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Analysis of Factors Associated With Basic Immunization Coverage In Infants

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ABSTRACT

Background: Basic immunization is mandatory from birth to protect infants from dangerous diseases, making its complete coverage an essential public health goal. Although its implementation in Indonesia is strictly regulated (Law No. 17/2023 and Minister of Health Regulation No. 36/2017), challenges to achieving full coverage persist. Therefore, this study is necessary to identify the factors influencing the completeness of basic immunization in infants.This study aims to analyze the factors associated with the completeness of basic immunization in infants.
Methods: This quantitative descriptive study employed a cross-sectional design. The study population comprised mothers with infants aged 0–12 months in Wotgalih Village, Jatinegara District, Tegal Regency. The sampling technique used was saturated sampling, where all respondents completed a questionnaire to analyze the factors influencing basic immunization completeness.
Results: The study results indicated a significant relationship between maternal knowledge, trust, and family support and the completeness of basic immunizations in infants. The significance values (p-value) for these relationships were 0.0004 (knowledge), 0.011 (trust), and 0.003 (family support).
Conclusion: Maternal knowledge, trust, and family support play a critical role in ensuring the completeness of basic immunizations. Efforts to improve these three factors are expected to effectively increase basic immunization coverage in the community

Keyword : Immunization; Infants; Knowledge; Family Support

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Background. Basic immunization is a mandatory health intervention administered to infants and children from birth to protect them from dangerous diseases. Complete basic immunization coverage is essential for infant growth and development and serves as a vital preventive measure to reduce child morbidity and mortality (Ministry of Health, 2020). In Indonesia, the implementation of immunization is regulated by Law No. 17 of 2023 concerning Health and Minister of Health Regulation No. 36 of 2017 concerning Immunization Administration. Although the government actively implements this program, various obstacles persist, necessitating a thorough analysis of their causes and the development of improvement strategies (Ministry of Health, 2021).

Globally, approximately 20 million children fail to receive routine immunizations each year. This failure has led to the re-emergence of several vaccine-preventable diseases, such as measles, pertussis, diphtheria, and polio, in both developed and developing countries (Rokom, 2023). In Indonesia, the trend in child mortality has shown a year-on-year decline; in 2022, infant deaths were recorded at 27,566, a decrease from 28,158 in 2021. However, approximately 73.1% of infant deaths occur during the neonatal period (0–28 days), and an estimated 5% of infant deaths in Indonesia are caused by diseases that could have been prevented by immunization (Ministry of Health, 2022; Rokom, 2023).

At the provincial level, the 2022 Central Java Health Profile indicates that the Under-

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five Mortality Rate (AKABA) remains high. The leading cause of postnatal death is pneumonia (32.1%), a condition preventable through DPT-HB-Hib and PCV immunizations (Dinkes, 2022). Furthermore, complete basic immunization coverage in Central Java decreased from 94.7% in 2021 to 86.7% in 2022. Specifically, in Tegal Regency, DPT-HB-Hib and measles immunization coverage saw a decline from 95.3% in 2021 to 92.3% in 2022, partly attributed to limited *Posyandu* (Integrated Health Post) services during the COVID-19 pandemic (Dinkes, 2022).

Jatinegara District, particularly Wotgalih Village, reported a significantly low rate of complete basic immunization coverage, reaching only 71.51% in 2022. Despite various interventions, including outreach by village midwives and the Catch-Up Immunization program, obstacles persist, such as community rejection often based on religious grounds (Nurali, 2022).

Incomplete basic immunization carries far-reaching impacts, including increasing the risk of serious illness in children, the potential for disease spread within the family and community, high medical costs, and reduced quality of life and life expectancy (Nurali, 2022). Factors commonly influencing immunization completeness include maternal knowledge, trust in immunization, and family support, especially the husband's role.

Given this context, this study is crucial for analyzing factors related to the completeness of basic immunization in infants, particularly in areas with low coverage, to support efforts aimed at improving child health and achieving national immunization targets

Methods. Study Design and Population This study used a quantitative cross-sectional design to analyze factors associated with the completeness of basic immunization in infants. The study population comprised all mothers with infants aged 0–12 months in Wotgalih Village, Jatinegara Subdistrict, Tegal Regency, totaling 50 individuals. Due to the small size of the population, a total population sampling (saturated sampling) technique was employed, meaning all 50 members of the population served as respondents.

Variables The independent variables were defined as maternal knowledge, belief in immunization, and family support. The dependent variable was the completeness of basic immunization in infants.

Data Collection and Instrument Validity Data were collected using a structured questionnaire covering all study variables. The instrument's validity was tested using the Pearson Product-Moment correlation at a 5% significance level (α=0.05). All questionnaire items were found to be valid, with r-values greater than the r-table (0.361). Reliability testing, conducted using Cronbach's alpha, yielded a score of α=0.962, confirming that the instrument was highly reliable and consistent.

Data Analysis Data were analyzed using the SPSS statistical software. Univariable analysis was performed to describe the frequency distribution and percentages of each variable. Bivariate analysis employed the Chi-square test to examine the relationship between the independent and dependent variables. Fisher's exact test was applied in cases where the assumptions for the Chi-square test were not met.

Ethical Considerations The study adhered strictly to ethical standards. Ethical clearance was obtained (No. 0954/EA/KEPK/2024), informed consent was secured from all respondents, and anonymity and confidentiality of the collected data were ensured throughout the study process.

Result and Discussion.

Characteristics of Respondents and Distribution of Main Variables

The following table presents the demographic profile of the respondents, including the infant's age (in months) and their mothers' characteristics: age, education, and occupation.

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Table 1. Characteristics of Respondents

Characteristic	Category	f(n)	(%)
Infant Age (Months)	9	8	16.0
	1, 2, 3	7 each	14.0 each
	4	6	12.0
	Other (5-12)	15	30.0
Mother's Age (Years)	20, 21	10 each	20.0 each
	30	8	16.0
	35	7	14.0
	Other (22-45)	15	30.0
Mother's Education	Junior High School	24	48.0
	Elementary/Senior High School	13 each	26.0 each
Mother's Occupation	Housewife	43	86.0
	Farmer/Merchant	5 / 2	10.0 / 4.0

The analysis of respondent characteristics shows that the infants' age distribution was relatively spread out. The largest proportion was observed in the 9-month-old category (16.0%). This age is crucial as it typically coincides with the Measles-Rubella (MR) immunization schedule, which may account for the high turnout in this specific age group. Regarding the mothers' characteristics, the population was predominantly young, with 40% of respondents aged 20 or 21 years, indicating a population of young parents. In terms of educational background, nearly half (48.0%) had attained only a Junior High School education. Furthermore, the vast majority of mothers (86.0%) were housewives. This demographic profile—characterized by young age, lower secondary education, and being predominantly homemakers—is common in similar community health settings and is likely to influence their access to health information and mobility for immunization services (Ministry of Health Republic of Indonesia, 2022).

The distribution of the main study variables is presented in Table 2. The results show a highly positive landscape: most mothers had good knowledge (88%), a strong belief in immunization (92%), and received supportive family support (82%). This favorable environment is reflected in the high rate of complete basic immunization coverage (84%).

Knowledge, Belief, Family Support, and Immunization Status

Table 2. Distribution of Knowledge, Belief, Family Support, and Immunization Status

Variable	Category	Frequency (n)	Percentage (%)
Knowledge Level	Good	44	88.0
	Fair	6	12.0
Belief Level	Believe	46	92.0
	Do Not Believe	4	8.0
Family Support	Supportive	41	82.0
	Not Supportive	9	18.0
Immunization Status	Complete	42	84.0
	Incomplete	8	16.0

The distribution of knowledge, belief, family support, and immunization status is presented in Table 2. The results show a highly positive landscape: most mothers had good knowledge (88%), a strong belief in immunization (92%), and received supportive family support (82%). This favorable environment is reflected in the high rate of complete basic immunization coverage (84%).

The findings of this study depict a highly positive landscape regarding maternal knowledge, belief, family support, and immunization status. The high percentage of complete basic immunization (84%) aligns with the generally high levels of the predisposing and enabling factors examined. This strong correlation suggests a synergistic relationship where good knowledge, positive beliefs, and robust family support collectively contribute to successful immunization completion.

The data reveals that the vast majority of mothers (88%) possessed a good level of knowledge about immunization. This is a crucial finding, as knowledge serves as the foundational pillar for health-seeking behaviour. Mothers with adequate knowledge are more likely to understand the function, schedule, and importance of vaccines, which directly influences their decision to vaccinate their children (Sari et al., 2022). The high knowledge score in this study is indicative of

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successful public health education and the effectiveness of information dissemination by healthcare workers, which has been shown to significantly improve immunization uptake (Kementerian Kesehatan RI, 2020).

Furthermore, an overwhelming majority of respondents (92%) held positive beliefs towards immunization. This finding resonates with the Health Belief Model, which posits that an individual's belief in the perceived benefits of a health action is a powerful predictor of their compliance (Rosenstock, 1974, as cited in Glanz et al., 2018). When mothers believe that vaccines are effective in preventing dangerous diseases and that the benefits far outweigh the perceived risks, they are more likely to follow through with the complete schedule. A recent study by Pratama (2021) in a similar setting confirmed that maternal belief in vaccine efficacy was the single strongest predictor of complete immunization status, underscoring the critical role of this cognitive factor.

In addition to individual factors, the social environment, particularly family support, plays an indispensable role. The results show that 82% of mothers received supportive family support. Family members, especially husbands and grandparents, often influence health decisions by providing tangible resources such as transportation, reminders for schedules, and financial assistance, as well as intangible emotional encouragement (Afifah et al., 2019). This support system reduces the barriers and burdens on the mother, making it easier to navigate the logistical challenges of accessing immunization services. The presence of strong family support acts as a reinforcing factor that transforms intention into action (Green et al., 2019).

The convergence of these three favorable factors—high knowledge, strong belief, and supportive family—creates an enabling environment that is clearly reflected in the high rate of complete immunization coverage (84%). This outcome supports the holistic framework that immunization completion is not merely a function of healthcare service availability but is deeply rooted in a complex interplay of individual cognition and social context (Winarsih, 2023). The small percentage of incomplete immunization (16%), while a minority, warrants attention. This group likely consists of mothers facing one or a combination of barriers, such as misinformation, vaccine hesitancy rooted in negative beliefs, or a lack of supportive social networks, highlighting areas for targeted intervention.

In conclusion, the findings demonstrate a strong positive association between maternal knowledge, belief, family support, and immunization status. The high coverage rate achieved in this study is a testament to the successful interplay of these factors. Future efforts to sustain and improve immunization rates should continue to emphasize comprehensive health education to strengthen knowledge and positive beliefs, while also designing family-centered interventions that actively engage and empower the entire family unit in the immunization process.

Relationships between believe the family support and imunization

Analysis of the relationship between the family support and immunization Completeness, including the frequency of immunization status and the significance value (p-value)

Table 3. Relationship between Independent Variables and Immunization Completeness

Independent Variable	Immunization Status		p-value
	Complete n (%)	Incomplete n (%)	
Knowledge Level			0.004*
Good	40 (90.9%)	4 (9.1%)	
Fair	2 (33.3%)	4 (66.7%)	
Belief Level			0.011*
Believe	41 (89.1%)	5 (10.9%)	
Do Not Believe	1 (25.0%)	3 (75.0%)	
Family Support			0.003*
Supportive	38 (92.7%)	3 (7.3%)	
Not Supportive	4 (44.4%)	5 (55.6%)	

The Interplay of Maternal Knowledge and Immunization Completeness

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The robust association between maternal knowledge and immunization completeness (p=0.004) reinforces the fundamental role of health education. The finding that 90.9% of mothers with good knowledge had fully immunized children strongly supports the Health Belief Model. This model suggests that when individuals perceive a health threat as serious (e.g., childhood diseases) and believe in the benefits and feasibility of a preventive action (immunization), they are more likely to adopt the recommended behavior (Glanz et al., 2015). Good knowledge empowers mothers to navigate the immunization process confidently, from understanding the schedule to managing common side effects, thereby reducing drop-out rates. This is consistent with a study by Safford et al. (2019), which found that structured educational interventions significantly improved immunization completion rates by addressing knowledge gaps. However, the presence of four children with incomplete immunization despite their mothers' good knowledge indicates that knowledge alone is not a silver bullet. Barriers such as distance to health facilities, time constraints, or temporary unavailability of vaccines can still hinder even the most knowledgeable mothers (Rainey et al., 2011).

Navigating the Landscape of Trust and Immunization Belief

The significance of belief (p=0.011) highlights a critical layer beyond factual knowledge: the dimension of trust. In the context of immunization, belief encompasses trust in the healthcare system, the safety of vaccines, and the credibility of the information source. The dramatic difference in completion rates between believing (89.1%) and non-believing (25%) mothers underscores that doubt can be a more powerful deterrent than a lack of information. This finding resonates with global research on vaccine hesitancy, which identifies "complacency" and "lack of confidence" as core psychological antecedents (MacDonald & SAGE Working Group on Vaccine Hesitancy, 2015). In many communities, beliefs are shaped by socio-cultural narratives and information (or misinformation) spread through social networks and media, as noted by Hestiningsih (2024). Therefore, countering misinformation requires building resilient trust through transparent communication, community engagement, and leveraging trusted influencers, such as religious leaders or respected local figures, to endorse immunization (Larson et al., 2014).

Family Support as the Social Scaffolding for Health Behavior

The strongest association observed was with family support (p=0.003), emphasizing that a mother's health decisions are embedded within a family system. The data is striking: 92.7% of mothers with supportive families achieved full immunization. Family support acts as a practical and emotional buffer against barriers. Instrumental support, such as a husband taking time off work to accompany the mother to the *posyandu* or providing financial resources for transportation, directly enables access. Emotional and informational support reinforces the mother's decision and helps her resist pressure from anti-vaccination narratives. This aligns with the social support theory, which posits that support enhances an individual's ability to cope with stressors (Sarafino & Smith, 2011). For housewives, who constituted the majority of respondents, the husband's role is particularly pivotal. Studies have shown that involving fathers in reproductive and child health programs leads to better outcomes, as they are often key decision-makers (Arias et al., 2022). The low completion rate (44.4%) among mothers without family support illustrates how social isolation or opposition within the household can cripple the best intentions.

Synergy of Factors and Programmatic Implications

The synergy between knowledge, belief, and support is critical. A mother with good knowledge is better equipped to build a strong,

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evidence-based belief and to effectively advocate for support within her family, a process aligned with the concept of health empowerment (Anderson & Funnell, 2010). Conversely, a supportive family environment can encourage a mother to seek out accurate knowledge and strengthen her belief in the face of doubts. This synergy implies that public health programs must be integrated. Siloed interventions that focus solely on education may fail if deep-seated mistrust or a lack of social support is the primary barrier (Milat et al., 2015).

Therefore, a multi-pronged strategy is essential:

1. Empowerment through dialogue: Move beyond one-way health messaging to participatory dialogues where mothers' concerns can be heard and addressed by trusted healthcare providers.
2. Community-centric trust building**:** Engage entire communities, including fathers, grandparents, and community leaders, in immunization advocacy to create a normative environment that supports vaccination (Larson et al., 2014).
3. Strengthening support systems: Integrate support mechanisms into health services, such as forming mother support groups or providing counseling sessions for families, to reinforce positive health decisions.

In conclusion, achieving and sustaining high immunization coverage requires understanding and addressing the interconnected layers of individual knowledge, personal belief, and the social context of the family. This holistic, socio-ecological approach is key to closing the immunization gap and ensuring every child is protected from vaccine-preventable diseases.

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