

# Maternal compliance with complete basic immunization: The role of knowledge, family support, and anxiety

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## ABSTRACT

Complete basic immunization plays a crucial role in public health efforts to protect infants from infectious diseases and to decrease child morbidity and mortality. Despite its importance, the coverage of complete basic immunization in the Socah Community Health Center area remained low at 44.7%, which did not meet the national standard. This situation reflects inadequate maternal adherence in providing immunizations for their children. The present study aimed to examine the association between maternal knowledge, family support, and anxiety levels with their adherence to complete basic immunization. An analytic observational design with a cross-sectional approach was utilized. Eighty-three mothers with children aged 12-24 months were chosen through proportionate cluster random sampling. Data collection was conducted using structured questionnaires and immunization record reviews, and analyzed through the Chi-square test at a significance level of 0.05. Findings revealed significant associations between knowledge ( $p = 0.005$ ), family support ( $p = 0.039$ ), and anxiety ( $p = 0.007$ ) and maternal adherence to immunization. Mothers possessing better knowledge, stronger family backing, and lower anxiety levels tended to follow the immunization schedule more consistently. The study suggests strengthening educational interventions and psychological support programs for mothers and families to enhance complete basic immunization coverage in the community.

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## INTRODUCTION

Complete basic immunization remains one of the most effective strategies for preventing vaccine-preventable diseases such as tuberculosis, hepatitis B, diphtheria, pertussis, tetanus, poliomyelitis, and measles (Noor Baihaqi et al., 2024). Immunization not only provides individual protection but also supports herd immunity, which prevents the spread of infectious diseases within the

community (Sigdel et al., 2023). Achieving optimal coverage plays a vital role in reducing child morbidity and mortality while strengthening public health resilience (Unicef, 2023; WHO, 2024). Conversely, insufficient immunization coverage may trigger the re-emergence of preventable diseases and cause severe complications or death, especially among vulnerable children (Gavi, 2022; Zulkifli et al., 2022).

Globally, around 14.3 million children have not received any routine vaccines or are classified as zero dose children a significant improvement from 18.1 million in 2021, nearing pre-pandemic levels in 2019 WHO (2025). The WHO (2024) and (Centers for Disease Control and Prevention (CDC), 2023) highlight that post-pandemic recovery requires addressing socioeconomic and behavioral barriers that hinder access to vaccination services. Likewise, (Unicef, 2023) emphasizes that behavioral and psychosocial determinants among caregivers continue to affect immunization completion in low- and middle-income countries.

In Indonesia, national coverage of basic immunization remains below the government's target. The Ministry of Health 2024 reported that 1.88 million children had not received full immunizations between 2018-2023, and approximately 2.8 million remained incompletely immunized during 2021-2023, spread across 309 districts in 38 provinces (Kementrian Kesehatan Indonesia, 2024b). The national coverage in 2023 reached 95.4%, below the target of 100% (Kementrian Kesehatan Indonesia, 2024a). East Java recorded 99.3% and ranked 10th nationally but still failed to achieve the target. Bangkalan Regency showed the lowest coverage at 66.6% (Dinas Kesehatan Provinsi Jawa Timur, 2024). The Socah Community Health Center reported only 44.7%, a level associated with increased risks of stunting and decreased child health (Dinas Kesehatan Provinsi Jawa Timur, 2024; Kementrian Kesehatan Indonesia, 2024b).

Maternal compliance in administering complete basic immunization is influenced by behavioral, social, and environmental factors. Referring to Lawrence Green's PRECEDE-PROCEED model (Wahyuningsih et al., 2022), three key components determine health behavior: predisposing, enabling, and reinforcing factors. Predisposing factors include knowledge, education, and culture; enabling factors involve the availability and accessibility of health facilities; and reinforcing factors comprise family and community support (Atmojo et al., 2024; Halimah et al., 2024). The Health Belief Model also explains that perceived benefits, barriers, and self-efficacy determine a mother's decision to immunize her child (Mahachi et al., 2022; Warner & Schwarzer, 2020). In addition, the Health Belief Model (HBM) provides a complementary conceptual framework, suggesting that health behavior is influenced by perceived susceptibility, perceived benefits, perceived barriers, and self-efficacy (Warner & Schwarzer, 2020). Maternal knowledge helps shape these perceptions by enhancing understanding of vaccine benefits and reducing misconceptions. Family support reinforces self-efficacy through emotional and practical encouragement, while anxiety functions as a psychological barrier that reduces motivation. Within the PRECEDE-PROCEED framework, knowledge acts as a predisposing factor, family support as a reinforcing factor, and anxiety as a modifying factor that can either inhibit or strengthen compliance. Together, these two models explain how cognitive, social, and emotional factors interact in shaping maternal compliance with complete basic immunization. In the context of this study, no specific cultural beliefs or traditional practices were identified as influencing maternal compliance with immunization; instead, social and informational factors appeared to be more dominant.

Several studies support this theoretical framework. Hudhah & Hidajah (2018) found that most mothers in Sumenep had low knowledge and weak family support toward immunization, while Hafid et al. (2017) revealed that these two factors significantly affected immunization completeness in Bangkalan. Zafirah (2021) also discovered that limited knowledge, poor family support, and fear of post-immunization side effects such as fever contributed to low coverage. Similarly, recent studies reported that family involvement and emotional encouragement were essential for maternal adherence (Carolina et al., 2021; Fajriah et al., 2021; Utomo, 2022; Wulandari,

2020). Evidence from other countries also confirms that maternal anxiety is a psychological barrier to immunization compliance (MacDonald et al., 2020; Samson et al., 2025; Triningsih et al., 2025; Zulkifli et al., 2022).

However, research in the working area of the Socah Community Health Center examining the combined influence of knowledge, family support, and anxiety on maternal compliance has not yet been conducted. Educational and economic variables are not included in this study, as Hafid et al. (2017) found no significant correlation in previous local research. Therefore, this study aims to analyze the relationships between maternal knowledge, family support, and anxiety levels with compliance in providing complete basic immunization for infants. The findings are expected to generate empirical insights and recommendations for effective interventions to increase immunization coverage and improve child health outcomes both locally and nationally.

## RESEARCH METHOD

This research applied an analytic observational method using a cross-sectional study design. It took place within the service area of Socah Community Health Center, Bangkalan Regency, East Java, during June–July 2024. The selected design aimed to examine the association between the independent variables – maternal knowledge, family support, and anxiety level – and the dependent variable, namely maternal adherence to complete basic immunization. The study population comprised mothers with children aged 12–24 months residing in the Socah Health Center area. A total of 83 participants were determined using proportionate cluster random sampling. The inclusion criteria covered mothers who had lived in the area for at least six months, had infants within the specified age range, and provided informed consent to participate. Respondents who declined or were unavailable during data collection were excluded from the study.

The research process was conducted in several stages. Researchers first obtained administrative permission and ethical approval from the relevant authorities. The instruments prepared for data collection consisted of questionnaires containing statements related to maternal knowledge, family support, and anxiety levels, as well as immunization records taken from the Maternal and Child Health (MCH) book. Respondents completed the questionnaires independently under the supervision of researchers and health workers, after receiving a clear explanation of the research objectives and procedures. The maternal knowledge questionnaire included multiple-choice items covering the definition, benefits, and schedule of immunization. Family support was measured using a Likert-scale instrument assessing emotional, informational, instrumental, and appraisal support. Anxiety levels were assessed through the Hamilton Anxiety Rating Scale (HARS), which has been previously validated and proven reliable in studies involving maternal health.

The collected data were checked for completeness before performing both descriptive and inferential analyses. The Chi-square test was applied to examine the correlation between maternal knowledge, family support, and anxiety levels with mothers' adherence to completing basic immunizations. A statistical significance level of  $p < 0.05$  was considered. Ethical approval for this research was obtained from the Ethics Committee of the Faculty of Medicine, Universitas Airlangga (Approval No. 237/EA/KEPK/2024). Participation was entirely voluntary, and participants' privacy and confidentiality were strictly protected.

## RESULTS AND DISCUSSIONS

The research was carried out from June to July 2024 within the Socah Community Health Center area, Bangkalan Regency, East Java. A total of 83 eligible participants who met the inclusion criteria were involved. The results are presented in two analytical stages, namely univariate and bivariate analyses.

**Univariate Analysis**

Univariate analysis was conducted to outline the frequency distribution of respondents’ characteristics, focusing on maternal knowledge, family support, anxiety levels, and compliance with complete basic immunization.

**Table 1.** Frequency distribution of respondents based on knowledge, family support, anxiety levels, and compliance

Variable	Category	Frequency (n)	Percentage (%)
Maternal Knowledge	Good	38	45,8
	Poor	45	54,2
Family Support	Supportive	49	59
	Unsupportive	34	41
Anxiety Level	Mild	29	35
	Moderate	30	36
	Severe	24	29
Immunization Compliance	Compliant	43	51,8
	Non-compliant	40	48,2
Total		83	100

The findings indicated that a majority of mothers possessed limited understanding regarding complete basic immunization (45.8%). Additionally, only a portion of respondents reported adequate family support (59%) and moderate anxiety levels (36%). In contrast, 51.8% of mothers were classified as compliant in ensuring their infants received complete basic immunization.

**Bivariate Analysis**

A bivariate analysis was performed to examine the correlation between maternal knowledge, family support, and anxiety levels with mothers’ adherence to completing the basic immunization schedule.

**Table 2.** Relationship between maternal knowledge, family support, and anxiety levels with compliance in providing complete basic immunization

Independent Variable	Category	Compliant (n)	Non-Compliant (n)	Total (n)	p-value
Maternal Knowledge	Good	26	12	38	0,005
	Poor	17	28	45	
Family Support	Supportive	30	19	49	0,039
	Unsupportive	13	21	34	
Anxiety Level	Mild	21	8	29	0,007
	Moderate	15	15	30	
	Severe	7	17	24	
Total				83	

The bivariate test was conducted to examine the association between maternal knowledge, family support, and anxiety levels with mothers’ adherence to completing the basic immunization schedule. Based on the Chi-square analysis, there was a statistically significant correlation among these variables and maternal compliance ( $p < 0.05$ ).

**Discussion**

**The Relationship Between Maternal Knowledge and Immunization Compliance**

Maternal knowledge is one of the crucial elements that shapes a mother’s actions in completing her child’s immunization schedule. Findings from this research indicated a significant link between maternal knowledge and immunization adherence ( $p = 0.005$ ). Mothers with good knowledge were more likely to complete their infants’ immunizations than those with lower knowledge levels. Knowledge forms the basis for awareness and confidence in the benefits of immunization, encouraging mothers to adopt positive health behaviors. These findings are

consistent with the study conducted by Hudhah & Hidajah (2018), which revealed that greater maternal knowledge enhances understanding of the importance of immunization in preventing infectious diseases. Similarly, Zulkifli et al. (2022) emphasized that adequate maternal knowledge can reduce vaccine hesitancy and increase participation in immunization programs.

#### **The Relationship Between Family Support and Immunization Compliance**

The study revealed a significant association between family support and maternal adherence to immunization ( $p = 0.039$ ). Mothers who received strong family support were more motivated to complete their infants' immunizations. Family support may take various forms, including emotional encouragement, practical assistance, and the provision of relevant information to help overcome barriers to accessing health services. These findings align with (Hafid et al., 2017), who noted that family participation, particularly from husbands, plays an essential role in increasing maternal compliance with immunization. When family members—especially husbands—provide motivation and assistance, mothers are more confident that immunization is safe and beneficial for their children. Therefore, family-centered education and counseling strategies should be strengthened to improve immunization coverage.

#### **The Relationship Between Anxiety Levels and Immunization Compliance**

The results also revealed a significant relationship between maternal anxiety levels and immunization compliance ( $p = 0.007$ ). Mothers with low anxiety levels were more likely to complete their infants' immunizations compared to those with moderate or high anxiety levels. Anxiety often arises from fear of post-immunization side effects, such as fever or swelling at the injection site. These findings are consistent with (Zafirah, 2021), who reported that maternal anxiety about vaccine side effects can decrease compliance with immunization schedules. Providing accurate information and post-immunization counseling is crucial to reducing anxiety and building trust in vaccine safety.

#### **Overall Findings**

Overall, this study indicates that maternal knowledge, family support, and anxiety levels are interrelated factors influencing immunization compliance. Knowledge and family support act as reinforcing factors, while anxiety serves as an inhibiting factor. These results highlight the importance of implementing community-based interventions through health education and psychosocial counseling to improve maternal understanding and confidence. Strengthening cooperation among healthcare workers, families, and community cadres can help increase full immunization coverage while simultaneously reducing infant morbidity and mortality associated with vaccine-preventable diseases.

#### **Study Limitations**

This research is not without limitations. The cross-sectional approach restricts the ability to infer a causal relationship between the studied variables. Moreover, other possible influencing factors, such as the involvement of health personnel, accessibility to healthcare facilities, socioeconomic conditions, and trust in vaccines, were not included in the analysis. Additionally, the study was confined to the operational area of a single Community Health Center, which may limit the generalizability of the findings to areas with differing social and cultural contexts.

## **CONCLUSION**

This study proves that maternal knowledge, family support, and anxiety levels have a significant relationship with maternal compliance in providing complete basic immunizations for infants. Mothers with sufficient knowledge and strong family support tend to complete their children's immunizations more consistently, whereas high levels of anxiety may hinder adherence. These findings align with the theoretical expectations outlined in the introduction, emphasizing that behavioral and psychosocial factors play an essential role in shaping immunization compliance

among mothers. The results of this study carry practical implications for improving maternal and child health programs. Enhancing health education through family-oriented counseling, encouraging the active participation of health workers, and providing psychological support for mothers can increase the rate of complete basic immunization. Furthermore, this study recommends that the Health Office and Community Health Centers integrate educational and psychological support aspects into the complete basic immunization program. Educational strategies should emphasize participatory learning and family-based counseling to strengthen mothers' understanding and confidence regarding vaccine safety and benefits. Meanwhile, psychological assistance programs – such as stress management training, individual counseling, or peer-support groups – can help reduce maternal anxiety and improve adherence to immunization schedules. Strengthening collaboration between health workers, families, and community leaders is also crucial to ensure continuous educational and emotional support for mothers at the community level. These policy recommendations are expected to enhance the effectiveness and sustainability of immunization programs and contribute to achieving national targets for complete basic immunization while reducing morbidity and mortality from vaccine-preventable diseases. In addition, future research is recommended to examine causal relationships between maternal psychosocial factors and immunization compliance through longitudinal or experimental study designs. Further studies should also include additional variables such as access to health facilities, socioeconomic status, and mothers' perceptions of vaccine risk to develop a more comprehensive model of factors influencing complete basic immunization. Such research would provide stronger evidence for designing targeted interventions and policymaking aimed at improving immunization coverage and child health outcomes.

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