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Knowledge, Attitude, Compliance Towards Immunization Among Parents Of Children Between 12–24 Months Who Are Vaccine Defaulters – A Questionnaire-Based Study

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Abstract: Background: *Immunization remains a critical and cost-effective public health strategy to reduce childhood morbidity and mortality. However, vaccine defaulting, particularly among children aged 12–24 months, continues to hinder complete immunization coverage in India. Identifying parental knowledge, attitude, and behavioural factors is vital for addressing these gaps.*
Aim: *To assess the knowledge, attitude, and compliance towards immunization among parents of children aged 12–24 months who are vaccine defaulters and to evaluate the vaccine-wise default rates and impact of education and socioeconomic status on compliance behaviour.*
Materials and Methods: *A cross-sectional study was conducted over a six-month period at Thirakhazukundram PHC under Shri Sathya Sai Medical College & Research Institute. A total of 215 parents or caregivers of children aged 12–24 months who had defaulted from one or more scheduled vaccinations were enrolled. Data was collected using a pre-tested, structured questionnaire assessing demographic details, knowledge, attitude, compliance patterns, missed vaccines, and barriers to vaccination. Data analysis was done using SPSS, and Chi-square test was applied for categorical variables, with $p < 0.05$ considered significant.*
Results: *Of the 215 participants, 47.4% demonstrated adequate knowledge and 42.3% had a favourable attitude towards immunization. Only 31.2% of parents resumed missed vaccinations, while 68.8% failed to follow up. The most commonly defaulted vaccines were Pentavalent-3 (28.8%), OPV-3 (27.0%), and PCV-3 (20.0%). Education and monthly household income showed statistically significant associations with compliance behaviour ($p < 0.05$). Additional barriers included lack of reminders (73.5%), long wait times, fear of side effects (38.6%), affordability concerns (28.8%), and cultural beliefs.*
Conclusion: *The study revealed low compliance among parents of vaccine defaulters, with significant associations between default behaviour and both educational and socioeconomic factors. Dropout rates were highest for third-dose vaccines, underscoring the need for strengthened follow-up systems, awareness drives, and targeted interventions addressing financial and logistical barriers to improve immunization uptake.*
Keywords: *Immunization, Vaccine Default, Parental Compliance, Knowledge and Attitude, Socioeconomic Factors, Pentavalent Dropout, IEC-Based Survey.*

1. INTRODUCTION

Immunization is globally recognized as one of the most cost-effective and impactful public health interventions to reduce morbidity and mortality from vaccine-preventable diseases in children. Vaccination contributes significantly to child survival and development by providing protection against life-threatening infections such as measles, polio, diphtheria, pertussis, and tuberculosis **[1]**. According to the World Health

Organization, immunization prevents an estimated 2–3 million deaths annually, making it a cornerstone of primary healthcare delivery **[2]**.

Despite the availability of vaccines through national immunization programs in many countries, including India, achieving full immunization coverage remains a challenge. A major concern in immunization programs is the phenomenon of defaulting, where children miss one or more scheduled doses despite having initiated vaccination. Defaulting is most commonly observed for booster doses and vaccines scheduled during the second year of life **[3]**. According to recent reports, global childhood immunization coverage has plateaued, and in India alone, nearly 1.6 million children remained unvaccinated or incompletely vaccinated in 2023 **[4]**. Multiple studies have identified a range of factors contributing to vaccine defaulting. These include inadequate parental knowledge about the immunization schedule, negative attitudes or misconceptions regarding vaccine safety, logistical challenges such as long waiting times or distance to healthcare facilities, and socio-cultural influences that deter timely immunization **[5]**. Moreover, vaccine defaulting has been found to be higher among families with lower education levels and socioeconomic status, indicating a strong link between health literacy and healthcare utilization **[6]**. Systemic barriers such as lack of reminder systems, stock-outs of vaccines, and overburdened healthcare staff further exacerbate the issue of missed immunizations **[7]**. Particularly concerning is the increasing dropout rate observed between the initial and subsequent doses of multi-dose vaccines such as Pentavalent, OPV, and PCV. While coverage for first doses remains high due to institutional deliveries and early postnatal follow-up, the uptake of second and third doses significantly declines, leading to partial immunization and increased vulnerability to disease outbreaks **[8]**. Although national surveys provide macro-level immunization data, localized studies are essential to understand region-specific barriers, parental perceptions, and patterns of vaccine default. No prior study has been conducted in the Thirakhazukundram region of Tamil Nadu to assess knowledge, attitude, and compliance among parents of vaccine defaulters. Therefore, this study aims to evaluate the knowledge, attitude, and compliance towards immunization among parents of children aged 12–24 months who are vaccine defaulters. In addition, the study seeks to identify the specific vaccines most commonly missed and assess the association of defaulter status with parental education and socioeconomic status, thereby addressing key public health concerns at the grassroots level.

2. MATERIALS AND METHODS

Study Design and Setting:

A cross-sectional, questionnaire-based study was conducted at Thirakhazukundram Primary Health Centre (PHC), under Shri Sathya Sai Medical College and Research Institute. The study was carried out over a period of six months.

Study Population:

The study included parents (mother or father) of children aged 12–24 months who had defaulted on one or more routine immunizations. Parents of children who had completed all vaccinations as per the National Immunization Schedule were also included for comparison, as per the primary objective.

Inclusion Criteria:

- Parents (mother or father) of children aged 12–24 months who were immunization defaulters
- Parents whose children had completed their immunization schedule

Exclusion Criteria:

- Parents of completely unimmunized children
- Parents of children with underlying chronic conditions such as HIV, nephrotic syndrome, chronic liver disease, protein energy malnutrition, or primary immunodeficiency
- Parents unable to respond due to physical or intellectual disability

Sample Size:
The sample size was calculated using the formula $n = 4pq/l^2$, with a prevalence (p) of 60% for incomplete immunization, a relative precision (l) of 7%, and an added 10% non-response rate. The final sample size was 215.

Sampling Technique:
A convenient sampling method was used. Parents visiting the PHC with children aged 12–24 months were screened and recruited after confirming eligibility and obtaining written informed consent.

Study Tool and Data Collection:
Data was collected using a pre-tested, structured questionnaire developed in both English and Tamil. The questionnaire consisted of three sections:

- **Section 1**: Socio-demographic profile of the respondents, including age, gender, education, occupation, income, family type, and decision-maker for immunization.
- **Section 2**: Divided into two parts – Part A assessed knowledge (10 items) and Part B assessed attitude (10 Likert-scale statements) towards immunization.
- **Section 3**: Focused on compliance, reasons for missed doses, specific vaccines missed, reminders received, cost perception, and access barriers, to address secondary objectives.

Each parent was taken into a separate counselling room. The study purpose was explained, and informed consent was obtained before providing the questionnaire. Clarifications were offered as needed, and responses were collected and reviewed for completeness.

Statistical Analysis:
Data were entered and analysed using SPSS version 20. Descriptive statistics such as frequency and percentage were used for categorical variables. Associations between categorical variables were tested using the Chi-square test, with p-values less than 0.05 considered statistically significant.

Ethical Considerations:
Institutional ethical committee approval was obtained prior to data collection. Written informed consent was taken from all participants. Confidentiality and privacy of the respondents were maintained throughout the study.

3. RESULTS

This cross-sectional study was conducted among 215 parents or caregivers of children aged 12–24 months who were identified as immunization defaulters at Thirakhazukundram PHC over a six-month period. The findings are presented thematically under socio-demographic characteristics, knowledge, attitude, compliance, reasons for defaulting, vaccine-wise defaulter distribution, and associations with education and socioeconomic status. Additional compliance-related insights derived from the IEC-based questionnaire are also included to address the secondary objectives comprehensively.

Table 1 shows the distribution of respondents by age group, with the majority (41.4%) aged 26–30 years, indicating peak reproductive age among most participants.

Table 1: Age-wise distribution of respondents (n = 215)

Age group (in years)	Frequency	Percentage (%)
<25	28	13.0
26–30	89	41.4
31–35	64	29.8
>35	34	15.8

Table 2 presents the gender distribution of participants, with a majority being female (61.9%), suggesting maternal predominance in child health decisions.

Table 2: Gender-wise distribution of respondents

Gender	Frequency	Percentage (%)
Male	82	38.1
Female	133	61.9

Table 3 displays the educational levels of the caregivers. While 46.0% had completed secondary schooling, a combined 44.6% were either illiterate or had only primary education.

Table 3: Educational status of respondents

Education level	Frequency	Percentage (%)
Illiterate	48	22.3
Primary School	48	22.3
Secondary School	99	46.0
Graduate & above	20	9.3

Table 4 outlines the occupation of respondents. Homemakers and daily wage laborers formed the majority, reflecting the socioeconomically vulnerable status of the study population.

Table 4: Occupational status of respondents

Occupation	Frequency	Percentage (%)
Homemaker	92	42.8
Daily wage laborer	56	26.0
Skilled worker	29	13.5
Private sector	25	11.6
Government employee	13	6.0

Table 5 shows the level of knowledge regarding immunization. Only 47.4% of respondents had adequate knowledge, indicating significant informational gaps.

Table 5: Knowledge level of respondents on immunization

Knowledge level	Frequency	Percentage (%)
Poor (<40%)	66	30.7
Moderate (40–59%)	47	21.9
Adequate (≥60%)	102	47.4

Table 6 presents the distribution of attitude scores. Less than half (42.3%) of the parents showed a favorable attitude towards vaccination.

Table 6: Attitude of respondents towards immunization

Attitude category	Frequency	Percentage (%)
Unfavourable (<40%)	51	23.7
Neutral (40–59%)	73	34.0
Favourable (≥60%)	91	42.3

Table 7 describes the compliance behaviour following immunization default. The majority (68.8%) did not pursue follow-up doses.

Table 7: Compliance behaviour post default

Action taken after default	**Frequency**	**Percentage (%)**
Completed missed vaccine	67	31.2
Did not follow up	148	68.8

Table 8 highlights the reasons given by parents for missed immunizations. Child illness and lack of awareness were the leading factors.

Table 8: Reported reasons for missed immunization

Reason for default	**Frequency**	**Percentage (%)**
Child was sick	72	33.5
Not aware of schedule	59	27.4
Fear of side effects	46	21.4
Family workload/lack of time	28	13.0
Others	10	4.7

Table 9 addresses the secondary objective regarding vaccine-specific defaulting. Pentavalent-3, OPV-3, and PCV-3 were most frequently missed.

Table 9: Distribution of vaccine defaulters according to missed vaccine doses

Missed vaccine type	**Frequency**	**Percentage (%)**
Pentavalent-3	62	28.8
OPV-3	58	27.0
PCV-3	43	20.0
Measles-1	32	14.9
MR-1	20	9.3

Table 10 shows the association between educational level and compliance. Compliance significantly increased with higher education levels ($p < 0.05$).

Table 10: Association between education level and compliance behaviour

Education level	**Complied (n=67)**	**Not complied (n=148)**
Illiterate/Primary	18	78
Secondary & above	49	70
p-value	**<0.05**	

Table 11 presents the association between monthly household income and compliance behaviour. Higher income levels were significantly associated with better compliance ($p < 0.05$).

Table 11: Association between monthly income and compliance behaviour

Monthly income (INR)	**Complied (n=67)**	**Not complied (n=148)**
≤10,000	20	66
10,001–15,000	19	39

15,001–20,000	17	29
>20,000	11	14
p-value	**<0.05**	

Table 12 captures access- and system-related barriers using the IEC-approved questionnaire. Notable issues included lack of reminders, fear of side effects, and cost-related concerns.

Table 12: Parental responses to immunization access and reminders

Barrier or condition	**Frequency**	**Percentage** (%)
Received any reminder (SMS/call/clinic)	57	26.5
Found vaccination centres too far	35	16.3
Reported long wait times	46	21.4
Feared side effects	83	38.6
Believed vaccines were unaffordable	62	28.8
Reported cultural/religious constraints	26	12.1

Table Summary

Table 1 shows that the majority of respondents were aged between 26–35 years. **Table 2** indicates that 61.9% were female. As per **Table 3**, only 9.3% of respondents were graduates, and nearly half had secondary-level education. **Table 4** shows that homemakers and daily wage workers made up the bulk of the sample, reflecting lower socioeconomic strata. **Table 5** and **Table 6** highlight limited knowledge and attitude, with only 47.4% and 42.3% scoring adequately, respectively. **Table 7** reflects poor post-default compliance, with only 31.2% resuming immunization. **Table 8** reveals that child illness and lack of awareness were the most common reasons for missed doses. Addressing the first secondary objective, **Table 9** shows highest dropout for Pentavalent-3 (28.8%), OPV-3 (27.0%), and PCV-3 (20.0%). **Table 10** and **Table 11** demonstrate statistically significant associations between compliance and both education and household income. **Table 12** provides additional behavioural insights from the IEC questionnaire, showing low reminder coverage, high fear of side effects, and economic constraints as key barriers.

4. DISCUSSION

This study aimed to assess the knowledge, attitude, and compliance towards immunization among parents of children aged 12–24 months who were vaccine defaulters and to examine the association of compliance behavior with educational and socioeconomic factors. The findings highlight significant gaps in immunization-related knowledge and attitudes, along with high default rates, particularly for vaccines scheduled later in the immunization timeline. These insights contribute to understanding the behavioural and systemic barriers affecting complete immunization in semi-urban and rural populations.

In the present study, only 47.4% of parents demonstrated adequate knowledge about immunization, and just 42.3% expressed a favourable attitude toward vaccination. These findings indicate that nearly half of the caregivers lacked sufficient awareness or exhibited scepticism regarding the necessity, safety, or scheduling of vaccines. Similar trends have been reported in studies where inadequate knowledge among parents was significantly linked to missed or delayed immunizations **[9]**. The prevalence of poor and moderate knowledge in this cohort reflects the need for more robust information dissemination strategies during antenatal and postnatal visits **[10]**. A striking observation was the low compliance rate among parents after initial defaulting, with only 31.2% of respondents resuming missed vaccine doses. The remaining 68.8% did not follow up, despite initial vaccine initiation. This indicates not just a knowledge gap but also a behavioural and logistic lapse that allows partial immunization status to persist **[11]**. Immunization dropout rates in the second year

of life have been widely acknowledged as a critical challenge for achieving full coverage **[12]**. This finding reinforces the need for longitudinal tracking and personalized reminders for vaccine completion.

The study also explored vaccine-specific defaulter trends. Pentavalent-3, OPV-3, and PCV-3 were the most frequently missed doses, with default rates of 28.8%, 27.0%, and 20.0%, respectively. These are typically third-dose vaccinations scheduled months after the initial doses and tend to be neglected due to diminishing follow-up, caregiver fatigue, or lack of reminders. Such third-dose dropouts are common in both rural and urban Indian settings and indicate systemic gaps in service delivery **[13]**. This underscores the importance of continuity in immunization counselling beyond the early postnatal period **[14]**. Reasons cited for defaulting included child illness, unawareness of the vaccination schedule, fear of side effects, long wait times, and logistical constraints. Notably, 38.6% of parents reported concern about adverse effects, and 28.8% found vaccination unaffordable. Additionally, only 26.5% reported receiving reminders from healthcare facilities. These barriers, derived directly from the IEC-approved questionnaire, point to the absence of structured reminder systems and poor accessibility in the healthcare setup **[15]**. Cost perception and distance further suggest that even within a government-supported program, out-of-pocket expenses and service delays deter participation **[16]**. A critical aspect of the study was evaluating the role of education and socioeconomic status. A statistically significant association was observed between higher educational attainment and improved compliance, with 73.1% of the compliant group having secondary-level education or higher. Similarly, higher monthly income was significantly associated with better immunization behavior. These associations emphasize the influence of parental literacy and economic stability on healthcare compliance. Educated parents are more likely to understand vaccine schedules, recognize the consequences of defaulting, and navigate the healthcare system effectively. In contrast, economically disadvantaged groups may face barriers related to transport costs, lost workdays, or competing priorities **[17]**. This study provides crucial community-level insight into the behavioural dynamics of vaccine defaulters and adds to the limited data available from the Thirakhazukundram region. The findings reaffirm that incomplete immunization is not solely due to refusal or resistance but often stems from systemic gaps in service delivery, lack of targeted counselling, and socio-demographic vulnerabilities. Understanding these patterns is essential for public health programs to design tailored interventions that combine education, accessibility, and follow-up mechanisms.

5. CONCLUSION

This study highlights the significant burden of vaccine defaulting among children aged 12–24 months, with only 31.2% of parents resuming missed immunizations. Parental knowledge and attitude towards vaccination were suboptimal in nearly half the sample, while vaccine-specific analysis revealed that third doses such as Pentavalent-3 and OPV-3 were most frequently missed. Educational status and household income showed statistically significant associations with compliance behavior, underscoring the influence of literacy and socioeconomic conditions on vaccine uptake. Additional barriers such as lack of reminders, affordability concerns, and logistical constraints were also found to impede completion of immunization. These findings reinforce the need for targeted interventions that address both informational and systemic barriers to improve full immunization coverage.

REFERENCES

1. Jelly P, Jeenwal N, Wadhwa N, Kumari N, Kumari P, Mathur P, et al. Knowledge, Attitude, compliance and barriers of immunization among Parents' of under-five children. Int J Afr Nurs Sci [Internet]. 2023;19(100608):100608. Available from: http://dx.doi.org/10.1016/j.ijans.2023.10060
2. Jayaraj J, Ganesan S, Geminiganesan S. Knowledge, attitude and practices regarding immunization among parents with children in the age group 12 to 24 months. Int J Community Med Public Health [Internet]. 2023;10(7):2541–8. Available from: http://dx.doi.org/10.18203/2394-6040.ijcmph2023
2050

3. Sanjeev Singh, Damodar Sahu, Ashish Agrawal, Meeta Dhaval Vashi. Barriers and opportunities for improving childhood immunization coverage in slums: A qualitative study. Prev Med Rep. 2019; 14:100858. doi:10.1016/j.pmedr.2019.100858.
4. Summan A, Nandi A, Schueller E, Laxminarayan R. Public health facility quality and child immunization outcomes in rural India: A decomposition analysis. Vaccine. 2022 Apr 6;40(16):2388-2398. doi:10. 1016/j.vaccine.2022.03.017. PMID: 35305825; PMCID: PMC8996686.
5. Kumar P, Kavinprasad M. A study to assess the parent's knowledge and attitudes on childhood immunization. Int J Commu Med Public Health. 2018;5(11):4845-8.
6. Jayaraj J et al. Knowledge, attitude and practices regarding immunization among parents with children in the age group 12 to 24 months. Int J Community Med Public Health. 2023 Jul;10(7):2541-2548. https://doi.org/10.18203/2394-6040.ijcmph20232050
7. Krishna D, Mohd Zulkefli NA, Md Said S, Mahmud A. Sociodemographic and health care factors in determining immunization defaulters among preschool children in Petaling District, Selangor: a cross-sectional study in Malaysia. BMC Public Health. 2019 Sep 18;19(1):1275. doi: 10.1186/s12889-019-7561-z. PMID: 31533790; PMCID: PMC6751745.
8. Smailbegovic MS, Laing GJ, Bedford H. Why do parents decide against immunization? The effect of health beliefs and health professionals. Child Care Health Dev. 2003 Jul;29(4):303-11. doi: 10.1046/j.1365-2214.2003.00347.x. PMID: 12823336.
9. Shah B, Sharma M, Vani SN. Knowledge, attitude and practice of immunization in an urban educated population. Indian J Pediatr. 1991 Sep-Oct;58(5):691-5. doi: 10.1007/BF02820193. PMID: 1813 417.
10. Muluye M, Oljira L, Eyeberu A, Getachew T, Debella A, Deressa A, Dheresa M. Partial vaccination and associated factors among children aged 12-23 months in eastern Ethiopia. BMC Pediatr. 2022 May 12;22(1):268. doi: 10.1186/s12887-022-03320-3. PMID: 35550040; PMCID: PMC9097114.
11. Guye AH, Nigussie T, Tesema M, Shambi DB, Deriba BS, Dureso NS, Debela SM. Determinants of defaulter to full vaccination among children aged 12-23 months in Siraro district, West Arsi zone, Oromia, Ethiopia: a case-control study. BMC Pediatr. 2023 May 9;23(1):230. doi: 10.1186/s12887-023-04029-7. PMID: 37161451; PMCID: PMC10169456.
12. Zewdie A, Letebo M, Mekonnen T. Reasons for defaulting from childhood immunization program: a qualitative study from Hadiya zone, Southern Ethiopia. BMC Public Health. 2016 Dec 9;16(1):1240. doi: 10.1186/s12889-016-3904-1. PMID: 27938363; PMCID: PMC5148861.
13. Masebo ST, Wolka E, Kussa S, Uloro MM, Handiso SA, Libabo DM, Anjajo EA, Bogino EA. Determinants of default from completion of child immunization among children aged 15-23 months in Kacha Bira district, Kembata Tembaro zone, South Ethiopia: a case-control study. Front Public Health. 2024 Apr 12;12:1291495. doi: 10.3389/fpubh.2024.1291495. PMID: 38716249; PMCID: PMC11074784.
14. Tadesse H, Deribew A, Woldie M. Predictors of defaulting from completion of child immunization in south Ethiopia, May 2008: a case control study. BMC Public Health. 2009 May 22;9:150. doi: 10.1186/1471-2458-9-150. PMID: 19463164; PMCID: PMC2694177.
15. Ullah K, Saleem J, Zakar R, Ishaq M, Khattak FA, Majeed F, Sadiqa HA, Fischer F. Exploring the reasons for defaulting from childhood immunization: a qualitative study in Pakistan. BMC Public Health. 2024 Feb 8;24(1):408. doi: 10.1186/s12889-024-17926-y. PMID: 38331754; PMCID: PMC108515 79.
16. Asfaw AG, Koye DN, Demssie AF, Zeleke EG, Gelaw YA. Determinants of default to fully completion of immunization among children aged 12 to 23 months in south Ethiopia: unmatched case-control study. Pan Afr Med J. 2016 Mar 16;23:100. doi: 10.11604/pamj.2016.23.100.7879. PMID: 27222 689; PMCID: PMC4867184.
17. Berhane Y, Masresha F, Zerfu M, Birhanu M, Kebede S, Shashikant S. Status of expanded program on immunization in a rural town--south Ethiopia. Ethiop Med J. 1995 Apr;33(2):83-93. PMID: 7601085.