

A Crosssectional Study on Perceptions of Vaccine Safety, Awareness and Adherence to National Immunization Schedule Among Urban Population

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ABSTRACT

Immunization is critical for promoting public health, but there are still communities that are unaware of how vaccinations work and do not properly follow their government's immunization schedule, and have concerns about their safety. This study's purpose was to assess people's knowledge, attitudes, and practices regarding the safety of vaccines; evaluate their level of adherence to the National Immunization Schedule (NIS); and determine their awareness of how to report an Adverse Drug Reaction (ADR) through a Community-Based Cross-Sectional Study of 150 adults residing in Kerala using a structured validated questionnaire. Of participants, 82.0% believed that vaccines were safe; 84.7% believed that vaccines were also safe for children; and 86.0% had knowledge about mild side effects of vaccines. Overall attitudes toward vaccination were positive in that most respondents (89.3%) considered vaccination necessary for their family protection and (81.3%) trusted that vaccines from government programs were safe. However, many of the respondents expressed concerns regarding adverse effects from vaccines, and there was a lot of confusion regarding potential interactions between vaccines and other drugs. While respondents generally had positive vaccination practices, there were still gaps in receiving consultation from physicians (32.7%) as well as receiving proper vaccination information from health workers. The most common reason cited by respondents who missed doses of vaccines was lack of knowledge (61.2%) regarding the immunization schedule. The number of individuals who were aware of how to report ADRs was small (17.3%) compared to the number of individuals who had experienced an ADR. Overall, although vaccination acceptance and practices were good among respondents, gaps exist in the understanding of and communications regarding reporting of ADRs, and emphasized the need for improved education, counselling, and reminder systems for all health professionals involved in

providing vaccines to increase patient compliance with immunization schedules and to promote safe vaccination practices.

KEY WORDS: Vaccination; Vaccine safety; Knowledge, Attitude and Practice; Immunization; National Immunization Schedule; Vaccine hesitancy; Adverse drug reaction; ADR reporting; Public health; Kerala

I. INTRODUCTION

Vaccination is widely recognized as one of the most cost-effective and impactful public health interventions, preventing an estimated 3.5–5 million deaths annually worldwide [1]. Globally, immunization programs have contributed to a significant decline in vaccine-preventable diseases, yet challenges such as incomplete adherence to immunization schedules and rising vaccine hesitancy continue to threaten these gains. The World Health Organization has identified vaccine hesitancy as one of the ten major threats to global health, emphasizing the urgent need to address both compliance and public perceptions of vaccine safety [2].

In India, despite progress in child health indicators, gaps in immunization coverage remain. Studies have shown that parental knowledge, attitudes, and compliance with vaccination schedules are critical determinants of child health outcomes. For instance, Jelly et al. (2023) reported that while most parents of under-five children had average to good knowledge and positive attitudes toward immunization, nearly one-fifth of children were not vaccinated as per schedule, with barriers including lack of awareness of subsequent doses, illness in the family, and vaccine unavailability [3]. Similarly, community-based studies in Kerala have highlighted knowledge gaps, misconceptions, and the influence of anti-vaccination campaigns, underscoring the need for continuous health education and awareness initiatives [4,5].

Parallel to these findings, vaccine hesitancy has emerged as a growing concern in many countries,

including Turkey. Yorulmaz Demir (2025) found that only 45.6% of adults perceived all vaccines as necessary and beneficial, while incomplete childhood vaccination was reported in 16.3% of cases. Factors such as reliance on social media for vaccine information, fear of side effects, and limited exposure to vaccine-preventable diseases contributed to hesitancy, whereas personal uptake of vaccines such as influenza and COVID-19 acted as protective factors [1]. These findings highlight the paradox of vaccines becoming “victims of their own success,” as declining disease prevalence has led some communities to question the necessity of vaccination.

Against this backdrop, the present study was conducted among the urban population of Trivandrum, Kerala, to assess perceptions of vaccine safety, awareness, and adherence to the National Immunization Schedule (NIS). By evaluating knowledge, attitudes, and practices related to vaccination, as well as identifying barriers to adherence and awareness of adverse drug reaction (ADR) reporting, this study aims to generate evidence that can inform targeted educational interventions and strengthen public confidence in vaccines. Addressing these issues is essential for improving adherence to the NIS, reducing missed or delayed vaccinations, and sustaining community immunity against vaccine-preventable diseases.

II. METHODS

Purpose and Study Design

This research was designed as a descriptive cross-sectional study to assess the knowledge, attitude, and practices regarding vaccine safety, evaluate adherence to the National Immunization Schedule and Determine the level of awareness about vaccination among the community.

Study Setting and Participants

A community based cross-sectional study was done at the urban community. The population of the study consist of individuals aged 18 and above residing at the selected community in Trivandrum municipal corporation, Kerala, India. The research was conducted in an urban community residing at the ward of Alathara, the reason for conducting the study in this ward was the absence of prior research on vaccine hesitancy in this region, highlighting a gap in the existing literature. The minimum sample size required for the study was calculated as 150 using the formula

$$n = \frac{Z_{1-\alpha/2}^2 P(1-P)}{(d)^2}$$

P= anticipated population proportion

d= absolute precision

$Z_{1-\alpha/2}^2$ = desired confidence interval

	Good knowledge	Compliance to vaccination	Vaccines as per schedule to be given
Expected Proportion	0.85	0.62	0.57
Precision (%)	8	8	8
Desired confidence level (1- alpha) %	95	95	95
Required sample size	77	141	147

Sample size is 147 rounded to 150.

Data Collection Tools

The research data were collected using the Descriptive Characteristics Questionnaire the questionnaire was designed to capture knowledge, attitudes, and practices (KAP) comprehensively, while also identifying barriers to adherence and gaps in awareness. Responses were structured using yes/no/not sure options and multiple-choice formats to ensure clarity and ease of analysis. The tool was validated by subject experts and accompanied by educational leaflets in English and Malayalam to enhance participant understanding.

This questionnaire consists of four sections: a) Sociodemographic Information Section, b) Knowledge Attitude and practice towards the safety

of vaccines, b) Adherence to national immunization schedule and awareness towards vaccination among the community. The Sociodemographic Information Section includes 8 questions on some characteristics of the participants such as Name, age, gender, educational level, and employment status. Included questions on prior vaccination history to contextualize responses.

The questionnaire on perceptions of vaccine safety includes 15 questions and was divided into three domains. The knowledge domain assessed general beliefs about vaccine safety, safety for children, awareness of common side effects, and recognition of mild post-vaccination reactions. The attitude domain explored trust in government-

provided vaccines, fear of side effects, perceived necessity of vaccination for family protection, safety during pregnancy, and concerns about drug-vaccine interactions. The practice domain focused on behaviours such as checking vaccine information, consulting doctors, experiences with side effects, instructions received from health workers, and waiting at health centres after vaccination. Together, these domains provided a comprehensive overview of participants' perceptions and practices related to vaccination

The adherence section of the questionnaire includes 7 questions and focused on participants' awareness of the National Immunization Schedule (NIS) and whether children had received vaccines according to it. It also explored reasons for missed or delayed doses, such as fear of side effects, illness of the child, poor accessibility, or vaccine unavailability, while including questions on adult vaccination practices and maternal vaccination during pregnancy.

The awareness section also includes 7 questions of the questionnaire examined participants' knowledge of vaccine safety and adverse drug reactions (ADRs), including whether they knew about reporting mechanisms and the importance of ADR reporting. It also assessed awareness of drug-vaccine interactions, newly introduced vaccines such as COVID-19, HPV, and pneumococcal, and identified the main sources of vaccine information, such as health workers, hospitals, media, social media, and family or friends.

Data Collection Procedure and Inclusion Criteria

The data were collected by the researchers between November 1, 2023, and January 31, 2026. Adults aged 18 (able to give informed consent) and Residents of the selected community who live there for ≥ 6 months, Parents or primary caregivers of children in the age-range covered by the NIS (to

assess adherence), Able to understand the language used for the questionnaire And Present at home or reachable during data-collection period and willing to participate. Those adults who willingly volunteered to participate were provided with the data collection instruments and subsequently incorporated into the research. The response time for completing the data collection tools was 4-5 minutes, and the research data were collected after obtaining ethical committee and institutional approval.

Data collection was done by contacting mothers through house-to-house visit. Initially a detailed information regarding the objectives, procedures, confidentiality, benefits and risks regarding the study was explained to the participant and informed consent was taken. The data collected was entered in Microsoft Excel, compiled and analysed. Knowledge score was calculated by assigning For Yes/No/Not sure items: 1=Yes, 0=No, 9=Not sure. For Yes/No items: 1=Yes, 0=No. For checkbox 'reasons missed vaccination': each reason is a separate variable coded 1=Selected, 0=Not selected. Recommended missing code: 99 (Missing/Not stated) for coded variables.

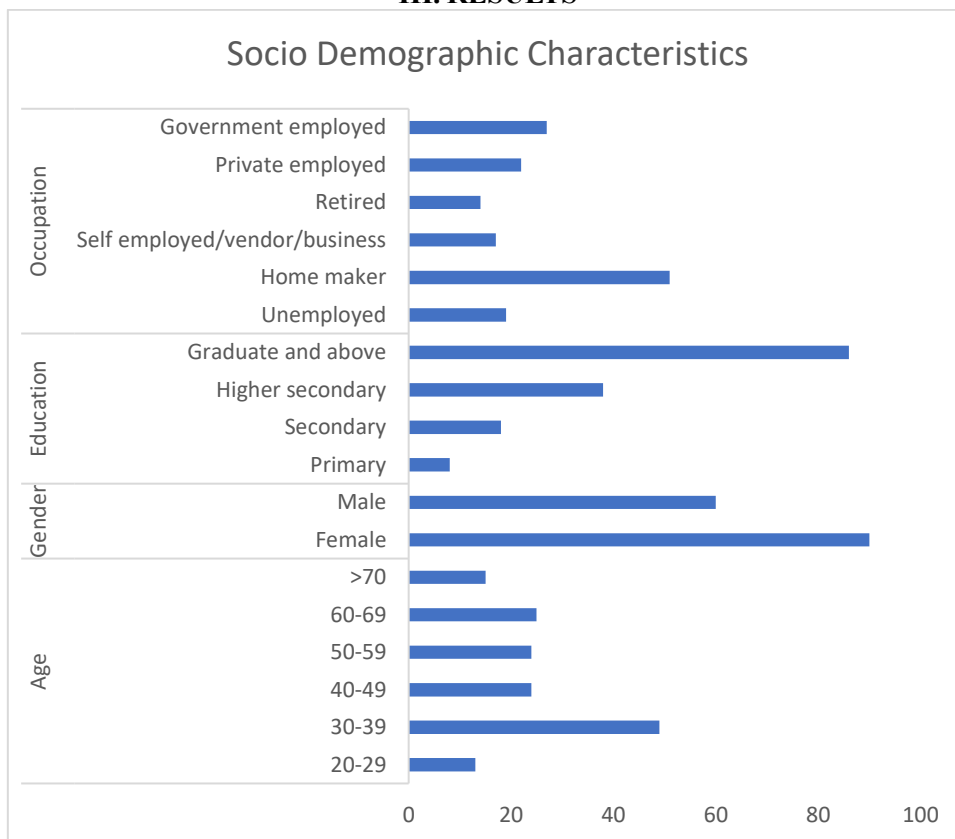
Data Analysis

Data Analysis The research data were analysed using the Statistical Package for Social Sciences (SPSS) 25.0 software. Descriptive statistics, including number and percentages, were utilized for the evaluation of descriptive data.

Ethical Considerations

Prior to the research, ethical committee approval and institutional approval were obtained Before initiating the study, participants were informed about the research and its content, and their consent was obtained. This research was conducted in accordance with the principles of the Helsinki Declaration.

III. RESULTS



The study included 150 participants, which matches the planned and rounded sample size for this cross-sectional urban population study.

Age distribution indicates a predominantly middle-adult sample. The largest share belonged to the 30–39 years group (49 participants; 32.7%), followed by fairly similar proportions in the 40–49 (24; 16.0%) and 50–59 (24; 16.0%) groups. Older adults also formed a substantial segment: 60–69 years accounted for 25 (16.7%), and those >70 years were 15 (10.0%). The youngest category 20–29 years was the smallest, with 13 (8.7%) participants. Overall, this suggests the sample is weighted toward adults in their 30s to 60s rather than young adults.

Gender composition shows a higher representation of women: 90 females (60.0%) compared with 60 males (40.0%), indicating that women constituted the majority of respondents.

Educational status reflects a largely educated sample. More than half of the participants Knowledge

were graduates or above (86; 57.3%), while higher secondary education contributed 38 (25.3%). Smaller proportions reported secondary (18; 12.0%) and primary education (8; 5.3%). This overall pattern indicates that the surveyed urban population had relatively high educational attainment.

Occupation profile suggests a mix of household and employed participants. The most common occupational category was home makers (51; 34.0%). Formal employment together formed a sizable proportion, with government employed (27; 18.0%) and private employed (22; 14.7%). Unemployed participants were 19 (12.0%), while self-employed/vendor/business accounted for 17 (11.3%) and retired participants were 14 (9.3%). Taken together, the sample includes a strong representation of homemakers and working adults, with smaller contributions from self-employed and retired groups.

		Yes	No	Not sure
Do you think vaccines are generally safe?	No	123	12	15
	%	82.0	8.0	10.0
Do you think vaccines are safe for children?	No	127	11	12
	%	84.7	7.3	8.0
Do vaccines cause side effects in most people?	No	51	40	59
	%	34.0	26.7	39.3
Do you think mild side effects (fever/pain at injection site) are normal after vaccination?	No	129	11	10
	%	86.0	7.3	6.7
Do you know about the side effects?	No	62	35	53
	%	41.3	23.3	35.3

Table 1 reflects participants' knowledge and perceptions about vaccine safety and side effects using three response options (Yes/No/Not sure). Overall, confidence in vaccine safety is high, especially for children. A large majority believed that vaccines are generally safe (123; 82.0% answered "Yes"), while 12 (8.0%) disagreed and 15 (10.0%) were unsure. Similarly, an even higher proportion felt that vaccines are safe for children (127; 84.7%), with only 11 (7.3%) responding "No" and 12 (8.0%) remaining uncertain.

However, when the questions moved from "safety" to "side effects," the pattern became more mixed—showing uncertainty and incomplete knowledge about adverse effects. For the item "Do vaccines cause side effects in most people?", only 51 (34.0%) said "Yes," while 40 (26.7%) said "No," and the largest group 59 (39.3%) selected "Not sure." This suggests many participants were unclear about how common side effects actually are.

In contrast, understanding of *expected mild reactions* was strong: most participants recognized that mild side effects such as fever or pain at the injection site are normal after vaccination, with 129 (86.0%) answering "Yes," and only 11 (7.3%) saying "No" and 10 (6.7%) unsure. This indicates good awareness that minor symptoms can be part of the normal immune response.

Finally, when asked more directly "Do you know about the side effects?", responses again showed a knowledge gap: 62 (41.3%) reported that they knew about side effects, but 35 (23.3%) said they did not, and 53 (35.3%) were unsure. Taken together, the findings suggest that while participants largely trust vaccines and accept mild post-vaccination symptoms as normal, many lack clarity about the broader range and frequency of side effects, with a substantial proportion expressing uncertainty

Attitude

		Yes	No	Not sure
Do you trust the safety of vaccine provided by Government?	No	122	14	14
	%	81.3	9.3	9.3
Are you afraid of the side effects of vaccines?	No	75	62	13
	%	50.0	41.3	8.7
Do you think vaccination is necessary to protect your family?	No	134	6	10
	%	89.3	4.0	6.7
Do you think vaccines recommended during pregnancy are safe when advised by doctors?	No	118	18	14
	%	78.7	12.0	9.3
Do you think vaccines cause any interaction with other medications?	No	48	42	60
	%	32.0	28.0	40.0

Table 2 describes participants' attitudes toward vaccination, covering trust in government-provided vaccines, fear of side effects, perceived necessity of vaccination, confidence in doctor-advised pregnancy vaccines, and beliefs about drug interactions. Overall, the findings show a strongly favourable attitude toward vaccination, with some persistent concerns and uncertainty, especially around side effects and interactions with medicines. A high proportion of participants reported trust in the safety of vaccines provided by the Government. Most respondents answered "Yes" (122; 81.3%), while 14 (9.3%) did not trust them and 14 (9.3%) were unsure. This indicates that public-sector vaccine delivery is largely viewed as reliable by the majority. Fear of adverse effects, however, was more divided. Exactly 75 participants (50.0%) said they were afraid of vaccine side effects, whereas 62 (41.3%) were not afraid, and 13 (8.7%) were unsure. This suggests that although trust in vaccines is generally high, emotional concern about side effects remains common, affecting about half of the sample. Attitudes were most positive regarding the *importance of vaccination*: an overwhelming majority agreed that vaccination is necessary to protect their family (134; 89.3%). Only 6 (4.0%) disagreed and 10 (6.7%) were uncertain. This reflects

a strong belief that vaccination has protective value at the household level.

With respect to maternal vaccination, attitudes again leaned positive. Most participants believed that vaccines recommended during pregnancy are safe when advised by doctors (118; 78.7%). Nevertheless, 18 (12.0%) disagreed and 14 (9.3%) were not sure—showing that while doctor recommendation builds confidence, a meaningful minority still holds doubts. The greatest uncertainty was observed for beliefs about interaction with other medications. Only 48 (32.0%) thought vaccines could interact with medicines, 42 (28.0%) believed they do not, and the largest segment 60 (40.0%) selected "Not sure." This indicates that knowledge and certainty about vaccine–drug interactions is limited, with many respondents unsure how vaccination fits with other ongoing treatments.

In summary, participants displayed high trust and strong perceived necessity of vaccination, including substantial confidence in government and doctor-advised vaccines. At the same time, fear of side effects is common, and there is considerable uncertainty about interactions with other medications, suggesting areas where focused health education and counselling could further strengthen vaccine confidence.

Practice

		Yes	No	Not sure
Do you check vaccine information before taking it?	No	114	21	15
	%	76.0	14.0	10.0
Do you consult doctor before vaccination?	No	97	49	4
	%	64.7	32.7	2.6
Have you/your child ever experienced any side effects after vaccination?	No	37	91	22
	%	24.7	60.7	14.6
Did the health worker explain what to do in case of side effects?	No	101	47	2
	%	67.3	31.3	1.4
Have you waited at the health centre after vaccination?	No	115	33	2
	%	76.7	22.0	1.3

Table 3 presents key self-reported practices related to vaccination, including information-seeking behaviour, consultation with a doctor, experience of side effects, counselling by health workers, and post-vaccination waiting at the health facility. Overall, the table suggests generally good preventive practices, with some gaps in consultation and counselling, and a relatively low reported history of side effects. A large majority reported that they check vaccine information before taking it (114; 76.0%), indicating

an encouraging level of information-seeking behaviour. However, 21 (14.0%) did not check information and 15 (10.0%) were unsure, implying that around one-quarter of participants may not consistently seek or verify information prior to vaccination.

Regarding clinical guidance, nearly two-thirds stated that they consult a doctor before vaccination (97; 64.7%). At the same time, a sizable proportion 49 (32.7%) reported not consulting a doctor, suggesting

that for many individuals' vaccination decisions may be made without direct physician input—possibly due to reliance on routine immunization services or prior familiarity.

When asked about actual experience of adverse events, only 37 participants (24.7%) reported that they or their child had ever experienced side effects after vaccination, while the majority 91 (60.7%) reported no side effects, and 22 (14.6%) were unsure. This pattern suggests that most respondents did not recall notable adverse effects, though the “not sure” group also indicates that some may not clearly recognize or remember mild reactions as “side effects.”

Communication from the health system appeared moderate to good. About 101 (67.3%) reported that a health worker explained what to do in case of side effects, which is a positive practice supporting safe vaccination. However, nearly one-third (47; 31.3%) said this explanation was not provided, highlighting

a counselling gap that could affect confidence and response to minor adverse events.

Finally, adherence to recommended observation after vaccination was relatively strong. Most participants said they waited at the health centre after vaccination (115; 76.7%), while 33 (22.0%) did not and 2 (1.3%) were unsure. This indicates good compliance with post-vaccination monitoring advice in most cases, but also shows that about one in five may leave immediately—potentially missing early observation for immediate reactions.

In summary, participants demonstrated good vaccination practices, particularly in checking information and waiting after vaccination. Yet, the findings also reveal areas for improvement—especially ensuring that more people consult appropriately when needed and that health worker counselling about side-effect management is consistently provided

Awareness on National Immunization Schedule

		Yes	No	Not sure
Do you have any idea of National Immunization Schedule (NIS)?	No	95	31	24
	%	63.3	20.7	16.0
Have your child received immunization according to NIS?	No	112	10	28
	%	74.7	6.7	18.7
If you missed any dose, did you complete it later?	No	85	2	27
	%	56.7	1.3	18.0
Have adults in household received vaccines appropriate for age (e.g., TT, COVID-19)?	No	141	7	2
	%	94.0	4.7	1.3
Have you/your wife received TT/Td vaccine during pregnancy?	No	113	13	24
	%	75.3	8.7	16.0
Did you get the vaccine at the recommended time?	No	141	2	7
	%	94.0	1.3	4.7

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Reasons for missing dose

	No	%
Fear of side effects	8	9.4
Illness of child	13	15.3
Lack of knowledge	2	2.4
Poor accessibility	3	3.5
Vaccine unavailable	7	8.2
No information	52	61.2
	85	100.0

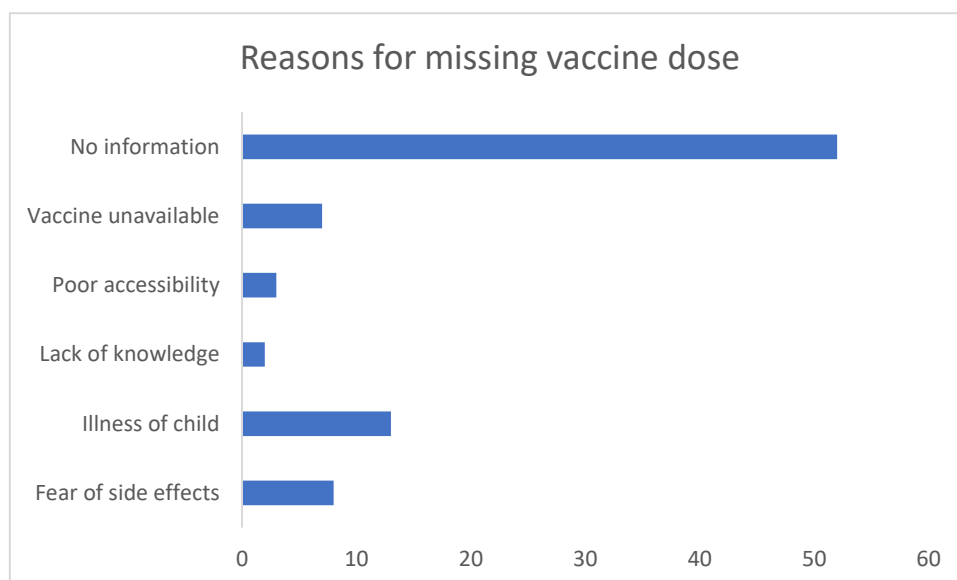


Table 5 summarizes the reasons reported for missing a vaccine dose among 85 participants (or 85 instances

of missed doses), presented as frequencies and percentages. The pattern clearly shows that the

dominant reason was information-related, rather than access or fear alone.

The most frequently cited reason was “No information”, reported by 52 respondents (61.2%). This means that nearly two-thirds of those who missed a dose did so primarily because they did not receive adequate information—such as not knowing the due date, schedule, place/time, or reminder details. This highlights a major gap in communication and follow-up systems.

The second most common reason was illness of the child, reported by 13 (15.3%). This suggests that practical health-related circumstances—where vaccination may have been postponed due to the child being unwell—contributed to missed doses in a meaningful minority.

Fear of side effects was reported by 8 (9.4%), indicating that concerns about adverse reactions were present but not the leading barrier compared with information gaps.

Issues related to vaccine service delivery and access were reported less often. Vaccine unavailability accounted for 7 (8.2%), suggesting that stock-outs or supply issues contributed to missed doses for some. Poor accessibility was reported by 3 (3.5%), showing that distance, transport, or facility access barriers were relatively uncommon in this group.

Finally, lack of knowledge was reported by 2 (2.4%), which is distinct from “no information” and may reflect limited awareness about the importance of vaccination or the schedule itself, rather than simply not receiving reminders.

In summary, the table indicates that the primary driver of missed doses was the absence of timely information (61.2%), followed by temporary child illness (15.3%), while fear of side effects and system/access barriers played smaller roles. This suggests that strengthening communication, reminders, and counselling could substantially reduce missed doses in this population.

Knowledge on ADR

		Yes	No	Not sure
Knowledge that vaccines may also have potential for ADR?	No	54	23	73
	%	36.0	15.3	48.7
Aware you could report vaccine ADR to health authorities?	No	49	32	69
	%	32.7	21.3	46.0
Do you know how to report ADR?	No	26	54	70
	%	17.3	36.0	46.7
Believe reporting ADR helps improve overall vaccine safety?	No	99	13	38
	%	66.0	8.7	25.3
Aware some medicines can interact/contraindicate vaccines?	No	66	75	9
	%	44.0	50.0	6.0

Table 6 assesses participants’ knowledge and awareness about vaccine-related adverse drug reactions (ADR) and the process and value of ADR reporting, along with perceptions about medicine–vaccine interactions/contraindications. Overall, the table shows a clear pattern: participants strongly believe ADR reporting is useful, but awareness and practical knowledge about ADR and reporting mechanisms are limited, with a large proportion answering “Not sure” to several items.

Awareness that vaccines can cause ADR

Only 54 (36.0%) responded “Yes” to the statement that vaccines may have the potential for ADR, while 23 (15.3%) said “No” and nearly half, 73 (48.7%), were not sure. This indicates that uncertainty dominates regarding the basic concept

that vaccines—like any medicine—can rarely lead to adverse reactions.

Awareness that ADR can be reported to authorities

Similarly, awareness that vaccine ADR can be reported to health authorities was low. Only 49 (32.7%) were aware of this, whereas 32 (21.3%) were not aware and 69 (46.0%) were unsure. This suggests that formal reporting systems are not well-known among many respondents.

Knowledge of *how* to report ADR (practical knowledge)

Practical knowledge was the weakest area. Only 26 (17.3%) said they know how to report ADR, while 54 (36.0%) said “No” and 70 (46.7%) were unsure. This means that even among those who might

conceptually support reporting, most do not know the steps or channels to actually report an event.

Belief that ADR reporting improves vaccine safety

In contrast to the above gaps, the attitude-related knowledge about the benefit of ADR reporting was strong. A large majority (99; 66.0%) believed that reporting ADR helps improve overall vaccine safety. Only 13 (8.7%) disagreed and 38 (25.3%) were unsure. This indicates that people are receptive to the idea of reporting and see it as meaningful, even if they lack awareness of systems and procedures.

Knowledge about interactions/contraindications with medicines

Responses to whether some medicines can interact with or contraindicate vaccines were mixed and somewhat conflicting: 66 (44.0%) answered “Yes,” 75 (50.0%) answered “No,” and 9 (6.0%) were unsure. The relatively low “Not sure” here suggests participants had stronger opinions, but the split between “Yes” and “No” indicates inconsistent or incorrect understanding, and likely reflects confusion about what “interaction/contraindication” actually means in the context of vaccination.

Taken together, Table 7 suggests that while participants generally recognize the importance of ADR reporting (two-thirds believe it improves safety), their knowledge about vaccine ADR as a concept, awareness that ADR can be reported, and especially knowledge of how to report are relatively poor, with “Not sure” responses close to or above 45% in several items. This points to a strong need for public education and counselling at vaccination sites—not just about expected side effects, but also about when to report, where to report, and how reporting contributes to safer immunization programs.

Across the study population, the overall picture shows high confidence in vaccination, generally supportive attitudes, and largely appropriate vaccination-related practices, but with clear gaps in knowledge about adverse drug reactions (ADR) and reporting, and a major communication gap contributing to missed doses.

Knowledge (general vaccine safety and side effects): Most participants perceived vaccines as generally safe and safe for children, and a large majority correctly recognized that mild side effects (fever/pain at injection site) are normal after vaccination. However, understanding about how common side effects are and broader awareness of side effects was inconsistent, with a substantial

proportion selecting “Not sure”—indicating uncertainty rather than firm misconceptions.

Attitude (trust and perceived need): Attitudes were strongly favourable overall. Most respondents trusted government-provided vaccines and overwhelmingly agreed that vaccination is necessary to protect the family. At the same time, fear of side effects remained notable (about half reported fear), and there was marked uncertainty regarding vaccine interaction with other medications, suggesting the need for clearer counselling for people on treatment for chronic conditions.

Practice (behaviours related to vaccination): Practices were mostly positive. Many reported checking vaccine information, consulting doctors, and waiting at the health centre after vaccination, and most stated that a health worker explained what to do in case of side effects. Still, a sizeable minority did not consult a doctor and reported not receiving guidance on managing side effects—suggesting variability in service delivery and counselling.

Missed doses (N = 85): The most prominent reason for missing a dose was “no information” (around three-fifths), far exceeding barriers such as accessibility, vaccine unavailability, or fear. This indicates that missed doses were driven primarily by communication/reminder failures, not by strong refusal or hard access constraints.

ADR knowledge and reporting: This was the weakest domain. Many participants were uncertain whether vaccines can cause ADR, were not aware that ADR can be reported to health authorities, and very few knew how to report ADR. Importantly, most participants believed that ADR reporting improves vaccine safety, suggesting that people are *receptive* to reporting—but lack awareness and practical know-how.

IV. LIMITATIONS

This study has several limitations. First, being a cross-sectional design, it captures information at a single point in time and does not allow for causal inferences between knowledge, attitude, and practices. Second, the findings are based on self-reported data, which may be subject to recall bias and social desirability bias, potentially leading to overestimation of positive practices and attitudes.

The study was conducted in an urban population, which may limit the generalizability of the findings to rural or underserved settings where access and awareness may differ. Additionally, the sample showed a higher proportion of educated participants, which could influence the overall high level of vaccine acceptance and may not reflect populations with lower literacy levels.

Some responses, particularly those with a high proportion of “not sure” answers, indicate possible information gaps or misunderstanding of questions, which may affect the accuracy of measured knowledge levels. Furthermore, the study did not explore qualitative factors such as cultural beliefs, misinformation sources, or healthcare provider influence in depth, which could provide better insight into vaccine hesitancy.

Finally, the study did not include inferential statistical analysis (e.g., association testing), limiting the ability to identify significant predictors of knowledge, attitude, or practice outcomes.

V. CONCLUSION

The study concludes that participants demonstrate strong overall acceptance of vaccination, reflected in high perceived safety, trust in government vaccines, and belief in vaccination as essential for family protection. Vaccination-related practices were generally appropriate, particularly regarding information-checking and post-vaccination waiting.

However, the findings also identify critical gaps: (1) substantial uncertainty and limited practical knowledge regarding ADR recognition and reporting, (2) persistent fear of side effects among a sizeable proportion despite high trust, and (3) a major programmatic weakness in communication, as “no information” emerged as the leading reason for missed doses.

Overall, while vaccine confidence is encouraging, strengthening counselling, clear messaging on side effects, and especially reminder/notification systems and ADR reporting awareness is essential to improve completion of vaccination schedules and support safer, more informed immunization practices in the community.

VI. SUGGESTIONS

1. Strengthen communication and reminder systems: Since “no information” was the leading reason for missed doses, public health programs should improve dose-tracking and reminders

through vaccination cards, SMS/WhatsApp alerts, ASHA/ANM follow-ups, and community announcements to ensure timely completion of schedules.

2. Standardize vaccine counselling at service points: Integrate brief, consistent counselling on expected mild side effects, danger signs, and what actions to take—so that fear of side effects reduces and people feel prepared rather than anxious after vaccination.
3. Build community awareness on AEFI/ADR reporting: The study shows low awareness of ADR reporting and poor knowledge of how to report. Public health systems should promote simple reporting pathways (at PHC/UPHC level), visible helpline/posters, and staff guidance to improve reporting and surveillance.
4. Address medication and comorbidity concerns through targeted education: High uncertainty about vaccine–medicine interactions call for focused messaging for people with chronic diseases (diabetes, hypertension, pregnancy, elderly), with clear guidance on when to consult a doctor and when vaccination is safe as routine.
5. Improve service readiness and equity in access: Although access barriers were less common, vaccine unavailability and poor accessibility still contributed to missed doses. Ensuring consistent supply, convenient session timing, outreach sessions in underserved areas, and supportive supervision can reduce dropouts and improve coverage.

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