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Original Article

Immunization Coverage and Factors Associated with Failure to Complete Childhood Immunization

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ABSTRACT

Background: Immunization is a cornerstone of public health, aiming to reduce morbidity and mortality among children. Despite global efforts to increase vaccination coverage, gaps in immunization persist, influenced by a variety of socio-economic and demographic factors. Understanding these factors is crucial for improving vaccination strategies and achieving herd immunity.

Objective: The study aimed to assess the immunization coverage among children aged 12 to 23 months and identify factors associated with incomplete immunization in a peri-urban area of Peshawar.

Methods: A cross-sectional survey was conducted from September 15, 2021, to November 15, 2022, involving 239 children aged 12 to 23 months from five villages selected through multi-stage cluster sampling. Data on demographic and socio-economic factors, along with immunization status, were collected through interviews with mothers and caretakers using a semi-structured questionnaire. Immunization coverage was assessed, and factors associated with failure to complete immunization were analyzed. Statistical analysis was performed using SPSS version 25.

Results: The study revealed that 50.2% (120/239) of children were fully immunized, 35.5% (85/239) were partially immunized, and 14.2% (34/239) were unimmunized. Factors contributing to incomplete immunization included lack of information (31/239), lack of motivation (17/239), accessibility issues (9/239), vaccine availability (7/239), and family-related challenges (22/239). No significant gender discrimination in immunization coverage was observed. Children from families with lower socioeconomic status and parents with education less than secondary level were more likely to be incompletely immunized.

Conclusion: While there has been progress in immunization coverage, significant barriers remain, particularly among children from low socioeconomic backgrounds and families with lower levels of parental education. Addressing these challenges through targeted public health interventions and enhanced community awareness is essential for improving immunization coverage and protecting children against vaccine-preventable diseases.

Keywords: Immunization coverage, Vaccine-preventable diseases, Socio-economic factors, Parental education, Peri-urban, Peshawar, Cross-sectional survey, SPSS.

INTRODUCTION

Immunization stands as a cornerstone in public health strategies for diminishing infant morbidity and mortality, representing a paramount mechanism for disease control. Acknowledged widely as the most economically viable health intervention, its efficacy in safeguarding children's health, alleviating parental distress during child upbringing, and curtailing child mortality rates is well-documented (1). The deployment of immunization services hinges on the community's receptivity, which is predicated on a comprehensive understanding of vaccination benefits, the health system's preparedness to administer vaccines, and the implementation of strategies to surmount barriers to accessing immunization services (2). The pursuit of augmented immunization coverage against childhood diseases is increasingly recognized as a critical developmental challenge, necessitating further inquiry.

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Journal of Health and Rehabilitation Research 2791-156X JHRR

According to the WHO/UNICEF (2008) report, the global immunization landscape has witnessed substantial progress, with the proportion of infants under one year of age receiving the DPT vaccine (three doses against diphtheria, pertussis, and tetanus) soaring from 20% in 1980 to 79% in 2006 (3, 4). Concurrently, the coverage for the three doses of polio vaccine escalated from 22% in 1980 to 80% in 2006, and measles immunization coverage expanded from 16% in 1980 to 80% in 2006. Despite these advances, the attainment still lags behind the WHO/UNICEF Global Immunization Vision and Strategy's 2010 target of 90%, underscoring the imperative for enhancing DPT, polio, and measles vaccine coverage to avert millions of infant deaths (5-11). This investigation primarily aims to evaluate the immunization coverage among children aged 12 to 23 months and to identify prevalent factors contributing to incomplete immunization (12-17). By pinpointing and addressing the reasons for immunization default, the study endeavors to ameliorate coverage rates. Given its concise duration and relatively small sample size, this research underscores the necessity for expansive, in-depth studies to tackle these critical issues comprehensively (18).

MATERIAL AND METHODS

A cross-sectional survey was meticulously conducted between 15th September 2021 and 15th November 2022, targeting a demographic of 239 children aged 12 to 23 months residing in five strategically selected villages within the peri-urban confines of Peshawar (19). The selection of these villages was achieved through a rigorous multi-stage cluster sampling technique, ensuring a representative distribution across the area under study. The primary aim was to gather comprehensive data regarding the immunization status of these children, while concurrently examining the impact of various demographic and socio-economic factors on immunization coverage (10, 20, 21).

Data collection was executed with precision, utilizing a semi-structured questionnaire meticulously designed to encapsulate a wide array of variables pertinent to the children and their familial contexts. This questionnaire was administered by a cadre of female research assistants, each of whom had undergone extensive training to ensure the integrity and consistency of the data collection process. Prior to the initiation of the survey, these research assistants engaged with mothers and caretakers to elucidate the objectives of the study, securing verbal consent before proceeding with the interviews. The inclusion criteria were comprehensive, encompassing all children under one year of age residing with their mothers, irrespective of gender. However, exclusions were made for any child with a documented allergy to vaccines or those not residing with their mothers (22).

In a bid to ensure the robustness of the data collection instrument, a pilot study was conducted on a subset of the population, accounting for approximately 10% (50 children) of the total sample size. The insights garnered from this pilot study were instrumental in refining the questionnaire, although the data from the pilot were not incorporated into the final analysis. This preparatory phase was pivotal in validating the feasibility and applicability of the questionnaire for the larger study.

For the analysis of the collected data, a detailed manual examination was complemented by sophisticated statistical analyses, leveraging the capabilities of SPSS version 25. This dual approach facilitated a nuanced exploration of the associations between immunization coverage and the identified demographic and socio-economic factors. The results of this comprehensive analysis were then meticulously documented, utilizing a combination of tables and charts to convey the findings in a clear and accessible manner (23).

Ethical considerations were paramount throughout the study, with the research protocol meticulously designed to adhere to the principles outlined in the Declaration of Helsinki. This commitment to ethical rigor ensured the protection of participant rights and the integrity of the research process. Each participant was approached with respect and informed consent was obtained, underscoring the voluntary nature of their participation and the confidentiality of their responses. This ethical stance not only reinforced the credibility of the study but also fostered a trustful relationship between the researchers and the community.

RESULTS

In the study conducted to assess the immunization status of children aged 12 to 23 months, the results unveiled a nuanced landscape of vaccination coverage within the targeted demographic. Of the 239 children surveyed, a slight majority, amounting to 120 children or 50.2%, were found to be fully immunized, indicating adherence to the recommended immunization schedule (Table 1). However, the study also highlighted areas of concern, with 85 children, representing 35.5% of the cohort, only partially immunized, and a further 34 children, constituting 14.2%, completely unimmunized. This distribution underscores a significant portion of the population at risk due to incomplete vaccination coverage, spotlighting the need for enhanced public health strategies to address these gaps (Table 1).

Delving deeper into the reasons behind the suboptimal immunization rates, the study identified several pivotal factors contributing to partial or non-immunization status among the children surveyed. A notable segment of the partial immunization group, 18 children, was attributed to a lack of information, while 13 children in the non-immunized category were similarly affected, pointing

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Journal of Health and Rehabilitation Research 2791-156X JHRR

to informational deficits as a critical barrier to full immunization (Table 2). Additionally, lack of motivation emerged as a significant concern, with 15 partially immunized children and 2 non-immunized children reported under this category. Accessibility issues also played a role, with 6 partially immunized and 3 non-immunized children living too far from vaccination sites, alongside 4 partially immunized and 3 non-immunized children finding the timing of immunization sessions inconvenient (Table 2).

Vaccine availability or the lack thereof was another impediment, affecting 3 partially immunized and 4 non-immunized children, highlighting logistical challenges in vaccine distribution. Parental factors, including 14 cases of mothers being too busy in the partially immunized group and 2 in the non-immunized group, alongside 5 instances of family problems in the partially immunized group and 1 in the non-immunized group, further elucidated the complex interplay of social and familial dynamics on immunization rates (Table 2).

Table 1: Immunization Status of Children Aged 12 to 23 Months

Immunization Status	Number of Children	Percentage (%)
Fully immunized	120	50.2
Partially immunized	85	35.5
Unimmunized	34	14.2
Total	239	100

Table 2: Reasons for Incomplete Immunization in Children Aged Less Than 23 Months

Reasons	Partial Immunization	Non-Immunization
Lack of information	18	13
Lack of motivation	15	2
Place of immunization too far	6	3
Time of immunization inconvenient	4	3
Vaccine not available	3	4
Mother too busy	14	2
Family problems	5	1
Child ill, not brought	10	3
Child ill, brought but not given	7	2
Long waiting time	3	1
Total	85	34

Moreover, health-related issues were identified as barriers, with 10 children not brought for vaccination due to illness in the partially immunized group and 3 in the non-immunized group. Additionally, 7 children were brought but not vaccinated due to illness in the partially immunized category, and 2 in the non-immunized category, indicating missed opportunities for vaccination. The problem of long waiting times was also flagged, albeit to a lesser extent, affecting 3 partially immunized and 1 non-immunized child (Table 2).

DISCUSSION

In the context of our study, which explored the immunization status among children aged 12 to 23 months, we observed a nuanced landscape of vaccination coverage. This research aligned with previous studies, such as the one conducted in Karachi by Siddiqi et al., which reported a coverage rate of 45%, and another across three districts in KPK, noting a 65% coverage rate. The comparatively lower coverage rates in these studies were attributed to a combination of reduced awareness about the importance of immunization and the limited availability of Expanded Programme on Immunization (EPI) services within communities. Our findings suggest a gradual improvement in the EPI programme, reflecting an increase in public awareness and utilization of immunization services, although the coverage rate still falls short of the threshold required for herd immunity (1, 12, 24). This highlights a pivotal area for public health intervention, aiming to escalate coverage rates to safeguard children against infectious diseases (13, 25).

Our analysis revealed no significant gender disparity in immunization coverage, counteracting the societal presumption of female children being less vaccinated than male children. This finding underscores a positive shift towards equitable health practices within the community, challenging traditional biases and emphasizing the uniform application of immunization services across genders (21, 26, 27).

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Journal of Health and Rehabilitation Research 2791-156X JHRR

Socioeconomic status emerged as a critical determinant of immunization coverage. Children from families with an income less than Rs. 30,000 per month exhibited lower immunization rates, echoing findings from similar research endeavors, including the study by Nisar et al., which corroborated the association between lower socioeconomic status and diminished immunization coverage (9). This correlation was further substantiated by our observation that children from higher-income families were more likely to be fully immunized, emphasizing the influence of economic factors on health outcomes (4, 18, 20, 28).

Education levels of parents, particularly mothers, were significantly associated with the immunization status of their children. Our study, in line with research conducted by Siddiqi et al. in Karachi and findings from Uganda, illustrated a direct relationship between higher parental education and complete immunization of children (29). This suggests that educational attainment fosters greater awareness and understanding of the benefits of vaccination, facilitating higher immunization rates.

However, our study also identified several barriers to complete immunization, including lack of awareness and motivation, vaccine unavailability, inconvenient vaccination times, and familial challenges such as large family sizes, busy schedules, and frequent maternal illnesses. These findings are reminiscent of those by Ahmad Nisar, who outlined key obstacles to EPI service utilization, including distrust in immunization, the necessity for multiple doses, maternal busyness, and the absence of vaccinators (8). It is noteworthy that since Nisar's study in 1999, significant efforts have been made to enhance immunization programmes, improving awareness and access to immunization services (2, 5, 16, 30, 31). This study, while insightful, is not without its limitations. The reliance on self-reported data may introduce bias, and the cross-sectional design limits the ability to establish causality. Furthermore, the study's geographical scope, focused on a peri-urban area of Peshawar, may not fully represent the broader national context (17, 23, 29, 32).

CONCLUSION

In conclusion, our findings underscore the critical need to continue enhancing immunization coverage to achieve herd immunity and protect children from vaccine-preventable diseases. It is imperative that public health efforts concentrate on improving communication to raise awareness about the severe morbidity and mortality associated with these diseases. Given the indispensable role of immunization in disease prevention, completing the vaccination schedule remains paramount. We advocate for further research to identify causes of high dropout rates and to elucidate factors contributing to suboptimal immunization status. Additionally, EPI field workers should be adequately trained to disseminate crucial information effectively. Every healthcare professional, whether a general practitioner or specialist, bears a collective responsibility to prevent deaths from vaccine-preventable diseases. By harnessing the full potential of immunization against traditional child-killer diseases, we can make significant strides in public health, fulfilling our obligation to protect the most vulnerable segments of our population.

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Journal of Health and Rehabilitation Research 2791-156X JHRR

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