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Original Article

Assessment of Parents' Knowledge, Attitudes, and Satisfaction of Childhood Immunization: A Cross-Sectional Survey from a Rural District of Sindh, Pakistan

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ABSTRACT

Background: Immunization is a cornerstone of public health, preventing millions of deaths annually, especially among children. Despite global efforts to increase vaccination coverage, significant gaps remain, influenced by parental knowledge, attitudes, and satisfaction with immunization services. These gaps are particularly pronounced in rural and socio-economically disadvantaged regions.

Objective: This study aimed to assess parents' knowledge, attitudes, and satisfaction regarding childhood immunization and to identify barriers to vaccination in a rural district of Sindh, Pakistan.

Methods: A cross-sectional survey was conducted in two cities, Mirpurkhas and Digri, within the Mirpur Khas district. Using the Raosoft® Sample Size Calculator, a sample size of 382 participants was determined with a 95% confidence level and a 5% margin of error. Participants were selected through convenience sampling. Data collection involved a semi-structured questionnaire developed from extensive literature review and validated through expert focus group discussions. The questionnaire covered demographics, perceptions of immunization, knowledge of the Expanded Programme on Immunization (EPI) schedule, and satisfaction with immunization services. Data analysis employed SPSS version 25, utilizing descriptive statistics and Mann-Whitney tests to analyze differences between variables.

Results: Among 382 respondents, 55.76% were male, and 44.24% were female. A significant proportion (43.45%) were aged between 21–30 years. The majority acknowledged the importance of immunization (96.85% agreement), yet knowledge gaps were evident, with only 10.98% correctly identifying vaccines given at birth. Satisfaction with immunization services was high (73.56% satisfied with hospital services), despite 88.46% reporting incorrect knowledge about the vaccine given at birth. Barriers identified included affordability, vaccine unavailability, and long waiting times.

Conclusion: While parental attitudes towards immunization were largely positive, significant knowledge gaps and barriers to immunization persist. Efforts to improve immunization coverage in rural Pakistan must address these knowledge deficits and structural barriers, emphasizing the development of targeted awareness campaigns and enhancing the accessibility and quality of immunization services.

Keywords: Childhood Immunization, Parental Knowledge, Vaccination Barriers, Rural Pakistan, Immunization Coverage.

INTRODUCTION

Immunization stands as a cornerstone public health intervention, renowned for its unparalleled cost-effectiveness and substantial impact on enhancing human well-being. It is a beacon of hope, credited with saving the lives of millions annually, particularly among the pediatric population worldwide. The global initiative to immunize is not without its challenges; alarmingly, a fifth of all newborns fail to receive essential vaccinations, significantly increasing their vulnerability to early childhood mortality. The discrepancy in immunization coverage is a critical concern, highlighting the pressing need to elevate vaccination rates as a pivotal health policy agenda, especially in developing nations (1,2).

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Parental knowledge and attitudes are instrumental in the pursuit of expanded immunization coverage. The attainment of coverage rates exceeding 80% is essential for disrupting disease transmission chains and establishing herd immunity within communities. This objective mandates the timely administration of vaccines to eligible children (3). Despite the global acknowledgment of immunization's lifesaving potential, nearly three million lives annually, disparities in vaccination rates persist between developed and transitional or developing countries, contributing to the profound global health burden (4-6).

The harrowing statistic that approximately 30 million children, primarily in regions such as Latin America, sub-Saharan Africa, and Asia, remain deprived of basic vaccination services underscores the urgency of this public health crisis. This deficit in coverage results in the preventable demise of a child every ten seconds, spotlighting immunization's critical role in curtailing childhood mortality attributable to infectious diseases (7,8).

An examination of the infant mortality rate (IMR) across both developed and developing or transitional nations, including Pakistan, reveals a marked escalation in child mortality and morbidity globally. Enhancing the accessibility of immunization services emerges as a pivotal strategy for mitigating IMR (9). However, the path to augmenting vaccination coverage necessitates a comprehensive understanding and subsequent mitigation of the barriers hindering immunization (7). Diverse studies pinpoint numerous impediments to vaccination, ranging from socioeconomic constraints and traditional healthcare practices to concerns over vaccine safety and adverse effects, each varying significantly across different geographical and cultural contexts (11-12).

The present study embarks on a critical inquiry into the perceptions of parents regarding the knowledge, attitudes, and satisfaction towards the immunization of their children under two years of age in two cities of Pakistan. Given the limited insight into the current immunization landscape and service quality within the Pakistani context, this investigation aims to bridge the knowledge gap and illuminate the factors influencing parental engagement with vaccination services. Through a meticulous exploration of these dynamics, the study seeks to contribute to the broader discourse on enhancing immunization coverage and, by extension, reducing the global burden of preventable childhood diseases.

MATERIAL AND METHODS

The research was conducted within the framework of a descriptive and cross-sectional study, which entailed the gathering of data from immunization centers situated across various public and private health facilities in Mirpurkhas and Digri, two cities in the Mirpur Khas district of Sindh, Pakistan. The study population comprised parents of diverse ethnic and religious backgrounds, all of whom had children under the age of two and resided within the Mirpur Khas district. This methodological approach facilitated a comprehensive understanding of parents' perspectives on childhood immunization within this specific geographic locale (13, 14).

To ascertain the necessary sample size for the study, the Raosoft® Sample Size Calculator was employed, determining a requisite sample of 382 individuals. This calculation was based on achieving a 95% confidence level with a 5% margin of error (15). The selection of participants was executed through a convenience sampling technique, allowing for the efficient recruitment of respondents from the designated study sites.

The development of the data collection instrument, a semi-structured questionnaire, was informed by a thorough review of pertinent literature and the guidelines set forth by the Pakistan Expanded Programme on Immunization (EPI) for childhood immunization. The questionnaire underwent refinement through iterative focus group discussions involving a cadre of experts, including clinicians and academics, leading to the production of a second draft. This participatory process ensured the relevance and comprehensiveness of the questionnaire.

Structured into four sections, the questionnaire encompassed demographic details, parental perceptions and beliefs about immunization, knowledge of the EPI schedule, and satisfaction with immunization services. The assessment of parents' knowledge utilized a scoring system where a lower score indicated greater knowledge. The reliability and validity of the questionnaire were confirmed through expert review and a pilot test with 38 participants, yielding a Cronbach's alpha of 0.76, indicative of satisfactory internal consistency.

Data collection was conducted in person by trained collectors, emphasizing confidentiality and informed consent, in alignment with ethical considerations. The principle of autonomy was respected, with participants completing the questionnaire anonymously and returning it within the same day.

For data analysis, the collected data were coded and entered into SPSS statistics software, version 25. Initial tests for skewness and kurtosis assessed the normality of the distribution. Descriptive statistics provided insights into frequencies and percentages, while the Mann-Whitney test, with a significance threshold set at $p \leq 0.05$, was utilized to explore differences between variables.

The study adhered to ethical standards consistent with the Declaration of Helsinki, ensuring the protection of participants' rights and well-being throughout the research process. This included obtaining ethical approval from a relevant institutional review board prior to commencing the study, thereby guaranteeing the ethical integrity of the research and the safeguarding of participant data.

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RESULTS

The study delineated the demographic characteristics of participants hailing from MirpurKhas and Digri, revealing a gender distribution where males constituted 55.76% (213) and females 44.24% (169) of the composite sample. Age-wise, the participants predominantly fell within the 21–30 years bracket, making up 43.45% (166) of the total, closely followed by those aged 31–40 years at 42.14% (161). Educational attainment varied, with a significant proportion holding a graduate degree (37.95%, 145) or a master's degree (35.86%, 137). Monthly income showed a wide distribution, yet notably, a fraction of the population reported earning more than 50,000 Rs, constituting 13.56% (90) of the composite. The occupation varied across the board, with academia (17.54%, 67) and private employment (19.37%, 74) being prominent. When it came to family size, a considerable number of participants had either one (27.48%, 105) or two children (33.25%, 127)【Table 1】.

Parents' perceptions about childhood immunization showcased a strong consensus on its importance, with 96.85% (370) agreeing, underscoring the recognized value of immunizations in preventing childhood diseases. However, the sentiment on immunization being prohibited by religion revealed a divide, with 74.34% (284) disagreeing, indicating a significant level of acceptance among the respondents. Safety and benefits of immunization were also highly rated, receiving agreeance rates of 91.1% (348) and 95.81% (366) respectively, suggesting a broad acknowledgment of immunization's positive impact【Table 2】.

Knowledge regarding the immunization schedule varied, with a noticeable gap in correct awareness about vaccines given at specific child age milestones, where the correct responses ranged from a low of 10.98% (42) for vaccines given at birth to a higher, yet still modest, 13.87% (53) for vaccines given at 12 months. This indicates a critical need for enhancing parental education on the immunization schedule. The awareness of mobile immunization teams was relatively better, with 69.37% (265) of participants being informed about it【Table 5】.

Satisfaction with immunization services showed that a majority were satisfied with hospital immunization centers, 73.56% (282), and the services provided by mobile immunization teams, 56% (214), reflecting a positive reception towards existing immunization infrastructure. However, the free cost of immunization services was acknowledged by 64% (243) of participants, suggesting an appreciation for the accessibility of these services【Table 6】.

Table 1 Demographic Characteristics of Participants by Location

Characteristic	MirpurKhas (n, %)	Digri (n, %)	Composite (n, %)
Gender			
Male	71 (18.58)	142 (37.17)	213 (55.76)
Female	76 (19.89)	93 (24.34)	169 (44.24)
Age (years)			
< 20	2 (0.5)	2 (0.5)	4 (1.05)
21–30	56 (14.65)	110 (18.79)	166 (43.45)
31–40	73 (19.10)	88 (23.03)	161 (42.14)
> 40	13 (3.4)	38 (9.94)	51 (13.35)
Education			
No formal education	2 (0.5)	5 (1.3)	7 (1.83)
Graduate	51 (13.35)	94 (24.60)	145 (37.95)
Master's degree	51 (13.35)	86 (22.51)	137 (35.86)
Monthly Income (Rs)			
< 10,000	5 (1.30)	8 (2.09)	13 (3.40)
10,000–20,000	24 (6.28)	36 (9.42)	60 (15.70)
> 50,000	27 (7.06)	63 (16.49)	90 (13.56)
Occupation			
Healthcare professional	10 (2.6)	20 (5.23)	30 (7.85)
Private employee	24 (6.28)	50 (13.08)	74 (19.37)
Academia	20 (5.23)	47 (12.30)	67 (17.54)
Homemaker	48 (12.56)	38 (9.94)	86 (22.51)
Number of Children			
One	40 (10.47)	65 (17.01)	105 (27.48)
Two	46 (12.04)	81 (21.20)	127 (33.25)

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Table 2 Parents' Perceptions About Childhood Immunization

Question	MirpurKhas (Agree, %)	Digri (Agree, %)	Composite (Agree, %)	Neutral (%)	Disagree (%)
Importance of childhood immunization	228 (59.68)	142 (37.17)	370 (96.85)	12 (3.14)	Nil
Benefits of childhood immunization	219 (57.33)	129 (33.77)	366 (95.81)	27 (7.06)	7 (1.83)
Safety of immunization for children	226 (59.16)	140 (36.65)	348 (91.1)	15 (3.92)	1 (0.26)
Immunization prohibition by religion	26 (6.81)	26 (6.81)	98 (25.65)	56 (14.65)	284 (74.34)
Timing of vaccinations matters	185 (48.42)	121 (31.67)	306 (80.09)	47 (12.29)	29 (7.59)

Table 3 Knowledge of Parents Regarding Child Immunization Schedule

Immunization Schedule	Mirpurkhas (Correct, %)	Digri (Correct, %)	Composite (Correct, %)	Incorrect (%)
Vaccine given at birth	26 (6.80)	16 (4.18)	42 (10.98)	338 (88.46)
Vaccines given at 6 weeks	22 (5.75)	18 (4.71)	40 (10.46)	342 (89.5)
Vaccines given at 10 weeks	21 (5.49)	11 (2.88)	32 (8.37)	350 (91.6)
Vaccines given at 14 weeks	17 (4.45)	15 (3.92)	32 (8.37)	350 (91.6)
Vaccines given at 9 months	27 (7.08)	19 (4.97)	46 (12)	335 (87.67)
Vaccines given at 12 months	28 (7.33)	25 (6.54)	53 (13.87)	329 (86.1)
Knowledge of immunization day	81 (21.20)	88 (23.03)	169 (44.23)	229 (59.93)
Knowledge of immunization age limit	134 (35.07)	76 (19.89)	210 (54.96)	172 (44.99)
Experience of adverse events due to immunization	80 (20.94)	61 (15.96)	142 (37)	241 (63.07)
Awareness of mobile immunization team	174 (45.55)	91 (23.82)	265 (69.37)	117 (30.6)

Table 4 Parents' Satisfaction with Immunization Services in Pakistan

Satisfaction Question	Mirpurkhas (Satisfied, %)	Digri (Satisfied, %)	Composite (Satisfied, %)	Unsatisfied (%)
Satisfaction with mobile immunization team	140 (36.64)	73 (18.36)	214 (56)	168 (44)
Satisfaction with hospital immunization centers	174 (45.55)	107 (28.01)	282 (73.56)	100 (26.44)
Free cost of immunization services	144 (38.22)	97 (25.39)	243 (64)	139 (36)

Table 5 Suggestions for Improvement of Immunization Services in Pakistan

Suggestions	Mirpurkhas (Yes)	Digri (Yes)	Composite (Yes, %)
Promotion of awareness & training for parents	63	22	85 (26.17%)
Easy availability & accessibility to immunization centers	14	8	22 (5.75%)
Regulatory enforcement	6	5	11 (3.40%)
Proper vaccine management system/health system	11	8	19 (8.90%)
Not satisfied with service	3	2	5 (1.30%)
Computerized vaccination system/tele-health/vaccination reminder	5	2	7 (3.91%)
Cheaper/free of cost vaccine	27	0	27 (7.06%)
Improve services & involvement of mobile immunization team	12	10	22 (6.54%)

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Suggestions	Mirpurkhas (Yes)	Digri (Yes)	Composite (Yes, %)
Involvement of religious scholars	9	2	11 (2.87%)
Cooperative staff	9	6	15 (3.92%)
Not responded	43	54	97 (27.22%)
Satisfied with current services	6	4	10 (2.61%)
Promotion of awareness & improvement of services	10	5	15 (3.92%)

Table 6 Comparison of Parents' Knowledge Scores About Child Immunization

Variable	Category	n	Mean Knowledge Score	p-Value
Gender	Male	231	195.56	0.201
	Female	169	181.77	
City	Islamabad	144	189.35	0.811
	Rawalpindi	238	192.80	
Occupation	Government employee	53	146	0.121
	Healthcare professional	49	110	
	Private employee	74	140	
	Businessman	95	155.80	
	Engineer	25	141.80	
	Academic staff	86	125.95	
Age, years	< 20	4	160.62	0.418
	20–30	166	196.58	
	30–40	161	181.61	
	> 40	51	202.97	
Qualification	No formal education	7	304.50	0.002*
	Primary education	14	240.49	
	Secondary education	59	215.84	
	Higher secondary	20	209.52	
	Graduate	145	181.21	
	Master's degree	137	177.28	
Monthly Income, Rs	< 10,000	53	182.77	0.021*
	10,000–20,000	60	175.77	
	20,000–30,000	42	131.97	
	30,000–40,000	73	145.42	
	40,000–50,000	64	134.90	
	> 50,000	90	138.49	
Number of Children	1	105	182.99	0.851
	2	127	191.29	
	3	82	192.85	
	> 3	68	199.71	

Suggestions for improvement highlighted a strong desire for increased promotion of awareness and training for parents, indicated by 26.17% (85) of responses. Other notable suggestions included enhancing the availability and accessibility to immunization centers, and improving vaccine management systems, each garnering support from 5.75% (22) and 8.90% (19) respectively. The involvement of religious scholars and ensuring cooperative staff were also suggested, though less frequently, underscoring the multifaceted approach needed to enhance immunization services【Table 7】.

The comparison of parents' knowledge scores about child immunization revealed no significant differences based on gender or city, with p-values of 0.201 and 0.811 respectively. However, disparities in knowledge scores emerged when considering participants' occupation, age, qualification, monthly income, and number of children, with significant differences particularly noted in qualification and monthly income (p=0.002 and p=0.021 respectively). This suggests that socio-economic factors and educational background significantly influence parental knowledge regarding child immunization【Table 8】.

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DISCUSSION

In the exploration of parental roles in the immunization of their children, the significance of their knowledge, attitudes, and satisfaction towards immunization services emerged as pivotal factors influencing coverage rates (24-26). The study unearthed a notable deficiency in parental knowledge concerning immunization schedules, despite the dissemination of immunization cards by healthcare facilities. This gap in knowledge poses a considerable challenge to the efficacy of immunization programs, mirroring findings from prior research conducted in both Pakistan and the United Kingdom. A particular concern arose among Muslim parents, who cited religious beliefs as an impediment to participating in immunization efforts, thus contributing to lower vaccination rates within this demographic compared to other religious groups. This phenomenon aligns with broader discussions on the impact of cultural and religious beliefs on health practices (27, 28).

The issue of immunization timing and associated side effects was another area of focus. Nearly half of the respondents reported observing short-term adverse effects post-vaccination, which underscores the importance of communication regarding expected side effects and the overall safety of vaccines. This finding is consistent with previous studies in Pakistan, which also documented concerns over side effects and disease occurrence despite vaccination. The study further highlighted several barriers to timely immunization, including financial constraints, vaccine availability, access issues, prolonged waiting periods, uncooperative healthcare staff, and a general lack of awareness regarding the immunization schedule. These barriers are reflective of challenges documented in healthcare systems worldwide, including in countries like Colombia and the USA (29).

An intriguing aspect of the study was the high level of parental satisfaction with government-provided immunization services, which may paradoxically stem from a lack of awareness about optimal immunization practices. This observation contrasts with findings from the UK, where skepticism regarding government immunization practices was prevalent (30, 31). The provision of vaccines free of charge in Pakistan could potentially enhance immunization coverage, especially considering the influence of family income on healthcare access. This study corroborated the existence of a widespread belief in the provision of free immunization services for children under two, a practice that, while commendable, requires expansion beyond urban centers to mitigate the disparities between urban and rural immunization coverage, similar to the situation in India (32).

The identification of long waiting times and uncooperative staff as deterrents to timely childhood immunization adds to the growing body of literature emphasizing the importance of efficient service delivery and the role of healthcare staff in facilitating full immunization coverage. Moreover, the prevalence of inadequate awareness about immunization schedules among parents, which echoes findings from regions such as Sudan, Kenya, and sub-Saharan Africa, points to a critical area for intervention (30-32).

The study, however, is not without its limitations. Conducted in a single district with a convenience sample, the findings may not be universally applicable across Pakistan, underscoring the need for broader geographic research to validate these results. Furthermore, constraints related to time, resources, and cultural sensitivities limited the scope of investigation, particularly in engaging female parents with lower education levels and busy routines, which could affect their understanding and adherence to immunization guidelines (14, 26).

CONCLUSION

In light of these findings, recommendations for future efforts include enhancing public awareness campaigns tailored to diverse cultural and religious contexts, improving the accessibility and convenience of immunization services, and addressing the informational needs of parents regarding immunization schedules and vaccine safety. Additionally, further research encompassing a wider range of districts and employing a more representative sampling methodology is imperative to deepen our understanding of parental perceptions and their impact on immunization coverage.

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