.
Methodology: A cross-sectional survey of 292 parents, attending EPI centers at HIT and THQ Hospital, Taxila (March to October 2024) was conducted using convenience sampling. Data was collected via face-to-face interviews using a structured questionnaire covering demographics, knowledge, attitudes, and immunization barriers. Chi-square test was employed to determine the associations between knowledge, attitude and identified barriers to timely immunization using SPSS version 26.0.
Results: Majority of participants were mothers 204 (69.9%), out of which 135 (46.2%) aged between 25-30 years and 132 (45.2%) had 2-3 children. Total 229 participants (78.4%) had completed the recommended age-specific immunizations for their children. Equal proportions of participants 111 (38%) demonstrated good knowledge and a statistics of those having positive attitude toward immunization. Lack of awareness 181 (53%) and vaccine misconceptions 137 (46.9%) were reported as common barriers. Level of knowledge was found to be significantly associated with misconceptions (p=0.02), as well as with long waiting time at EPI centers and long clinic queues (p=0.03). Similarly, parental attitude was significantly linked to misconceptions (p=0.006) and clinic wait times (p=0.01).
Conclusion: Misconceptions about vaccines and logistical issues, such as prolong waiting times, significantly affect parental knowledge and attitudes, potentially leading to delays in infant immunization. Targeted education and training of healthcare professionals to communicate immunization benefits are essential to improve perceptions and increase coverage of immunization.
Keywords: Parent's Knowledge, Attitude, Barriers, EPI Centers, Immunization,

INTRODUCTION

Immunization is a preventive process that makes an individual resistant to a disease through vaccination.[1] Childhood immunization, being one of the most affordable life-saving interventions, has significantly improved healthcare.[1,2] It is estimated to reduce 2-3 million deaths yearly and thwart diseases.[3] Despite its proven benefits, children in low-income countries like Pakistan remain vulnerable to vaccine-preventable illnesses due to numerous multidimensional barriers.[1,4] These barriers include limited education, religious beliefs, vaccine supply disruptions, concerns about safety and efficacy, logistical challenges, large family size, and financial constraints.[5]

The WHO estimates that vaccination prevents between 3.5 and 5 million deaths annually.[6] In 2018, the global immunization rate was 85%, though substantial disparities persisted across WHO regions.[2] For example, Bangladesh reported 86% immunization coverage rate in 2018, India 76% in 2019–2020, and Pakistan

Corresponding Author: Dr. Asifa Afzal, Assistant Professor, Department of Community Medicine, HITEC-IMS, Taxila.
E-mail: asifatafzal@gmail.com

only 66% in 2017.[3,7,8,9] Among these children, an estimated 5.3 million died in 2018 from all causes, with an estimated 700,000 attributed to vaccine- preventable diseases; 99 per cent of these deaths occurred in low- and middle-income countries. Unfortunately, the rate of child vaccination coverage fell to 81% globally in 2021.[10,11] South Asia accounts for world's one third under-immunized children, with some countries achieving vaccination coverage up-to 90%. Pakistan, however, has yet to meet the WHO's 95% immunization target.[12,13]

According to National Demographic and Health Survey (2017-2018), only 66% of children aged 12 to 23 months had received all of the basic Expanded Programme on Immunization (EPI vaccines.[13,14] This figure rose to 74% by 2020 but declined to 64% in 2022, largely due to flood-related disruptions.[15,16] Provincial disparities were notable: Punjab had the highest coverage at 88.5%, followed by Sindh (68%), Khyber Pakhtunkhwa (60.5%), and Balochistan with the lowest at 37.9%. [15] The reason for this suboptimal coverage rate and immunization denial in Pakistan is linked to different multifactorial barriers like geographical, socioeconomic status, social, cultural, and religious variables, misunderstandings about vaccinations negative consequences, that contribute to Pakistan's vaccination hurdles.[14,17,18]

Timely infant immunization remains a cornerstone of public health, crucial for preventing vaccine-preventable diseases and reducing child morbidity and mortality. However, uptake is often compromised by these perceived challenges. To date, no research has systematically examined parental knowledge, attitudes, and perceived barriers in this community. This study aims to fill that gap by assessing these factors through an EPI center-based cross-sectional design, the findings will help devising targeted interventions to improve perception and enhance immunization coverage.

METHODOLOGY

A Descriptive Cross-sectional survey was conducted on a sample of 292 parents or guardians of the children reporting to the EPI centers of THQ and HIT Hospitals Taxila-Pakistan, over a period of 8 months, from March to October 2024. Ethical approval was taken from healthcare institution administration, institutional review board of Hitec-IMS and from each participant as individual before data collection. A sample size of 217 was initially calculated using Open Epi calculator based on 83% prevalence[19], 95% confidence interval and 5% margin of error. However, data were collected from 292 participants using a convenience sampling technique to enhance data robustness. Participants whose youngest child was more than 1 year were included in the study and those who were linked to healthcare profession were excluded.

A self-structured proforma was developed following a thorough review of the relevant literature. It was subsequently evaluated by consultant pediatricians, and revisions were made based on their expert suggestions. Data was collected through face-to-face interviews method by the researches themselves. Parents and guardian visiting EPI center provided information regarding their children's immunization schedule. We approached 300 participants, out of which 292 participants provided complete responses and were included in the final analysis, out of which 8 of the parents with incomplete information were not included in the study. Data was collected over a span of two months on specified EPI days of healthcare facilities.

The questionnaire consisted of three sections: Section one covered socio-demographic characteristics; Section two assessed parents' knowledge and attitudes; and Section three explored perceived challenges toward infant immunization.

Knowledge was measured using eight questions with responses of "Yes," "No," or "I don't know." Correct answers were scored as 1, while incorrect or "I don't know" responses scored 0. Knowledge scores were categorized as satisfactory (≥4 points) or unsatisfactory (<4 points).

Parental attitude was evaluated using nine statements on a three-point Likert scale ("Agree," "Disagree," and "Neutral"). An "Agree" response was scored as 1, whereas "Disagree" and "Neutral" responses were scored as 0. Based on the cumulative score, attitude scores were then categorized as favourable (≥5 points) or unfavourable (<5 points).

Attitudes were classified as favorable or unfavorable, with participants scoring at or above the median considered to have a "favorable attitude" and those below the median as "unfavorable." Pretesting of questionnaire was done.

Data analysis was performed using SPSS version 26.0. Descriptive statistics, including frequencies and percentages, were calculated for variables such as gender, age, education, residence, number of children, and monthly income. Chi-square test was applied to examine associations between knowledge, attitude, and perceived challenges to timely infant immunization.

RESULTS

Out of 292 participants, majority were mothers 204 (69.9%), followed by fathers 87 (29.8%), with a minimal representation of other caregivers 1 (0.3%) and 212 (72.6%) were urban residents. Majority were housewives 177 (60.6%) and 135 (46.2%) lie between 25-30 years of age and only 4 (1.4%) were above the age of 40 years. Approximately 132 (45.2%) had 2-3 children and 204 (69.9%) reported a monthly income between 30,000 to 65,000 PKR and only 7 (2.4%) had income more than 1 lac. (Table I).

Table I: Socio-Demographic characteristics of the participants

		Frequency(n)	Percentages (%)
Educational background	Illiterate	17	5.8
	Primary	35	12.0
	Matric	72	24.7
	Intermediate	78	26.7
	Graduate	69	23.6
	Postgraduate	21	7.2
Sex of the children born	Boy	152	52.1
	Girl	138	47.3
	Twins	2	0.7
Age of the last-born child	<3months	96	32.9
	3-6months	86	29.5
	7-9months	56	19.2
	> 9months	54	18.5
Age-specific immunization status of the child	complete	229	78.4
	incomplete	63	21.6

Less than half of the participants 111 (38%) had good knowledge about immunization. Similarly, the proportion of parents with favorable attitudes towards immunization was comparatively lower than the parents with unfavorable attitudes (Figure 1).

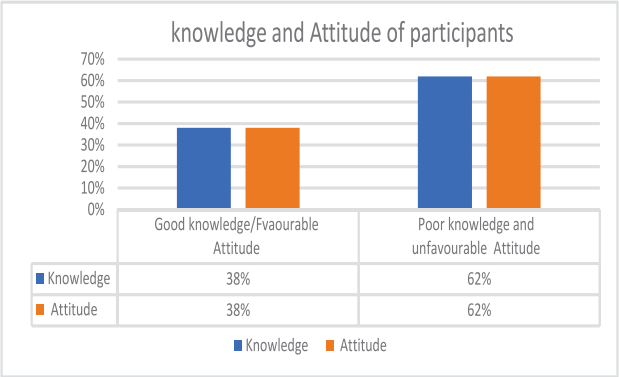

Figure 1: Responses of Participants Knowledge and Attitude about Immunization

There was a significant association (**p<0.001**) of knowledge with attitude, indicating that parents with poor knowledge were more likely to have an unfavorable attitude towards immunization (Table II).

Table II: Association between Participant Knowledge with attitude about Immunization

Knowledge of the participants about Immunization	The attitude of the participants toward Immunization		*p*-value
	favorable attitude	unfavorable attitude	
Good knowledge	102	9	**0.000****
Poor knowledge	9	172	

A major barrier to immunization identified by a large proportion of the parents 181 (62.30%) was lack of awareness. Misconceptions about vaccines and fear of side effects 136 (46.90%) were identified as the second most common challenge reported by the parents (Fig 2).

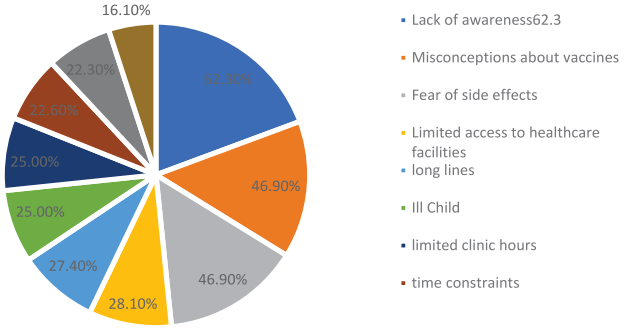

Figure 2: Key Barriers to Child Immunization Uptake

Chi-square analysis revealed a significant association between parental knowledge and misconceptions about vaccines (p=0.02) as shown in Table III. Long waiting time was also linked to poor knowledge (p=0.03). Other challenges, such as lack of awareness (p=0.7), limited access (p=0.4), and fear of side effects (p=0.08), showed no statistically significant association. Parental attitude was significantly influenced by vaccine misconceptions (p=0.006) and long waiting time (p=0.01), highlighting their role in fostering unfavorable views and potential delays. Time constraints (p=0.5) and limited clinic hours (p=0.4) had no significant effect on attitude towards immunization.

DISCUSSION

The purpose of the current study was to evaluate the knowledge and attitude of the parents about timely infant immunization and to identify the barriers to immunization. Further emphasis was made on determining the association of knowledge, attitude with the barriers.

Only 38% of parents had adequate knowledge and a positive attitude toward immunization. This contrasts with a study by Asim et al. (2012)[21], which reported higher awareness and favorable attitudes, possibly due to different sampling methods, as we used non-probability sampling, which may have influenced the results. A significant association between knowledge and attitude was observed, consistent with findings from a study in India by A. et al. (2017).[22]

According to our study, 46.9% of participants showed fear as a barrier to infant immunization. These findings are in line with the results of a study in New Zealand, conducted by Petousis-Harris et al.[23] Where a survey of healthcare providers showed that 53% of them believed that parental fear was the greatest barrier to children's immunization. Misconceptions about immunization are one of the major barriers to

Table III: Association of Participants knowledge and Attitude with key Barriers towards Immunization

	Barriers to Immunization						
	Bad behaviour of healthcare staff	Fear of vaccine side effects	Long waiting time	Misconception about vaccine	Lack of awareness	Limited access to healthcare	Ill child
Knowledge	*p*-value	*p*-value	*p*-value	*p*-value	*p*-value	*p*-value	*p*-value
	0.702	0.082	0.03*	0.020*	0.722	0.423	0.100
Attitude	0.990	0.088	0.01*	0.006*	0.644	0.688	0.092

immunization of infants. Our study showed similar findings about misconceptions and myths to a study conducted by Etokidem, A.J.et al.[24] Addressing these fears requires a multifaceted approach involving healthcare providers, community leaders, and credible information sources. This finding suggests that even among parents with adequate knowledge, concerns about vaccine safety, remain a critical issue. Good communication about vaccine safety and monitoring of vaccine efficacy could alleviate these fears. Education about vaccine safety and efficacy, and personalized communication can help build trust and alleviate concerns, ultimately increasing immunization rates and protecting infants from vaccine-preventable diseases.

Parental knowledge and attitudes toward infant immunization in our study were lower than those reported in Saudi Arabia (Alshammari et al.,)[25], largely due to limited awareness. This aligns with findings by Paterson et al. (2016)[26], which highlight how misconceptions such as the belief that vaccines are harmful, contribute to vaccine hesitancy. Parents with less knowledge were more likely to hold such views, increasing the risk of refusal and undermining herd immunity. Addressing these misconceptions with accurate information and education is crucial in promoting immunization and protecting public health. This disparity is attributed to inadequate counselling by our healthcare professionals and shortcomings in the educational system. To tackle these challenges, workshops and training programs should be implemented to better educate healthcare professionals while fostering community engagement to enhance public awareness.

Long waiting times at clinics were also associated with unfavourable attitudes. This may reflect frustration or inconvenience experienced by parents, leading to a negative perception of the immunization process.[27] Female participants were significantly more likely to report "bad behaviour of health workers" and "fear of side effects" as barriers to immunization. This gender-based disparity might be due to differences in healthcare interactions or varying levels of trust in healthcare providers, as supported by previous studies that found women are often more cautious about potential risks associated with medical interventions.[28]

LIMITATIONS

First, the use of non-probability sampling may limit the generalizability of the findings as it may not fully represent the broader population. Secondly, self-reported data has potential of recall bias and there is also chances that participants may have provided socially desirable responses, which could affect the accuracy of the findings. Third, participants were recruited from EPI centers, where they already had some knowledge and positive attitude towards childhood immunization, thereby limiting the ability to capture the perspective of less informed population who were not approaching to EPI center.

FUTURE RECOMMENDATIONS

There is need for targeted awareness campaigns to enhance parental understanding of vaccine benefits and safety.

Healthcare providers should be trained with effective communication strategies to address concerns and dispel myths about immunization.

Community Engagement is crucial to promote vaccine literacy and build trust in immunization programs.

Policymakers should expand immunization services especially in communities with low literacy or limited healthcare access and also integrate immunization awareness into maternal and child health programs

CONCLUSION

According to our study, the challenges affecting the knowledge and attitude of parents towards immunization of infants were lack of awareness and misconception about immunization. The study highlights the need for targeted educational initiatives to improve parental knowledge and attitudes towards immunization, especially in urban areas. Healthcare professionals should be trained to communicate the benefits and safety of immunizations effectively. Staff on the immunization should be trained to address the resource-related challenges to immunization.

CONFLICT OF INTEREST: None

REFERENCES

1. Umer MF, Zofeen S, Hu W, Qi X, Zhuang G. Spatiotemporal clustering analysis of Expanded Program on Immunization (EPI) vaccination coverage in Pakistan. Sci Rep. 2020; 10(1). doi:10.1038/s41598-020-76932-1

2. Yazdani AT, Muhammad A, Nisar MI, Khan U, Shafiq Y. Unveiling and addressing implementation barriers to routine immunization in the peri-urban slums of Karachi, Pakistan: a mixed-methods study. Health Res Policy Syst. 2021; 19(1). doi:10.1186/s12961-021-00708-6

3. Hussain A, Zahid A, Malik M, Ansari M, Vaismoradi M, Aslam A, et al. Assessment of parents' perceptions of childhood immunization: A cross-sectional study from Pakistan. Children. 2021; 8(11). doi:10.3390/children8110954

4. Aziz S, Mohiuddin SG, Iqbal MZ, Sivadasan S, Veerasamy R, Ghadzi SMS, et al. Barriers to pediatric immunization: Parents' perspective. J Crit Rev. 2020; 7:326–33. doi:10.31838/jcr.07.06.53

5. Vaccines and immunization [Internet]. [cited 2023 Dec 12]. Available from :URL: https://www.who.int/health-topics/vaccines-and-immunization#tab=tab_1

6. Frenkel LD. The global burden of vaccine-preventable infectious diseases in children less than 5 years of age: Implications for COVID-19 vaccination. How can we do better? Allergy Asthma Proc. 2021; 42:378–85. doi:10.2500/aap.2021.42.210014

7. Sarker AR, Akram R, Ali N, Sultana M. Coverage and factors associated with full immunisation among children aged 12-59 months in Bangladesh: Insights from the nationwide cross-sectional demographic and health survey. BMJ Open. 2019; 9(7). doi:10.1136/bmjopen-2019-031768

8. Summan A, Nandi A, Schueller E, Laxminarayan R. Public health facility quality and child immunization outcomes in rural India: A decomposition analysis. Vaccine. 2022; 40(16):2388–94. doi:10.1016/j.vaccine.2022.02.013

9. Fast Facts on Global Immunization [Internet]. [cited 2023 Dec 12]. Available from: https://www.cdc.gov/globalhealth/immunization/data/fast-facts.html

10. Sim SY, Watts E, Constenla D, Brenzel L, Patenaud BN. Return on investment from immunization against 10 pathogens in 94 low-and middle-income countries, 2011–30. Health Aff. 2023; 39(8):1343–53. doi:10.1377/hlthaff.2022.00899

11. Immunisation | UNICEF South Asia [Internet]. [cited 2023 Dec 12]. Available from: https://www.unicef.org/rosa/what-we-do/health/immunisation

12. Shahid S, Ahmed S, Qazi MF, Ali R, Ali SA, Zaidi AKM, et al. Differential coverage for vaccines in the expanded program on immunization (EPI) among children in rural Pakistan. Vaccine. 2023; 41(16):2680–9. doi:10.1016/j.vaccine.2023.03.070

13. Hasan Q, Bosan AH, Bile KM. A review of EPI progress in Pakistan towards achieving coverage targets: present situation and the way forward. East Mediterr Health J. 2010;

16(Suppl)

14. NIoPSa IC. Pakistan Demographic and Health Survey 2017-2018. Islamabad, Pakistan and Rockville. Maryland, USA: National Institute of Population Studies (NIPS)[Pakistan] and ICF. 2019.

15. Pakistan Races To Catch Up On Childhood Vaccinations After Floods - Health Policy Watch [Internet]. [cited 2023 Dec 12]. Available from: https://healthpolicy-watch.news/pakistan-races-to-catch-up-on-childhood-vaccinations-after-floods/

16. Yazdani AT, Muhammad A, Nisar MI, Khan U, Shafiq Y. Unveiling and addressing implementation barriers to routine immunization in the peri-urban slums of Karachi, Pakistan: a mixed-methods study. Health Res Policy Syst. 2021; 19(1). doi:10.1186/s12961-021-00708-6

17. Khaliq A, Elahi AA, Zahid A, Lassi ZS. A Survey Exploring Reasons behind Immunization Refusal among the Parents and Caregivers of Children under Two Years Living in Urban Slums of Karachi, Pakistan. Int J Environ Res Public Health. 2022; 19(18). doi:10.3390/ijerph191811377

18. Al-Salihi L, Aakef I, Al-Shuwaili S, Zaki Hadi W. Primary health-care staff barriers to immunization. Indian J Community Med. 2019; 44(3):256–60. doi:10.4103/ijcm.IJCM_265_19

19. Shahzadi A, Saddique H, Kousar ST, Jabeen R, Kalim-Ullah. Knowledge Attitude and Practice Factors on Parents Regarding Immunization. NURSEARCHER. 2022;2(2):07–11.

20. GebreEyesus FA, Tarekegn TT, Amlak BT, Shiferaw BZ, Emeria MS, Geleta OT, et al. Knowledge, Attitude, and Practices of Parents About Immunization of Infants and Its Associated Factors in Wadla Woreda, North East Ethiopia, 2019. Pediatr Health Med Ther. 2021; 12:223–38. doi:10.2147/PHMT.S298131

21. Asim M, Malik N, Yousaf H, Gillani I, Habib N. An assessment of parental knowledge, belief and attitude toward childhood immunization among minorities in rural areas of district Faisalabad, Pakistan. Mediterr J Soc Sci. 2012; 3(11):153–9. doi:10.5901/mjss.2012.v3n11p153

22. D A, Raghupathy NS, Sowmiya M, Amudharaj D, Jehangir HM. Immunization knowledge, attitude and practice among mothers of children from 0 to 5 years. Int J Contemp Pediatr. 2017; 4(3):783–7. doi:10.18203/2349-3291.ijcp20171606

23. Petousis-Harris H, Goodyear-Smith F, Turner N, Soe B. Family practice nurse views on barriers to immunising children. Vaccine. 2005; 23(21):2725–30. doi:10.1016/j.vaccine.2004.12.032

24. Etokidem AJ, Ndifon W, Ogaji D, Ebenso B, Nsan E, Ikpeme B, et al. Myths and misconceptions as barriers to uptake of immunization services in Calabar, Cross River State of Nigeria. Niger J Paediatr. 2016; 43(1):10–8. doi:10.4314/njp.v43i1.3

25. Alshammari SZ, Alfayyad I, Altannir Y, Al-Tannir M. Parental awareness and attitude about childhood immunization in Riyadh, Saudi Arabia: A cross-sectional study. Int J Environ Res Public Health. 2021;18(16). doi:10.3390/ijerph18168337

26. Paterson P, Meurice F, Stanberry LR, Glismann S, Rosenthal SL, Larson HJ. Vaccine hesitancy and healthcare providers. Vaccine. 2016; 34(52):6700–6. doi:10.1016/j.vaccine.2016.10.042

27. Bettinger JA, Greyson D, Money D. Vaccine hesitancy in Canada: Public, professional, and policy options. Hum Vaccin Immunother. 2016; 12(6):1516–8. doi:10.1080/21645515.2016.1150173

28. Smith JC, Appleton M, MacDonald NE. Immunization coverage in the United States. Vaccine. 2011; 29(14):2564–72. doi:10.1016/j.vaccine.2010.12.046