

Association Between Maternal Knowledge and Attitudes Toward Complete Basic Childhood Immunization

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ABSTRACT

This study aimed to determine the relationship between mothers' knowledge and attitudes and the completeness of basic immunization among children in Batu Napal Village, Sultan Daulat District, Subulussalam City, in 2026. This study used a quantitative method with a cross-sectional design. A total of 62 respondents were selected using the total sampling technique. Data were collected through questionnaires and analyzed using the Chi-Square test. The results showed that most respondents had moderate knowledge (46.8%), positive attitudes (51.6%), and incomplete basic immunization status (98.4%). The bivariate analysis indicated a significant relationship between mothers' knowledge and attitudes and the completeness of basic immunization ($p < 0.05$). It can be concluded that mothers' knowledge and attitudes are associated with the completeness of basic immunization among children. Therefore, health education and counseling should be strengthened to improve immunization coverage.

Keywords: Knowledge, Attitude, Basic Immunization, Mother

INTRODUCTION

Immunization is one of the most effective, safe, and cost-efficient public health interventions to prevent infectious diseases and reduce child morbidity and mortality. Vaccination stimulates the body's immune response before exposure to disease-causing pathogens, thereby providing protection against vaccine-preventable diseases. Complete basic immunization during infancy has been proven to reduce the incidence of diseases such as tuberculosis, hepatitis B, diphtheria, pertussis, tetanus, poliomyelitis, and measles. Therefore, increasing immunization coverage remains a major global health priority, particularly in developing countries (Wiladatul Hosnaniah et al., 2025).

Despite its proven effectiveness, global immunization coverage has declined in recent years. According to the World Health Organization (WHO), global vaccination coverage decreased from 86% in 2019 to 83% in 2020, leaving approximately 23 million children under one year of age without essential vaccines, the highest number reported since 2009 (WHO, 2025). In Indonesia, although national immunization coverage has gradually improved after the COVID-19 pandemic, disparities among provinces remain substantial. Reports from the Ministry of Health indicate that several provinces continue to experience low immunization

coverage, increasing the risk of outbreaks of vaccine-preventable diseases (Kementerian Kesehatan Republik Indonesia, 2025).

Aceh Province is one of the regions facing challenges in achieving complete childhood immunization coverage. Data from the Aceh Provincial Health Office showed a continuous decline in polio immunization coverage between 2018 and 2023. In 2023, Subulussalam City recorded one of the lowest immunization coverages in Aceh, with only 20.5%, far below the national target of 90% (Dinas Kesehatan Provinsi Aceh, 2025). Preliminary observations conducted in Batu Napal Village, Sultan Daulat District, Subulussalam City, identified that 62 mothers had not completed their children's basic immunization schedule. This condition indicates that incomplete immunization remains an important public health issue requiring further investigation.

Several factors influence childhood immunization coverage, including accessibility to health services, support from healthcare workers, socio-economic conditions, and parental characteristics. Among these factors, maternal knowledge and attitude play a crucial role in determining immunization behavior. Mothers with adequate knowledge are more likely to understand the benefits, schedules, and safety of immunization, while positive attitudes encourage adherence to recommended vaccination schedules. Conversely, inadequate knowledge and negative perceptions may lead to delayed or incomplete immunization (Permatasari, 2022). Previous studies have consistently demonstrated significant associations between maternal knowledge, attitudes, and immunization completeness (Aruan et al., 2024; Lubis et al., 2023; Putri et al., 2022). However, evidence regarding these relationships remains limited in rural communities of Subulussalam City, particularly in Batu Napal Village, where immunization coverage is still considerably low.

Based on these considerations, this study aimed to analyze the relationship between maternal knowledge and attitudes and the completeness of basic immunization among children in Batu Napal Village, Sultan Daulat District, Subulussalam City. The findings are expected to provide evidence for healthcare providers and local health authorities in designing educational interventions and community-based immunization programs to improve childhood immunization coverage.

METHODS

Research Design

This study employed a quantitative analytical design using a cross-sectional approach to examine the relationship between maternal knowledge and attitudes and the completeness of basic childhood immunization. The cross-sectional design allows the independent and dependent variables to be measured simultaneously, making it appropriate for identifying associations between variables (Artini et al., 2019).

Participant Characteristics

The study was conducted in Batu Napal Village, Sultan Daulat District, Subulussalam City, Indonesia, from May to June 2026. The target population consisted of all mothers who had children aged 1–5 years residing in the study area.

The inclusion criteria were mothers who had children aged 1–5 years, lived in Batu Napal Village during the study period, possessed the Maternal and Child Health (MCH) handbook (Buku KIA), and agreed to participate by providing informed consent. Mothers who were unavailable during data collection or declined participation were excluded from the study.

Sampling Technique

A total sampling technique was employed because the target population was relatively small. Consequently, all 62 eligible mothers who met the inclusion criteria were recruited as study participants. The unit of analysis was mothers of children aged 1–5 years.

Measures

Data were collected using structured questionnaires and document review. Maternal knowledge regarding childhood immunization was measured using a questionnaire consisting of 15–20 closed-ended questions adapted from Ramadhani (2019). Each correct response was scored 1, while incorrect responses were scored 0. Knowledge scores were categorized as poor, moderate, and good.

Maternal attitude toward childhood immunization was assessed using a Likert-scale questionnaire consisting of 10–15 statements with four response categories: strongly agree, agree, disagree, and strongly disagree. Negatively worded statements were reverse scored. Attitudes were categorized into positive and negative based on the median score.

The completeness of basic immunization was determined by reviewing each child's Maternal and Child Health (MCH) handbook. Children were classified as having complete immunization if they had received all vaccines included in the Indonesian National Basic Immunization Program (BCG, Hepatitis B, DPT-HB-Hib, Polio, and Measles), while children

who had not completed the recommended schedule were categorized as incompletely immunized.

Prior to data collection, the questionnaire was tested for validity using the Pearson Product Moment correlation test. Instrument reliability was assessed using Cronbach's Alpha coefficient, with a value of ≥ 0.60 indicating acceptable internal consistency.

Data Collection

Data collection began after obtaining permission from the local authorities and community health center. Eligible mothers were informed about the purpose and procedures of the study before signing informed consent forms. Participants completed the questionnaires under the supervision of the researcher. Immunization status was verified through documentation in the Maternal and Child Health handbook to improve data accuracy.

Data Analysis

Data were coded, entered, cleaned, and analyzed using the Statistical Package for the Social Sciences (SPSS). Descriptive (univariate) analysis was used to summarize respondent characteristics, maternal knowledge, maternal attitudes, and immunization completeness using frequencies and percentages. Associations between maternal knowledge and immunization completeness, as well as maternal attitudes and immunization completeness, were analyzed using the Chi-square test. Statistical significance was established at $p < 0.05$ with a 95% confidence interval.

Ethical Clearance

This study was conducted in accordance with the ethical principles of research involving human participants, including beneficence, confidentiality, veracity, and justice. Participation was voluntary, and written informed consent was obtained from all respondents before data collection. Participants' identities remained anonymous, and all collected information was kept confidential and used exclusively for research purposes.

RESULTS

A total of 62 mothers with children aged 1–5 years in Batu Napal Village, Sultan Daulat District, Subulussalam City participated in this study. Descriptive analysis was performed to describe respondents' characteristics, maternal knowledge, maternal attitudes, and the completeness of basic childhood immunization. Bivariate analysis using the Chi-square test

was conducted to determine the association between maternal knowledge, maternal attitude, and the completeness of basic immunization.

Respondent Characteristics

Table 1. Characteristics of Respondents

Variable	Category	n	%
Maternal age	<30 years	33	53.2
	≥30 years	29	46.8
Education	Elementary School	13	21.0
	Junior High School	6	9.7
	Senior High School	41	66.1
	Bachelor	2	3.2
Occupation	Housewife	60	96.8
	Midwife	1	1.6
	Civil servant	1	1.6
Child age	1 year	10	16.1
	2 years	20	32.3
	3 years	18	29.0
	4 years	14	22.6

Most respondents were younger than 30 years (53.2%), had completed senior high school education (66.1%), and were housewives (96.8%). The majority of children were two years old (32.3%).

Maternal Knowledge, Attitude, and Completeness of Basic Immunization

Table 2. Distribution of Maternal Knowledge, Attitude, and Immunization Completeness

Variable	Category	n	%
Knowledge	Poor	7	11.3
	Moderate	29	46.8
	Good	26	41.9
Attitude	Negative	30	48.4
	Positive	32	51.6
Basic Immunization	Incomplete	61	98.4
	Complete	1	1.6

Nearly half of the respondents had moderate knowledge regarding childhood immunization (46.8%), while 41.9% demonstrated good knowledge. More than half of the mothers showed a positive attitude toward immunization (51.6%). However, almost all children (98.4%) had incomplete basic immunization status.

Figure 1. Distribution of Maternal Knowledge

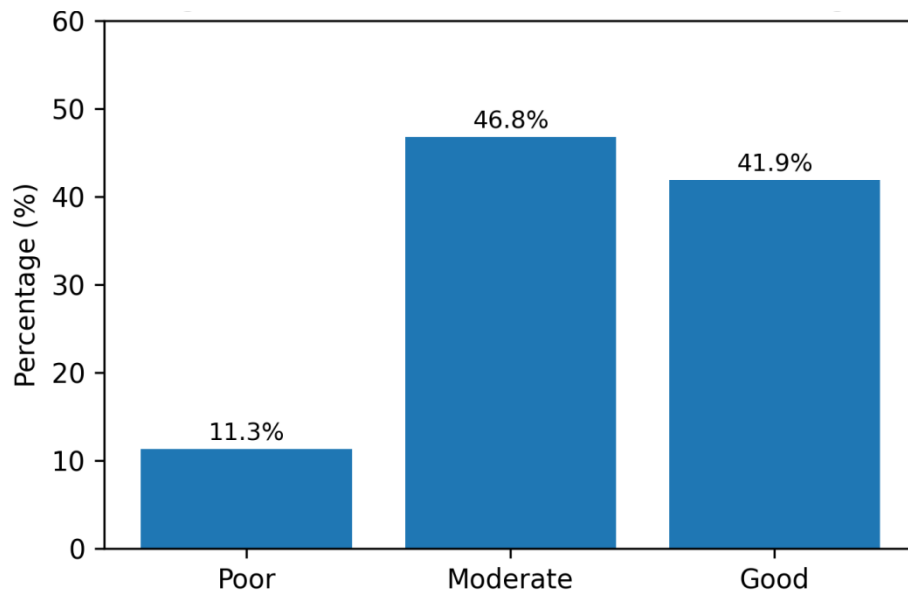


Figure 1 illustrates that mothers with moderate knowledge constituted the largest proportion (46.8%), followed by those with good knowledge (41.9%).

Figure 2. Distribution of Maternal Attitude

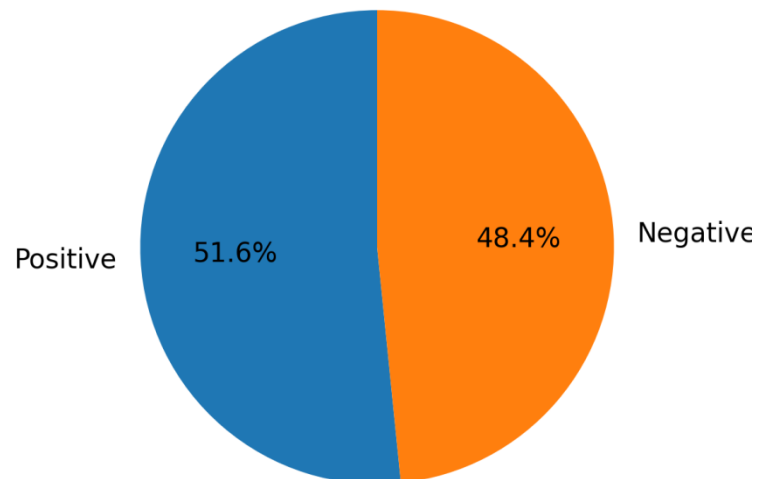


Figure 2 shows that slightly more than half of the respondents had a positive attitude toward childhood immunization (51.6%).

Figure 3. Completeness of Basic Immunization

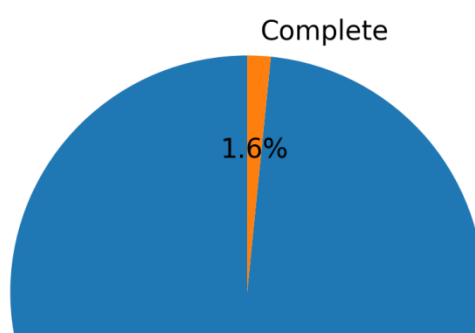


Figure 3 demonstrates that the vast majority of children had incomplete basic immunization (98.4%), while only 1.6% had completed the recommended immunization schedule.

ASSOCIATION BETWEEN MATERNAL KNOWLEDGE AND COMPLETENESS OF BASIC IMMUNIZATION

Table 3. Association Between Maternal Knowledge and Completeness of Basic Immunization

Knowledge	Incomplete n (%)	Complete n (%)	p-value
Poor	7 (100)	0 (0)	0.495
Moderate	29 (100)	0 (0)	
Good	25 (96.2)	1 (3.8)	

The Chi-square analysis showed that maternal knowledge was not significantly associated with the completeness of basic immunization ($p = 0.495$). Although mothers generally had moderate to good knowledge, almost all children remained incompletely immunized.

Association Between Maternal Attitude and Completeness of Basic Immunization

Table 4. Association Between Maternal Attitude and Completeness of Basic Immunization

Attitude	Incomplete n (%)	Complete n (%)	p-value
Negative	29 (96.7)	1 (3.3)	0.298
Positive	32 (100)	0 (0)	

No statistically significant association was found between maternal attitude and the completeness of basic immunization ($p = 0.298$). Although more than half of the respondents had a positive attitude, this was not reflected in complete immunization coverage among their children.

DISCUSSION

This study aimed to examine the relationship between maternal knowledge and attitudes toward the completeness of basic childhood immunization in Batu Napal Village, Sultan Daulat District, Subulussalam City. The findings revealed that neither maternal knowledge ($p = 0.495$) nor maternal attitude ($p = 0.298$) was significantly associated with the completeness of basic immunization. Although most respondents demonstrated moderate to good knowledge and positive attitudes toward immunization, almost all children (98.4%) had incomplete basic immunization status.

These findings suggest that knowledge and positive attitudes alone are insufficient to ensure complete immunization coverage. According to Lawrence Green's behavioral theory, health behavior is influenced not only by predisposing factors such as knowledge and attitudes but also by enabling factors, including accessibility of health services, vaccine availability, transportation, and financial resources, as well as reinforcing factors such as support from family members, community health workers, and healthcare professionals. Consequently, mothers who understand the importance of immunization may still fail to complete their children's immunization schedules due to structural and environmental barriers.

The present findings differ from those reported by Nasrah et al. (2022), Putri et al. (2022), and Nugrawati (2019), who found significant associations between maternal knowledge, attitudes, and childhood immunization completeness. Those studies suggested that better maternal understanding and positive perceptions encourage adherence to recommended immunization schedules. However, the current findings are consistent with the study conducted by Dillyana (2019), which reported that maternal knowledge and attitudes were not independently associated with immunization status because other contextual factors had a stronger influence on healthcare utilization.

One possible explanation for the absence of statistically significant relationships is the highly unbalanced distribution of the dependent variable. Only one child in this study had complete basic immunization, while 61 children had incomplete immunization. Such an uneven distribution reduces the statistical power of the Chi-square test and may increase the likelihood of failing to detect an existing association. Furthermore, more than half of the contingency table cells had expected frequencies below five, indicating that the assumptions of the Chi-square test were only partially satisfied.

Several contextual factors may also explain the low immunization coverage observed in this study. Informal interviews during data collection indicated that mothers frequently reported forgetting immunization schedules, concerns regarding post-immunization side effects,

limited family support, and inadequate reminders from healthcare providers. These findings indicate that behavioral interventions should not focus exclusively on improving maternal knowledge but should also strengthen health service accessibility, reminder systems, community-based education, and family involvement in child healthcare.

The findings have important implications for maternal and child health programs. Community health centers should strengthen health education activities through regular counseling sessions, home visits, and collaboration with community health volunteers (cadres) to improve immunization awareness and compliance. In addition, digital reminder systems, mobile health applications, and family-centered health promotion strategies may help increase immunization coverage by reducing missed vaccination opportunities.

Several limitations should be acknowledged. First, the cross-sectional design limits the ability to establish causal relationships between the study variables. Second, the relatively small sample size drawn from a single village limits the generalizability of the findings. Third, the extremely low proportion of children with complete immunization may have affected the statistical analysis. Future studies are therefore recommended to involve larger and more diverse populations, apply probability sampling techniques, and investigate additional determinants of childhood immunization, including accessibility of health services, socioeconomic status, family support, cultural beliefs, and healthcare provider factors. Mixed-methods approaches may also provide a deeper understanding of the barriers influencing maternal decisions regarding childhood immunization.

CONCLUSION

This study investigated the relationship between maternal knowledge and attitudes and the completeness of basic childhood immunization in Batu Napal Village, Sultan Daulat District, Subulussalam City. The findings showed that most mothers had moderate knowledge (46.8%) and positive attitudes (51.6%) toward childhood immunization. Nevertheless, the proportion of children with complete basic immunization was extremely low (1.6%). Statistical analysis using the Chi-square test demonstrated that maternal knowledge ($p = 0.495$) and maternal attitude ($p = 0.298$) were not significantly associated with the completeness of basic immunization. These findings indicate that improving maternal knowledge and attitudes alone may not be sufficient to increase immunization coverage. Other factors, such as accessibility of healthcare services, family support, reminder systems,

vaccine availability, and community involvement, should also be considered in immunization programs.

This study has several limitations. The cross-sectional design does not permit causal inference, the sample size was relatively small and limited to a single village, and the highly unequal distribution of immunization status may have reduced the statistical power of the analysis. Therefore, the findings should be interpreted with caution and cannot be generalized to broader populations. Future studies are recommended to include larger and more representative samples, employ probability sampling techniques, and examine additional determinants of childhood immunization, including socioeconomic conditions, healthcare accessibility, cultural beliefs, and family support. Strengthening collaboration among healthcare providers, community health volunteers, and families is expected to improve the completeness of childhood immunization and contribute to the prevention of vaccine-preventable diseases.

LIMITATION

This study has several limitations that should be considered when interpreting the findings. First, the cross-sectional design only describes the relationship between variables at a single point in time and cannot establish causal relationships between maternal knowledge, maternal attitudes, and the completeness of childhood immunization. Second, the study involved a relatively small sample of 62 respondents from a single village, which may limit the generalizability of the findings to other populations or regions. Third, the distribution of the outcome variable was highly unbalanced, as only one child had complete basic immunization, while the remaining respondents had incomplete immunization status. This imbalance may have reduced the statistical power of the Chi-square analysis and contributed to the absence of statistically significant associations. Finally, this study only examined maternal knowledge and attitudes, whereas other important determinants, such as healthcare accessibility, family support, socioeconomic conditions, cultural beliefs, and the availability of immunization services, were not included. Future studies should incorporate these variables using larger and more representative samples to provide a more comprehensive understanding of factors influencing childhood immunization completeness.

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