

Original Research Article

Knowledge, attitude and practice regarding childhood immunization among mothers of under-five children: a hospital-based cross-sectional study from upper Assam, India

Mithun Roy, Rupam Das*

Department of Pediatrics, Assam Medical College and Hospital, Dibrugarh, Assam, India

Received: 04 September 2026

Accepted: 19 September 2026

*Correspondence:

Dr. Rupam Das,

E-mail: rd.rupam21@gmail.com

Copyright: © the author(s), publisher and licensee Medip Academy. This is an open-access article distributed under the terms of the Creative Commons Attribution Non-Commercial License, which permits unrestricted non-commercial use, distribution, and reproduction in any medium, provided the original work is properly cited.

ABSTRACT

Background: Immunization is among the most cost-effective public health interventions, but awareness does not necessarily translate into timely completion of the schedule. This study assessed mothers' knowledge, attitude, and practice (KAP) regarding immunization of under-five children and factors associated with immunization status.

Methods: A hospital-based cross-sectional study was conducted at the pediatric outpatient department of Assam Medical College and Hospital, Dibrugarh, from June 2015 to May 2016. In all, 360 mothers of under-five children were interviewed using a predesigned, pretested proforma. Associations were tested using chi-square and Fisher exact tests, with $p < 0.05$ considered significant.

Results: Overall, 322 mothers (89.44%) were aware of childhood immunization, the commonest source being health facilities (40.99%). Knowledge regarding the purpose of immunization (72.78%) and the correct starting age at birth (85%) was good; however, schedule-specific knowledge was weaker, notably the correct age for measles (46.67%) and the number of DPT doses (41.67%). Attitudes were largely favourable (86.11% considered immunization important). However, only 264 children (73.33%) were completely immunized; 51 (14.17%) were partially immunized and 45 (12.50%) unimmunized. Child sickness (46.88%) and lack of knowledge (39.58%) were the leading reasons for incomplete immunization, and lack of knowledge accounted for 62.38% of missed scheduled doses. Maternal literacy was associated with immunization knowledge, and immunization status with child sex and maternal religion ($p < 0.05$).

Conclusions: A clear knowledge-practice gap was evident; awareness and attitudes were favourable, but about one in four children was incompletely immunized. Schedule-specific counselling, appropriate advice during childhood illness and reduction of access barriers may help convert favourable attitudes into timely immunization.

INTRODUCTION

Immunization is one of the most cost-effective and highest-impact health interventions available, reducing childhood morbidity, hospitalization, treatment expenditure and mortality.¹ Beyond protecting the individual child, high population coverage also interrupts transmission and confers indirect protection on susceptible children through herd immunity. Vaccine-preventable diseases nonetheless remain an important

cause of under-five deaths worldwide, with an estimated 1.5 million such deaths occurring each year among children below five years of age.²

The Expanded Programme on Immunization was launched by the World Health Organization in 1974 and endorsed by the Government of India in 1978. The Universal Immunization Programme was subsequently introduced in India in 1985 with the goal of achieving high infant coverage, and universal immunization against

vaccine-preventable diseases was reaffirmed as a national socio-demographic goal in the National Population Policy, 2000. Despite these efforts and a gradual rise in national coverage, a substantial proportion of Indian children still remain partially immunized or unimmunized.^{2,3} Coverage depends on more than vaccine supply and physical access. Parental knowledge, beliefs, and practices strongly influence whether a child is vaccinated at the recommended time, and information about the knowledge, attitude, and practice of parents remains limited in many developing countries.⁴

Maternal literacy and knowledge have been repeatedly associated with the timeliness and completeness of childhood vaccination, whereas poor knowledge may generate fear, inappropriate decisions after minor illness, missed appointments, and premature discontinuation.^{5,6} An important distinction lies between general awareness of vaccination and detailed knowledge of the schedule. A mother may recognize that vaccines are beneficial yet be unaware of the correct age or number of doses for individual vaccines. Adverse events following immunization, that is, medical events occurring after vaccination that may or may not be causally related to the vaccine, may also shape parental behavior, since local reactions such as pain and swelling and systemic reactions such as fever are commonly perceived as vaccine-related and can prompt caregivers to postpone or abandon subsequent doses.⁷

Reported reasons for incomplete immunization vary considerably across populations and include child illness, lack of information, poor access, social factors and forgetfulness, and differences by maternal literacy and child sex have been described in several settings.^{5,8} Because the barriers observed in one population may differ from those elsewhere, local assessment is valuable. Assam and the wider northeastern region of India have diverse populations and social circumstances, and a hospital-based assessment offers an opportunity to identify gaps that can be addressed during routine pediatric contact.

The present study was therefore undertaken to assess the knowledge, attitude, and practice of mothers of children younger than five years regarding immunization and to examine selected sociodemographic factors associated with maternal knowledge and immunization status.

METHODS

Study design and setting

This was a hospital-based cross-sectional study carried out in the Pediatrics Outpatient Department of Assam Medical College & Hospital (AMCH), Dibrugarh, a tertiary-care teaching hospital in Upper Assam, over one year from June 2015 to May 2016.

Study population and sampling

Mothers of children younger than five years attending the paediatric outpatient department for immunization were considered for inclusion. During the recruitment period, 396 eligible mothers attended; 36 declined to participate, and 360 mothers who provided written informed consent were enrolled. Mothers of children aged five years or older were excluded.

Data collection

Information was collected by personal interview using a predesigned, pretested proforma with two parts. The first part recorded six sociodemographic characteristics of the mother and child. The second part comprised 25 items assessing knowledge, attitude, and practice regarding immunization. Knowledge items covered awareness of childhood immunization, source of information, the purpose of immunization, the age at which vaccination should begin, antenatal (tetanus) vaccination, and the correct age and number of doses of BCG, oral polio vaccine (OPV), DPT, and measles vaccine.

Attitude was assessed using six statements, and practice was assessed by immunization status, reported adverse effects, missed scheduled doses, and the reasons for incomplete or missed vaccination. The questionnaire was prepared in English and administered in the local language, with clarification provided whenever necessary. Mothers with incorrect knowledge, attitude, or practice were counselled appropriately at the end of the interview.

Ethical considerations

Ethical clearance was obtained from the Institutional Ethics Committee (H) (No. AMC/EC/PG/1818), Assam Medical College & Hospital, Dibrugarh. Written informed consent was obtained from every participating mother.

Statistical analysis

Data were summarized as frequencies and percentages and displayed in tables and diagrams. Qualitative variables were compared using the chi-square test and Fisher's exact test as appropriate; a p value less than 0.05 was considered statistically significant.

RESULTS

Sociodemographic characteristics

A total of 360 mothers were studied. Most mothers were young, with 199 (55.28%) aged 21-25 years and only 6 (1.67%) were older than 35 years; no mother was older than 40 years. The majority were Hindu (298; 82.78%), followed by Muslim (55; 15.28%) and Christian (7; 1.94%). Two hundred and thirty-two mothers (64.44%)

were literate and 128 (35.56%) illiterate. There were 192 male children (53.33%) and 168 female children (46.67%) (Table 1).

Knowledge of immunization

Of the 360 mothers, 322 (89.44%) reported knowledge of childhood immunization, while 38 (10.56%) did not. Among those aware of immunization, the leading source of information was a hospital or health centre (132; 40.99%), followed by television or radio (61; 18.94%), neighbours (48; 14.91%), multiple sources (36; 11.18%), family members (26; 8.07%), and newspapers (19; 5.90%) (Figure 1). 262 mothers (72.78%) correctly identified disease prevention as the purpose of immunization, and 306 (85%) knew that immunization should begin at birth. Knowledge of antenatal vaccination was reported by 311 mothers (86.39%), and 297 (82.50%) knew that two doses of tetanus toxoid are given during the antenatal period.

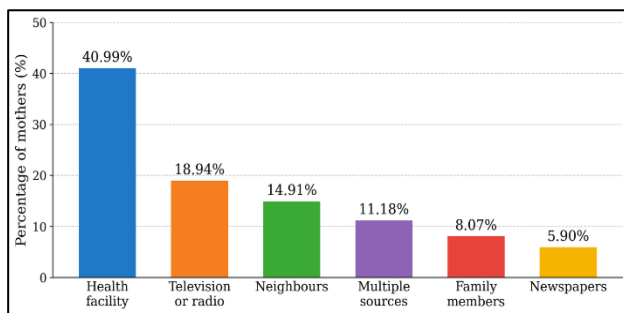


Figure 1: Sources of information about immunization among mothers aware of immunization (n=322).

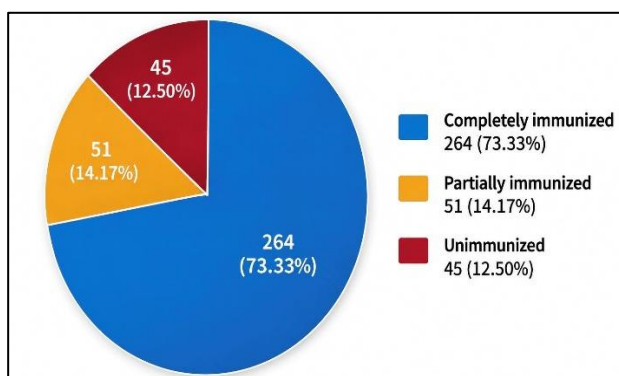


Figure 2: Immunization status of the study children (n=360).

However, detailed, schedule-specific knowledge was less consistent (Table 2). Correct knowledge of the appropriate age was highest for OPV (72.22%) and

lowest for measles (46.67%), so that fewer than half of mothers knew the correct timing of measles vaccination. Knowledge of the correct number of doses was highest for measles (77.78%) and BCG (72.78%) but lowest for DPT (41.67%).

Attitude towards immunization

Attitudes were predominantly favourable (Table 3). Most mothers considered child immunization important (310; 86.11%) and more beneficial than harmful (307; 85.28%) and were in favour of vaccination (301; 83.61%). Fewer expressed satisfaction with the way vaccination services were delivered (270; 75.00%) or agreed that vaccines should be received on the due date (271; 75.28%).

Practice and immunization status

Of the 360 children, 264 (73.33%) were completely immunized for their age, 51 (14.17%) were partially immunized, and 45 (12.50%) were unimmunized (Figure 2). Among the 96 incompletely immunized children (26.67%), the commonest reasons were child sickness (46.88%) and lack of knowledge (39.58%), followed by social reasons (5.21%), forgetfulness (4.17%), fear of side effects (3.13%) and a reaction during the first dose (1.04%) (Table 4).

Overall, 101 mothers (28.06%) reported that at least one scheduled dose had been missed. Among these, lack of knowledge was by far the leading reason (62.38%), followed by lack of facility (19.80%), lack of time (14.85%), and other reasons (2.97%) (Table 4). Among the 313 children for whom information on adverse effects following vaccination was available, 108 mothers (34.50%) reported an adverse effect; fever was the most frequent (76.85%), followed by pain, swelling or redness (11.11%), pus or a boil (7.41%), and rash or itching (4.63%).

Factors associated with knowledge and immunization status

Maternal literacy was significantly associated with immunization knowledge: 223 of 232 literate mothers (96.12%) had knowledge of immunization compared with 99 of 128 illiterate mothers (77.34%) ($p<0.05$). Immunization status differed significantly by child sex, being higher among boys (180/192; 93.75%) than girls (133/168; 79.17%) ($p<0.05$), and by maternal religion, being highest among children of Hindu mothers (268/298; 89.93%) compared with Muslim (40/55; 72.73%) and Christian (5/7; 71.43%) mothers ($p<0.05$) (Table 5).

Table 1: Sociodemographic characteristics of the study participants (n=360).

Characteristic (in years)	Number (N)	%
Maternal age	≤20	33 9.17
	21-25	199 55.28

Continued.

Characteristic (in years)	Number (N)	%
	26-30	78
	31-35	44
	36-40	6
Religion	Hindu	298
	Muslim	55
	Christian	7
Mothers	Literate	232
	Illiterate	128
Children	Male	192
	Female	168

Table 2: Maternal knowledge of the correct age and number of doses of individual vaccines (n=360).

Vaccine	Correct age known, N (%)	Correct dose known, N (%)
BCG	234 (65.00)	262 (72.78)
OPV	260 (72.22)	222 (61.67)
DPT	207 (57.50)	150 (41.67)
Measles	168 (46.67)	280 (77.78)

Table 3: Maternal attitude towards immunization (n=360).

Attitude statement	Agree, N	Agree, %
Child immunization is important	310	86.11
Immunization is more beneficial than harmful	307	85.28
I am in favour of vaccination	301	83.61
Immunization keeps my child healthy	296	82.22
Vaccine should be received on the due date	271	75.28
I am satisfied with the way vaccination is provided	270	75.00

Table 4: Reasons for incomplete immunization and for missed scheduled doses.

Reasons for partial/non-immunization (n=96)	N	%
Child sickness	45	46.88
Lack of knowledge	38	39.58
Social reasons	5	5.21
Forgetfulness	4	4.17
Fear of side effects	3	3.13
Reaction during first dose	1	1.04
Reasons for missed scheduled dose (n=101)		
Lack of knowledge	63	62.38
Lack of facility	20	19.80
Lack of time	15	14.85
Others	3	2.97

Table 5: Factors significantly associated with immunization knowledge and status.

Association	Favourable group	Comparison group
Literacy→ knowledge of immunization	Literate: 223/232 (96.12%)	Illiterate: 99/128 (77.34%)
Child sex→ immunization status	Male: 180/192 (93.75%)	Female: 133/168 (79.17%)
Religion → immunization status	Hindu: 268/298 (89.93%)	Muslim/Christian: 45/62 (72.58%)

All associations statistically significant (p<0.05).

DISCUSSION

The central finding of this study is a discordance between broad maternal awareness of childhood immunization and

the actual completion of the vaccination schedule. Almost nine in ten mothers were aware of immunization, and attitudes were generally positive, yet only 73.33% of children were completely immunized. This pattern

suggests that improving coverage requires more than generic awareness: parents must also understand the schedule, recognize the consequences of missed doses, and be able to reach services at the appropriate time. The level of awareness observed (89.44%) is consistent with several other studies, in which awareness of immunization ranged from about 94% to almost universal.¹²⁻¹⁶ The single most important source of information was the health facility (40.99%). Health workers, physicians, hospitals, and paramedical staff have similarly been reported as leading information sources elsewhere, which underlines the value of using every clinical contact to identify the next due vaccine, verify the immunization card, and correct specific misconceptions.^{10,17-21} General knowledge of the purpose of immunization was reasonably good, with 72.78% correctly identifying disease prevention, broadly comparable to the 65–83% reported from Karnataka, Saudi Arabia, and Nigeria and to the studies reporting that 70–83% of mothers recognized the preventive role of vaccination.^{11,15,18,22} Knowledge that vaccination begins at birth was also high (85%), similar to the 84.8% reported from Kerala, though lower than the near-universal figures from Karachi and North Kashmir.^{19,21} The concept of early vaccination therefore appears well understood across settings.

Knowledge fell away sharply, however, when mothers were asked about individual antigens, only 46.67% knew the correct age for measles vaccination and only 41.67% knew the number of DPT doses. Weaker knowledge of the timing and dosing of later or multiple-dose vaccines has been described previously; caregivers in West Bengal had particularly low knowledge of correct vaccine doses, and fewer than half of caregivers in a North Indian study knew the correct age of DPT and measles vaccination, while a rural study reported correct knowledge of measles timing in only 45%.^{9,23,24} These observations argue that schedule-specific counselling is likely to be more useful than repetition of generic messages that vaccination is beneficial.

Attitudes in the present study were encouraging, with most mothers considering child immunization important (86.11%) and more beneficial than harmful (85.28%). Mothers were in favour of vaccination (83.61%) and believed that immunization kept their child healthy (82.22%). These figures are consistent with the favourable attitudes reported from Saudi Arabia, Mangalore, and among family-practice patients.^{17,25,26} Agreement was lower for the two more practice-oriented statements, such as satisfaction with the way vaccination services were delivered (75.00%) and the belief that vaccines should be received on the due date (75.28%), items that may relate more directly to timely completion of the schedule than to general endorsement of vaccination.

The complete-immunization rate of 73.33% lay within the broad range reported previously but below several

comparable cohorts: complete immunization was 83.8% in West Bengal, 86% in the study by Joseph et al 86.33% in Al-Beida (Libya), and as high as 98% in a rural North Kashmir population.^{9-11,19} Differences in study population, age range, definitions, and service access probably contribute to this variation. Child sickness was the most frequent reason for partial or non-immunization (46.88%). This is strikingly consistent with work done by others: child sickness was the leading reason for cessation of immunization in Libya and for missed vaccination in the study by Joseph et al and sickness featured prominently among the barriers reported from West Bengal.⁹⁻¹¹ Counselling should therefore specifically address vaccination during childhood illness and clarify when vaccination should or should not be deferred.

The second major reason for incomplete immunization was lack of knowledge (39.58%); more so among mothers who had actually missed a scheduled dose, with 62.38% due to lack of knowledge. This suggests that lack of knowledge may act not merely as a background factor but as an immediate barrier to completing the schedule. Access-related barriers were also present, such as lack of facility (19.80%) and lack of time (14.85%), with reports that vaccine availability, distance, and limited services contribute to incomplete immunization.⁹⁻¹¹ Because such barriers cannot be resolved by education alone, improving availability and reducing missed opportunities at health facilities are necessary complements to counselling. Lack of knowledge has likewise been identified as a principal barrier to vaccination in wider reviews of literature and in other regional studies.^{18,28}

Maternal literacy was strongly associated with immunization knowledge, with nearly all literate mothers (96.12%) being knowledgeable compared with 77.34% of illiterate mothers, in keeping with reports linking maternal literacy to immunization knowledge and practice.^{9,27} Immunization status was significantly higher among boys and among children of Hindu mothers, and a significant association with a male child has similarly been reported.¹¹ These differences point to the need to adapt counselling to maternal literacy and preferred language and to remain alert to sex- and sociodemographic disparities in coverage.

Limitations

This study was conducted in a single tertiary-care hospital and may not represent mothers in the community, particularly those who do not access hospital services. The cross-sectional design precludes causal inference, and immunization status, adverse effects, and reasons for missed vaccination were based on maternal reports and were not verified against vaccination cards in every case. The analysis was descriptive and bivariate and did not include multivariable adjustment; the reported associations should therefore be interpreted as unadjusted. A larger, community-based sample would strengthen the generalisability of these findings.

CONCLUSION

Among mothers of under-five children attending a tertiary-care paediatric outpatient department in Dibrugarh, general awareness of and attitudes towards childhood immunization were favourable, yet only 73.33% of children were completely immunized, implying a clear knowledge-practice gap. The most important knowledge deficits concerned vaccine-specific timing and dosing. Child sickness and lack of knowledge were the leading reasons for incomplete immunization, and lack of knowledge was the principal reason for missed scheduled doses. Maternal literacy was associated with immunization knowledge, and immunization status differed by child sex and maternal religion. Improving coverage will require more than broad awareness campaigns: schedule-specific counselling, sound advice about vaccination during childhood illness, anticipatory guidance about expected adverse effects, and attention to practical access barriers are likely to help convert favourable attitudes into timely completion of childhood immunization.

Funding: No funding sources

Conflict of interest: None declared

Ethical approval: The study was approved by the Institutional Ethics Committee

REFERENCES

- Andre FE, Booy R, Bock HL, Clemens J, Datta SK, John TJ, et al. Vaccination greatly reduces disease, disability, death and inequity worldwide. *Bull World Health Organ.* 2008;86(2):140-6.
- World Health Organization. Immunization coverage. Fact sheet No. 378. Geneva: World Health Organization. 2013.
- Park K. Park's textbook of preventive and social medicine. 23rd ed. Jabalpur: Banarsidas Bhanot. 2015.
- Jheeta M, Newell J. Childhood vaccination in Africa and Asia: the effects of parents' knowledge and attitudes. *Bull World Health Organ.* 2008;86(6):419.
- Siddiqi N, Siddiqi AE, Nisar N, Khan A. Mothers' knowledge about EPI and its relation with age-appropriate vaccination of infants in peri-urban Karachi. *J Pak Med Assoc.* 2010;60(11):940-4.
- Kimmel SR, Burns IT, Wolfe RM, Zimmerman RK. Addressing immunization barriers, benefits, and risks. *J Fam Pract.* 2007;56(2):S61-9.
- World Health Organization. Surveillance of adverse events following immunization: field guide for managers of immunization programmes. Geneva: World Health Organization. 1997.
- Malkar VR, Khadilakar H, Lakde RN, Joge US, Choudhari SG. Assessment of sociodemographic factors affecting immunization status of children in the age group of 12-23 months in a rural area. *Indian Med Gaz.* 2013;147(5):164-70.
- Mandal S, Basu G, Kirtania R, Roy SK. Caregivers' knowledge and practice on routine immunization among 12-23 months children in a rural community of West Bengal. *IOSR J Dent Med Sci.* 2013;6(6):105-11.
- Bofarraj MAM. Knowledge, attitude and practices of mothers regarding immunization of infants and preschool children at Al-Beida City, Libya. *Egypt J Pediatr Allergy Immunol.* 2011;9(1):29-34.
- Joseph J, Devarashetty V, Reddy SN, Sushma M. Parents' knowledge, attitude, and practice on childhood immunization. *Int J Basic Clin Pharmacol.* 2015;4(6):1201-7.
- Asim M, Malik N, Yousaf H, Gillani I, Habib N. An assessment of parental knowledge, belief and attitude toward childhood immunization among minorities in rural areas of district Faisalabad, Pakistan. *Mediterr J Soc Sci.* 2012;3(11):153-9.
- Awodele O, Oreagba IA, Akinyede A, Awodele DF, Dolapo DC. The knowledge and attitude towards childhood immunization among mothers attending antenatal clinic in Lagos University Teaching Hospital, Nigeria. *Tanzan J Health Res.* 2010;12(3):172-7.
- Mapatano MA, Kayembe K, Piripiri L, Nyandwe K. Immunisation-related knowledge, attitudes and practices of mothers in Kinshasa, Democratic Republic of the Congo. *S Afr Fam Pract.* 2008;50(2):61-6.
- Abidoye AO, Odeyemi KA. Knowledge, attitude and practice of mothers to childhood immunization in Kosofe Local Government Area of Lagos State, Nigeria. *Int J Basic Appl Innov Res.* 2013;2(4):66-72.
- Chris-Otubor GO, Dangiwa DA, Ior LD, Anukam NC. Assessment of knowledge, attitudes and practices of mothers in Jos North regarding immunization. *IOSR J Pharm.* 2015;5(6):34-45.
- Mahalingam S, Soori A, Ram P, Achappa B, Chowta M, Madi D. Knowledge, attitude and perceptions of mothers with children under five years of age about vaccination in Mangalore, India. *Asian J Med Sci.* 2014;5(4):52-7.
- Al-Zahrani J. Knowledge, attitude and practice of parents towards childhood vaccination. *Majmaah J Health Sci.* 2013;1(1):23-32.
- Hamid S, Andrabi SAH, Fazli A, Jabeen R. Immunization of children in a rural area of North Kashmir, India: a KAP study. *Online J Health Allied Sci.* 2012;11(1):10.
- Nisar N, Mirza M, Qadri MH. Knowledge, attitude and practices of mothers regarding immunization of one-year-old child at Mawatch Goth, Kemari Town, Karachi. *Pak J Med Sci.* 2010;26(1):183-6.
- Aslami AN, Athira TK, Salim AK, Pillai AV, Asha TJ, Bency S, et al. Assessment of knowledge about immunization of under-five children among mothers attending the outpatient department of pediatrics in a tertiary care hospital in Kollam, Kerala. *J Evid Based Med Healthc.* 2015;2(29):4191-200.

22. Angadi MM, Jose AP, Udgiri R, Masali KA, Sorganvi V. A study of knowledge, attitude and practices on immunization of children in urban slums of Bijapur city, Karnataka, India. *J Clin Diagn Res.* 2013;7(12):2803-6.
23. Nath B, Singh JV, Awasthi S, Bhushan V, Kumar V, Singh SK. KAP study on immunization of children in a city of North India-a 30-cluster survey. *J Health Allied Sci.* 2008;7(1):2.
24. Singh MC, Badole CM, Singh MP. Immunization coverage and the knowledge and practice of mothers regarding immunization in rural area. *Indian J Public Health.* 1994;38(3):103-7.
25. Yousif MA, Albarraq AA, Abdallah MAA, Elbur AI. Parents' knowledge and attitudes on childhood immunization, Taif, Saudi Arabia. *J Vaccines Vacc.* 2013;5(1):215.
26. Qidwai W, Ali SS, Ayub S. Knowledge, attitude and practice regarding immunization among family practice patients. *J Dow Univ Health Sci.* 2007;1(1):15-9.
27. Tagbo BN, Uleanya ND, Nwokoye IC, Eze JC, Omotowo IB. Mothers' knowledge, perception and practice of childhood immunization in Enugu. *Niger J Paed.* 2012;39(3):90-6.
28. Favin M, Steinglass R, Fields R, Banerjee K, Sawhney M. Why children are not vaccinated: a review of the grey literature. *Int Health.* 2012;4(4):229-38.

Cite this article as: Roy M, Das R. Knowledge, attitude and practice regarding childhood immunization among mothers of under-five children: a hospital-based cross-sectional study from upper Assam, India. *Int J Contemp Pediatr* 2026;13:2045-51.