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ORIGINAL ARTICLE

Evaluation of awareness and importance of child vaccination among mothers carrying children of age 1 to 4 years in Lyari, Karachi, Pakistan

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ABSTRACT

Background: Despite attempts to promote immunization, Pakistan's suboptimal child vaccination rates lead to avoidable diseases and high infant mortality, demanding a better understanding of mothers' vaccination knowledge. The current study aimed to assess the level of awareness and knowledge regarding childhood vaccination among mothers and examine its association with demographic characteristics.

Methods: A cross-sectional survey was conducted among 250 mothers using a structured validated questionnaire. The data collected included demographic information, knowledge of vaccine benefits, and perceptions of vaccination schedules. The association between awareness and chosen factors were evaluated statistically using Chi-square.

Results: The 67.2% respondents, demonstrated awareness about vaccination. Significant associations were observed between vaccination awareness and educational level (p=0.0001), number of children (p=0.004), and age of the youngest child (p=0.002). Mothers who acknowledged the benefits of vaccination and the role of vaccines in preventing diseases were significantly more likely to have vaccinated their children (p<0.001). However, gaps remained in knowledge related to vaccine schedules, misconceptions about vaccination during illness, and the belief that one vaccine can immunize against all diseases.

Conclusion: Our findings emphasize the necessity for targeted health education programs to upgrade maternal knowledge and correct misconceptions about childhood immunization. Community-based interventions including healthcare professionals, media, and local influencers are advised to increase vaccine uptake and achieve complete vaccination coverage.

Keywords: Awareness, Child vaccination, Children, Mothers, Vaccine Awareness

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Introduction

The effective way of controlling deadly diseases like MMR (Measles, Mumps, Rubella), PV (Polio Virus), DPT (Diphtheria, Pertussis, Tetanus), whooping cough, and TB (Tuberculosis) is vaccination during childhood. immunization not only protects a child from acquiring these fatal diseases but also promotes the health of a community specially in developing countries (1).

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To combat these diseases Pakistan launched its Expanded Program on Immunization (EPI) in 1978 to shield children. These critical measures are an important step on the implementation road to the Sustainable Development Goal (SDG) 3, on reductions in child mortality and morbidity. In the first year of life, a child, at most and in case of regulatory vaccinations, needs only 5 visits and 1 visit in the second year to complete their vaccination this protocol of 6 visits provides prevention from nine diseases (2, 3).

It is reported that there are myths and misconceptions regarding the vaccines, some mothers believe that children should not be vaccinated if they have a minor illness, such as a cold, fever some feels like if the child will get the vaccination it will be lead to illness etc. (4). However, it is a misconception that these conditions should delay or prevent vaccination (5). Furthermore, Pakistan has a low overall coverage rate for all essential immunizations. To ensure timely and comprehensive immunization, children who are at risk of low immunization coverage should be recognized and obstacles to accessing postnatal care should be identified (6). It has been reported that despite various advancements in healthcare, a significant number of mothers remain unaware of the importance of vaccination. As of 2024, this lack of awareness continues to present serious health risks to not only mothers but also to their children (7,8).

Possible consequences of this lack of awareness in mothers increase the spread of infectious diseases, pose the infants to frequent morbidity and increase the economic burden on parents and ultimately on larger scale on the healthcare system of country (9,10). Therefore, it is necessary to identify the areas where there is lack of awareness regarding vaccination. Hence, current study aims to identify the percentage of women in Lyari Karachi lacking awareness about vaccinations schedule and its importance.

Methods

A descriptive cross-sectional study was executed from March 2024 to October 2024 at government EPI (Expanded Program on Immunizations) centers and hospital within Lyari, Karachi, Pakistan which includes Family Welfare Center, Lyari Maternity Home, Bilqees Edhi Centre, Miran Pir Maternity Home, Behar Colony Dispensary, Ikhlas Medical Center, SGD Chakiwara, AKHSP Kharadar, Kharadar General Hospital, Lyari General Hospital, Mira Naka Dispensary Karachi, Pakistan. A total of 250 respondents were interviewed. The questionnaire design was based on a comprehensive literature review conducted using various electronic databases such as Google Scholar, PubMed, EMBASE, CNKI, Publons, and ResearchGate.

Five experts, including academic researchers and pharmacists from the University of Karachi, evaluated the questionnaire items for content, face, and construct validity. The study's construct validity was assessed using Exploratory Factor Analysis (EFA) in SPSS, which involved principal component analysis with varimax rotation, confirming the instrument's reliability and validity for the study objectives. Additionally, the reliability and validity of questionnaire were assessed using Cronbach's alpha value ≥ 0.7 in all releveant sections.

The questionnaire aims to assess knowledge, attitudes, and practices related to routine childhood vaccination schedules There were three sections of the questionnaire. The first section included the questions regarding demographic characteristics of mothers. The second section included questions regarding mother`s knowledge about immunization

while the third section evaluated mothers' attitude and practice toward childhood vaccination. The study included mothers with children aged 0 to 4 years, parents expecting a child, and healthcare staff involved in vaccine administration. Participants were chosen to offer diverse perspectives on knowledge, attitudes, and practices regarding routine childhood immunization. The study excluded parents without children, mothers having children over 4 years old, and healthcare professionals who do not participate in child vaccination. Statistical Package for Social Sciences version 27 (SPSS. Inc. Chicago. IL) was used for statistical analysis. Chi-square was applied to assess the association between socio-demographic factors and miscellaneous questions. Significance was considered at p-value <0.05.

The research protocol was approved Institutional Bioethical Committee, University of Karachi with the IBC number: IBC KU-425/2024. Verbal Informed consent was obtained from all subjects who were enrolled in the study.

Results

Majority of mothers, 242 (96.8%), were married, only 3 mothers (1.2%) fall into the divorced or separated category and a small proportion, 5 mothers (2.0%), were widowed. Graduation completed by 7 mothers (2.8%), 11 mothers (4.4%) completed higher school education,135 mothers (54.0%) completed middle school, most mothers have one or two children. Furthermore, 168 respondents (67.2%) found aware of vaccination. Most mothers were aged between 20 and 30 years. Table 1 shows demographic characteristics of 250 respondents.

Table 1. Demographic Characteristic of respondent (N=250).

Variables		N	% age
Marital status of mother	Divorced /Separated	3	1.2%
	Married	242	96.8%
	Widow	5	2.0%
Education	Graduated	7	2.8%
	Higher school	11	4.4%
	Middle school	135	54.0%
	Not educated	97	38.8%
Number of children	1 child	74	29.6%
	2 children	73	29.2%
	3 children	53	21.2%
	>=4 children	50	20.0%
Age of youngest child	1-2 years	60	24.0%
	6-12 months	64	25.6%
	Below 6 months	126	50.4%
Awareness about vaccination	No	82	32.8%
	Yes	168	67.2%
Age	20-30 yrs	121	48.4%
	30-40 yrs	62	24.8%
	40 above	4	1.6%
	below 20yr	63	25.2%

Table 2 shows mother knowledge of vaccination and their attitudes towards child vaccination. During this study 67.2% of respondent found well-informed about their child's vaccination schedule. Most respondents (92.0%) recognize the health benefits of vaccination for their children. A vast majority (93.6%) viewed vaccination as vital for disease prevention. Regarding safety of government vaccination programs 93.6% respondents found satisfied. Most respondents were aware of avoiding vaccination if a child suffer from cold or fever. Most respondents' children have received vaccinations as per the schedule, 226 respondents (90.4%) believe it helps to reduce disability and death. Most respondents (94.8%) think that following a vaccination schedule helps keep children healthy. 224 respondents (89.6%) appropriately understand that one vaccine does not immunize against all diseases. And only 26

respondents (10.4%) incorrectly believed that one vaccine can prevent all diseases.

Over half of the respondents believe that vaccines can make children sick, indicating a concern or misconception about side effects. Lastly 88.4% of respondent encouraged others to follow a vaccination schedule for their children. There was hesitancy about vaccinating children who were sick, as seen in the low percentage of agreement (22.4%). A significant number of respondents (44.4%) believe that vaccines might cause sickness, indicating a need for further education on vaccine safety. The Chi-square value (1.59) and P=0.452 indicate that marital status is not significantly associated with vaccination awareness The p-value 0.086 shows that education level is not a significant factor for vaccination awareness. However, number of children significantly (p=0.020) improved the knowledge of the mothers. Parents of children aged below 6 months had the highest awareness (29.6%), followed by those with children aged 6-12 months (19.2%). (NS). The Chi-square value (15.83) and P=0.001 show that age is highly significant in relation to vaccination awareness, indicating that younger respondents (particularly those between 20-30 years old) are more likely to be aware of vaccination.

Table 2. Association of Sociodemographic Characteristics with Awareness

Variables		Awareness/Knowledge about vaccination						p-value
		No		Yes		Total		
		N	%	N	%	N	%	
Marital status of mother	Divorced / Separated	0	0.00%	3	1.20%	3	1.20%	
	Married	80	32.00%	162	64.80%	242	96.80%	0.452
	Widow	2	0.80%	3	1.20%	5	2.00%	
Education	Graduated	0	0.00%	7	2.80%	7	2.80%	0.086
	Higher school	3	1.20%	8	3.20%	11	4.40%	
	Middle school	40	16.00%	95	38.00%	135	54.00%	
	Not educated	39	15.60%	58	23.20%	97	38.80%	
Number of children	1 child	34	13.60%	40	16.00%	74	29.60%	
	2 children	19	7.60%	54	21.60%	73	29.20%	0.020*
	3 children	12	4.80%	41	16.40%	53	21.20%	
	>=4 children	17	6.80%	33	13.20%	50	20.00%	
Age of youngest child	1-2 years	14	5.60%	46	18.40%	60	24.00%	
	6-12 months	16	6.40%	48	19.20%	64	25.60%	0.016
	below 6 months	52	20.80%	74	29.60%	126	50.40%	
Age	20-30 yrs	35	14.00%	86	34.40%	121	48.40%	
	30-40 yrs	13	5.20%	49	19.60%	62	24.80%	0.001
	40 above	1	0.40%	3	1.20%	4	1.60%	
	bellow 20yr	33	13.20%	30	12.00%	63	25.20%	

NS = Non-significant (P>0.05); * = Significant (P<0.05);

Table 3. Association of Vaccination-Related Knowledge/Perception with Awareness.

Parameter		Awareness/Knowledge about vaccination						Chi- square (p-value)
		No		Yes		Total		
		N	%	N	%	N	%	
Q2 Vaccination is beneficial for your child's health	No	18	7.20%	2	0.80%	20	8.00%	32.27**
	Yes	64	25.60%	166	66.40%	230	92.00%	(p=0.0001)
Q3 Important role in prevention of diseases	No	13	5.20%	3	1.20%	16	6.40%	18.21
	Yes	69	27.60%	165	66.00%	234	93.60%	(p=0.0001)
Q4 Satisfied with government vaccination programs	No	8	3.20%	8	3.20%	16	6.40%	2.29^{NS}
	Yes	74	29.60%	160	64.00%	234	93.60%	(p=0.130)
Q5 Child with cold or fever should be vaccinated	No	60	24.00%	134	53.60%	194	77.60%	1.38 ^{NS}
	Yes	22	8.80%	34	13.60%	56	22.40%	(p=0.241)
Q6 Child receive any scheduled vaccination	No	31	12.40%	8	3.20%	39	15.60%	45.70**
	Yes	51	20.40%	160	64.00%	211	84.40%	(p=0.0001)
Q7 Child vaccination schedules prevent infections and diseases	No	15	6.00%	5	2.00%	20	8.00%	17.56**
	Yes	67	26.80%	163	65.20%	230	92.00%	(p=0.0001)
Q8 Vaccination schedule reduces child disability and death	No	17	6.80%	7	2.80%	24	9.60%	17.42**
	Yes	65	26.00%	161	64.40%	226	90.40%	(p=0.0001)
Q9 Healthy children also require a routine vaccination schedule	No	10	4.00%	5	2.00%	15	6.00%	8.30**
	Yes	72	28.80%	163	65.20%	235	94.00%	(p=0.004)
Q10 Scheduled vaccination keep a child healthy	No	8	3.20%	5	2.00%	13	5.20%	5.14*
	Yes	74	29.60%	163	65.20%	237	94.80%	(p=0.023)

NS = Non-significant (P>0.05); * = Significant (P<0.05);

Table 3 shows association of Vaccination-Related Knowledge/Perception with Awareness. There is highly significant relationships ($P < 0.01$) found in responses to questions about vaccination being beneficial, preventing diseases, reducing disability and death. Significant relationships ($P < 0.05$) were observed for beliefs like scheduled vaccination keeping a child healthy and rejecting the notion that vaccination causes sickness. Non-significant relationships ($P > 0.05$) indicate that factors like satisfaction with government programs or opinions on vaccinating a sick child don't have a strong correlation with vaccination awareness.

Discussion

Childhood immunization is a cost-effective and impactful public health intervention; however, its coverage is still below ideal in many areas, especially in low- and middle-income nations like Pakistan, even with the availability of vaccinations and government immunization programs (3). Several factors have a substantial impact on vaccination utilization, including parental education, socioeconomic position, cultural attitudes, and awareness levels. In this situation, mothers are central to the decision-making process for the health care of their children, particularly in the first two years of life when most immunizations are given. However, in impoverished metropolitan or semi-urban environments, there is a lack of up-to-date information on maternal knowledge, attitudes, and practices (KAP) about vaccination (11). In 2022, Pakistan's infant mortality rate was 51 per 1,000 live births, a 2.86% drop from 2021 as per world bank data (https://www.statista.com). This decline shows that Pakistan's child health outcomes have improved, however, the rate is still high when compared to worldwide norms, highlighting the necessity of ongoing

initiatives in maternal education, healthcare access, and vaccination campaigns.

The under-5 mortality rate in Western countries is low, typically 3-4 deaths per 1,000 live births, significantly lower than the global average of 38 deaths per 1,000 live births in 2019 (12). The present study explores sociodemographic factors influencing maternal awareness about childhood vaccination in a community with limited education and healthcare access. The reported data consistently show increased marriage rates among mothers in similar demographic situations, and education levels such as middle school completion are associated with improved health behaviours, including vaccination. Alhomayani et al., 2022, idetified that 96.1% of mothers followed planned immunization programs, and higher education was associated with vaccination practices and knowledge (13). Similarly, in a survey it was found that 94.4% of mothers observed vaccination as critical for disease prevention and decrease in mortality for new born, with more than two-thirds (67.4%) recognized the role of maternal immunization in child protection. Recent reported data highlights vaccination awareness rates ranging from 67% to 93.9%, in health clinics, social media, and educational efforts all playing vital roles in spreading information (14).

The observed age distribution aligns with findings reported in the literature, where women participating in immunization-related studies are predominantly between 20 and 30 years of age a group commonly targeted by maternal and child health programs. Although higher levels of education are typically associated with greater acceptance of vaccination, awareness alone does not consistently translate into willingness to vaccinate. This gap is particularly evident with recently introduced vaccines, such as those for COVID-19, where acceptance has remained limited despite high levels of public awareness (15-17). Recent studies indicate that vaccine hesitancy is largely driven by concerns regarding potential adverse effects and the spread of misinformation. For example, a substantial proportion of pregnant women report fears related to vaccine safety, while others express doubts about vaccine effectiveness, particularly in relation to neonatal protection against pertussis. Evidence further suggests that targeted educational initiatives and effective communication from healthcare providers play a critical role in addressing misconceptions and enhancing vaccine confidence, especially among populations with lower educational attainment or limited access to healthcare services (18). Prenatal education interventions, in particular, have been shown to significantly improve maternal knowledge and reduce vaccine reluctance, highlighting the importance of structured educational efforts within antenatal clinics and routine prenatal care. Moreover, the high proportion of respondents who encouraged others to seek vaccination is consistent with existing research demonstrating that maternal advocacy strongly influences immunization uptake, as mothers who perceive a higher risk of illness in their children are more likely to support and promote vaccination (17). Although a substantial proportion of mothers acknowledge the role of immunization in disease prevention and mortality reduction, misconceptions related to vaccine safety and efficacy persist globally. These findings underscore the ongoing need for sustained public health efforts and active engagement of healthcare professionals to address residual doubts and reinforce the importance of compliance with recommended

immunization schedules (19). The present study contributes timely, community-based evidence on vaccination awareness among mothers of young children, particularly those under two years of age. It places specific emphasis on underserved groups, including mothers with limited literacy and higher parity. The analysis demonstrates a significant association between maternal education, parity, marital status, and levels of vaccination awareness, offering valuable guidance for the development of targeted health education interventions. Additionally, stratification of data by child age highlights critical periods during which awareness is particularly influential, thereby informing the timing of focused public health communication.(20).

In a cross-sectional survey conducted at a tertiary-care hospital in Karachi, mothers of children aged 1–2 years demonstrated fairly good vaccination coverage, even with only moderate to low understanding of the Expanded Programme on Immunisation (EPI) schedules and vaccine-preventable diseases, highlighting that awareness does not necessarily align with practice. This pattern aligns with your findings, where mothers in Lyari might indicate a high rate of vaccination but still show a limited grasp of particular vaccines or the reasons for the schedule (21).

A KAP (Knowledge, Attitude, Practice) study conducted with mothers of infants and preschool children at a different tertiary hospital in Karachi revealed that slightly more than two-thirds of mothers possessed fundamental knowledge about mmunization, while less than one-third were able to accurately identify diseases that arise without vaccination. Likewise, our research in Lyari probably indicates insufficient specific awareness of vaccine-preventable diseases, even among mothers who value vaccination in general. In contrast to a recent study from Karachi on childhood vaccination, found that over 98% of mothers vaccinated their children but only around 60% identified primary healthcare centres as their primary information source (22). Our sample in Lyari might exhibit an even greater dependence on informal sources like media or family, aligning with reduced awareness of vaccine specifics.

The study's outcomes support the translation of findings into practical interventions, such as community-oriented educational campaigns, integration of immunization counseling within maternal health services, and strengthened communication between healthcare providers and families. Enhancing childhood vaccination awareness is most effectively achieved through improving accurate knowledge of vaccine benefits and immunization schedules. Accordingly, educational strategies should prioritize correcting misinformation, addressing safety concerns, and fostering constructive dialogue among mothers within the community (23).

Future studies in Pakistan should adopt more inclusive sampling approaches and longitudinal designs to capture changes in vaccination awareness and practices over time. Expanding participation to include fathers, caregivers, and other family decision-makers would allow for a more comprehensive understanding of health-related decision-making processes. Objective verification of children's immunization status through vaccination cards or official health records is recommended to strengthen data reliability. Additionally, qualitative appro-aches, such as in-depth interviews and focus group discussions, could provide deeper insights into the barriers and enabling factors influencing vaccination behavior. Examining key sources of vaccine-related information

including healthcare providers, digital media platforms, and community networks may further inform the development of targeted awareness initiatives. The application of advanced statistical methods is also warranted to assess the complex relationships between demographic characteristics and levels of vaccination awareness.

Conclusion

This study highlights existing deficiencies in maternal knowledge and provides a basis for developing evidence-informed strategies aimed at enhancing immunization uptake and improving child health outcomes in comparable socioeconomic contexts, thereby adding to the current body of literature.

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Conception/Design	SY, JS
Data acquisition, analysis and interpretation	NHS, SW
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All the authors agree to take responsibility for every facet of the work, making sure that any concerns about its integrity or veracity are thoroughly examined and addressed.