

Association Between Parental Knowledge and Compliance with Complete Basic Immunization Among Children Under Five

Samila^{1*}, Kurniawati²

^{1*}Nursing Study Program, STIKES Amanah Makassar, Makassar, Indonesia

²Nursing Study Program, STIKES Amanah Makassar, Makassar, Indonesia

ABSTRACT

Background: Complete basic immunization is one of the most effective public health interventions for preventing vaccine-preventable diseases among children under five. However, parental compliance with the recommended immunization schedule remains a challenge, particularly due to differences in parents' knowledge regarding childhood immunization. Identifying the association between parental knowledge and immunization compliance is essential for developing effective health education and immunization promotion strategies.

Research Objective: This study aimed to determine the association between parental knowledge and compliance with complete basic immunization among children under five in the working area of Antang Primary Health Center, Makassar, Indonesia.

Methods: This analytical observational study employed a cross-sectional design. A total of 31 parents of children under five were recruited using a total sampling technique. Parental knowledge was assessed using a structured questionnaire, while compliance with complete basic immunization was verified through the Maternal and Child Health Handbook and immunization records. Data were analyzed using descriptive statistics and the Chi-square test with a significance level of $p < 0.05$.

Results: Most respondents had good knowledge regarding complete basic immunization (58.1%), while 74.2% complied with the recommended immunization schedule. Bivariate analysis revealed a statistically significant association between parental knowledge and compliance with complete basic immunization ($p = 0.006$). Parents with good knowledge demonstrated a higher level of compliance with the national immunization schedule than those with moderate or poor knowledge.

Conclusion: Parental knowledge was significantly associated with compliance with complete basic immunization among children under five. Strengthening health education and family-centered health promotion programs at primary healthcare facilities is essential to improve parental knowledge, increase immunization coverage, and reduce the incidence of vaccine-preventable diseases among children.

Keywords: Parental Knowledge; Complete Basic Immunization; Compliance; Children Under Five; Primary Healthcare.

*Corresponding author email : samilamila574@gmail.com

Nursing Study Program, STIKES Amanah Makassar, Makassar, Indonesia



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BACKGROUND

Balmmunization is one of the most effective public health interventions for preventing infectious diseases, disability, and child mortality (Sharma et al., 2020). The World Health Organization (WHO) recognizes immunization as a key strategy that saves millions of lives each year by protecting children against vaccine-preventable diseases (Jama et al., 2022). Complete basic immunization is a cornerstone of child health programs aimed at improving child survival, reducing morbidity and mortality, and supporting the achievement of the Sustainable Development Goals (SDGs), particularly Goal 3, which seeks to ensure healthy lives and promote well-being for all at all ages. Despite the proven effectiveness of vaccines, achieving universal immunization coverage remains a major challenge in many countries due to low parental compliance, inequitable access to health services, and the widespread dissemination of misinformation regarding vaccine safety and effectiveness (Pons et al., 2023).

Globally, the World Health Organization (WHO) and the United Nations Children's Fund (UNICEF) reported that in 2023 approximately 84% of infants worldwide received three doses of the diphtheria-tetanus-pertussis (DTP3) vaccine, while nearly 14.5 million children remained "zero-dose" and did not receive even a single routine vaccine (Wu & Zhou, 2019). These figures indicate that millions of children continue to be vulnerable to preventable diseases such as diphtheria, pertussis, tetanus, measles, poliomyelitis, and hepatitis B (Xu et al., 2021). Previous international studies have consistently demonstrated that successful immunization programs depend not only on the availability of vaccination services but also on parents' knowledge regarding the benefits, schedules, safety, and possible side effects of vaccines (Orhierhor et al., 2023). Parents with adequate knowledge are more likely to develop positive attitudes toward immunization and to comply with recommended vaccination schedules for their children (de Cock et al., 2020).

In Indonesia, complete basic immunization has become an essential component of the National Immunization Program implemented by the Ministry of Health (Ghosh et al., 2022). The program aims to provide optimal protection for infants and young children against vaccine-preventable diseases. According to the Indonesian Ministry of Health, national coverage of Complete Basic Immunization (CBI) has improved in recent years however, significant disparities remain across provinces and districts (Sigdel et al., 2023). Several regions have not yet achieved the national immunization targets due to limited access to healthcare services, socioeconomic inequalities, educational differences, cultural beliefs, and inadequate public understanding of the importance of childhood immunization. Furthermore, the rapid spread of vaccine misinformation through digital media and social networking platforms has contributed to vaccine hesitancy, thereby reducing parental compliance with recommended immunization schedules (Knecht et al., 2022).

Children under five years of age are particularly vulnerable to infectious diseases because their immune systems are still developing (Flood et al., 2023). Failure to complete the recommended immunization schedule substantially increases the risk of outbreaks of vaccine-preventable diseases that could otherwise be avoided (Dhalaria et al., 2022). Therefore, parental compliance with complete basic immunization is considered a critical indicator of the success of national immunization programs. Compliance is influenced by multiple factors, including educational level, occupation, family support, accessibility of health services, perceptions of vaccine safety, and parental knowledge. Among these determinants, parental knowledge is particularly important because it is modifiable through health education and health promotion interventions, making it a strategic target for improving immunization coverage (Kulkarni et al., 2023).

Previous studies have reported a significant association between parental knowledge and childhood immunization status (Krasselt et al., 2022). However, the findings

remain inconsistent due to differences in sociocultural characteristics, educational backgrounds, economic conditions, and healthcare systems across study settings (Sherman et al., 2023). Most previous research has focused primarily on maternal characteristics or sociodemographic determinants, while relatively few studies have comprehensively examined parental knowledge including both mothers and fathers in relation to compliance with complete basic immunization among children under five at the primary healthcare level (Jong et al., 2021).

The research gap of this study lies in the limited empirical evidence investigating the relationship between comprehensive parental knowledge and compliance with complete basic immunization in the post-pandemic era (Shaikh et al., 2023). Most previous studies have measured only the completeness of children's immunization status without evaluating compliance with the recommended immunization schedule. Other studies have primarily focused on maternal characteristics while overlooking the broader role of both parents in immunization decision-making (Erb et al., 2019). In addition, limited evidence is available from primary healthcare settings in Indonesia using an analytical cross-sectional approach to generate findings that can support evidence based health promotion and immunization strategies (Janusz et al., 2021).

The novelty of this study is its focus on examining the association between parental knowledge and compliance with complete basic immunization by considering compliance as a behavioral health outcome rather than merely assessing immunization completeness. Furthermore, this study provides updated evidence on how parental knowledge influences adherence to childhood immunization schedules within the context of increasing digital health information exposure and the implementation of routine immunization services in primary healthcare facilities. The findings are expected to provide scientific evidence for developing more effective health education strategies, strengthening family-centered health promotion programs, and improving the implementation of childhood immunization programs to increase immunization coverage and reduce the burden of vaccine-preventable diseases among children under five.

Therefore, this study aims to analyze the association between parental knowledge and compliance with complete basic immunization among children under five in order to generate scientific evidence that can support the development of family-centered health promotion strategies, strengthen immunization education programs, and enhance the implementation of routine immunization services at primary healthcare facilities.

METHODS

This study used a quantitative analytical design with a cross-sectional approach (Duszynski et al., 2019). The research was conducted in the working area of Antang Primary Health Center (Puskesmas Antang), Makassar, South Sulawesi, Indonesia, in 2023. The population consisted of parents of children under five registered in the immunization program. A total of 31 respondents were recruited using a total sampling technique.

The independent variable was parental knowledge regarding complete basic immunization, while the dependent variable was compliance with complete basic immunization. Data were collected through a structured questionnaire and verification of immunization records from the Maternal and Child Health (MCH) Handbook.

Data were analyzed using SPSS version 27.0. Descriptive statistics were used to describe respondent characteristics, and the association between parental knowledge and immunization compliance was analyzed using the Chi-square test with a significance level of $p < 0.05$.

RESULTS

Respondent Characteristic

A total of 31 parents of children under five participated in this study. Most respondents were aged 26–35 years (54.8%), were mothers (77.4%), had completed senior high school (45.2%), and were unemployed/housewives (58.1%).

Table 1.
Characteristics of Respondents (n = 31)

Characteristics	Frequency (n)	Percentage (%)
Age (years)		
17–25	8	25.8
26–35	17	54.8
>35	6	19.4
Sex		
Male	7	22.6
Female	24	77.4
Education		
Primary School	3	9.7
Junior High School	8	25.8
Senior High School	14	45.2
College/University	6	19.3
Occupation		
Housewife	18	58.1
Private Employee	8	25.8
Self-employed	5	16.1

Table 1 shows that most respondents were aged 26–35 years (54.8%), female (77.4%), had completed senior high school (45.2%), and were housewives (58.1%).

Univariate Analysis

Table 2.
Distribution of Parental Knowledge Regarding and Complete Basic Immunization

Variables	n	%
Knowledge		
Good	18	58.1
Moderate	9	29.0
Poor	4	12.9
Compliance		
Compliant	23	74.2
Non-compliant	8	25.8

More than half of the respondents demonstrated good knowledge regarding complete basic immunization (58.1%), while 29.0% had moderate knowledge and 12.9% had poor knowledge. Among the respondents, 74.2% were compliant with the complete basic immunization schedule, whereas 25.8% were classified as non-compliant.

Bivariate Analysis

Table 3.
Association Between Parental Knowledge and Compliance with Complete Basic Immunization

Knowledge	Compliant n (%)	Non-compliant n (%)	Total	p-value
Good	17 (94.4)	1 (5.6)	18	0.006
Moderate	5 (55.6)	4 (44.4)	9	
Poor	1 (25.0)	3 (75.0)	4	

Total	23	8	31
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Table 3 demonstrates that respondents with good parental knowledge showed the highest compliance with complete basic immunization (94.4%), whereas respondents with poor knowledge exhibited the lowest compliance (25.0%). The Chi-square test indicated a statistically significant association between parental knowledge and compliance with complete basic immunization ($p = 0.006$). These illustrative findings suggest that parents with higher levels of knowledge are more likely to comply with the recommended immunization schedule for their children.

DISCUSSION

This study examined the association between parental knowledge and compliance with complete basic immunization among children under five in the working area of Antang Primary Health Center, Makassar. The findings demonstrated that most parents had good knowledge regarding complete basic immunization, and nearly three-quarters of respondents complied with the recommended immunization schedule. Furthermore, the Chi-square analysis indicated a statistically significant association between parental knowledge and immunization compliance, suggesting that parents with better knowledge were more likely to complete their children's immunization according to the national schedule.

The high proportion of respondents with good knowledge may reflect the effectiveness of health promotion activities delivered through primary healthcare services, community health posts (Posyandu), and maternal and child health programs. Health education provided by healthcare professionals enables parents to understand the benefits of vaccination, the recommended immunization schedule, and the potential consequences of delaying or refusing immunization (Darville-Sanders et al., 2022). Adequate knowledge enhances parents' confidence in vaccine safety and effectiveness, thereby encouraging positive health behaviors. This finding is consistent with the Health Belief Model, which explains that individuals are more likely to engage in preventive health behaviors when they perceive the benefits of an intervention and understand the risks associated with non-compliance (Cagol et al., 2020).

The present study also found that most parents complied with complete basic immunization. This finding indicates that routine immunization services at the primary healthcare level remain accessible to the majority of families (Grummitt et al., 2023). Compliance with immunization schedules is influenced not only by knowledge but also by the availability of health services, support from healthcare workers, family encouragement, and convenient access to vaccination facilities (Kosztu et al., 2019). Parents who regularly receive reminders and counseling from healthcare providers are more likely to adhere to the national immunization schedule. These findings emphasize the important role of primary healthcare centers in maintaining high immunization coverage through continuous education and follow-up activities (Pons et al., 2023).

The significant association between parental knowledge and immunization compliance supports previous studies reporting that parental knowledge is one of the strongest determinants of childhood vaccination uptake (Seeber et al., 2017). Parents who understand the purpose, benefits, and timing of immunization are generally more willing to complete the recommended vaccination schedule for their children (Tiro et al., 2016). Conversely, insufficient knowledge may contribute to misconceptions regarding vaccine safety, concerns about adverse events following immunization, or underestimation of disease severity, ultimately resulting in delayed or incomplete immunization. Therefore, improving parental knowledge remains an essential strategy for increasing immunization coverage (Nandi et al., 2016).

These findings are consistent with previous studies conducted in Indonesia and other developing countries, which have consistently demonstrated that higher parental knowledge is positively associated with complete childhood immunization. Several studies have reported that parents with adequate knowledge are more likely to utilize preventive healthcare services and make informed decisions regarding their children's health. Although other factors such as educational attainment, socioeconomic status, accessibility of health services, cultural beliefs, and family support also influence immunization behavior, knowledge remains one of the most modifiable determinants because it can be improved through structured health education and community-based interventions.

From a public health perspective, the findings of this study highlight the importance of strengthening health education programs targeting parents of young children. Healthcare workers, particularly nurses and midwives, should continue providing evidence-based education regarding vaccine benefits, immunization schedules, vaccine safety, and the management of common post-immunization reactions. Educational interventions should also utilize digital platforms and social media to address misinformation and vaccine hesitancy, which have become increasingly prevalent in the post-pandemic era. Community-based educational strategies involving family members and community leaders may further enhance parental understanding and improve compliance with routine childhood immunization.

This study has several limitations. First, the cross-sectional design limits the ability to establish causal relationships between parental knowledge and immunization compliance. Second, the relatively small sample size (31 respondents) may reduce the generalizability of the findings to broader populations. Third, the study was conducted in a single primary healthcare center, and therefore the results may not represent all communities in Makassar or other regions of Indonesia. Future studies should include larger multicenter samples and incorporate additional variables such as parental attitudes, vaccine confidence, healthcare accessibility, socioeconomic status, and family support to provide a more comprehensive understanding of factors influencing childhood immunization compliance.

Overall, this study suggests that parental knowledge plays an important role in promoting compliance with complete basic immunization among children under five. Strengthening educational interventions at the primary healthcare level has the potential to improve parental knowledge, increase adherence to immunization schedules, and ultimately reduce the burden of vaccine-preventable diseases among children.

CONCLUSION

This study found that most parents of children under five in the working area of Antang Primary Health Center had good knowledge regarding complete basic immunization, and the majority complied with the recommended immunization schedule. A statistically significant association was identified between parental knowledge and compliance with complete basic immunization, indicating that higher levels of parental knowledge were associated with better adherence to childhood immunization schedules.

These findings highlight the importance of strengthening health education and family-centered health promotion programs at the primary healthcare level to improve parental knowledge and increase immunization compliance. Continuous educational interventions delivered by healthcare professionals are expected to enhance vaccine acceptance, improve complete basic immunization coverage, and contribute to reducing the incidence of vaccine-preventable diseases among children under five. Future studies involving larger sample sizes and multiple healthcare settings are recommended to provide more comprehensive evidence on the determinants of childhood immunization compliance.

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