



Correlation between Mothers' Knowledge about Pentabio Immunization and Anxiety about the Effects of Immunization at Lemo 1 Health Center

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Abstract Parents' anxiety, especially mothers', regarding the effects of immunization remains a factor influencing the implementation of basic immunization in children. Pentabio immunization is a mandatory vaccine in the national immunization program to prevent diphtheria, pertussis, tetanus, hepatitis B, and *Haemophilus influenzae* type b. However, negative perceptions and anxiety regarding possible side effects after immunization can hinder the acceptance and implementation of immunization. This study aims to analyze the relationship between mothers' knowledge level regarding Pentabio immunization and their anxiety level regarding the effects of immunization in children at the Lemo 1 Community Health Center. This study used an observational analytical design with a cross-sectional approach. The sample consisted of 30 mothers selected using a purposive sampling technique. The research instruments included a 15-item knowledge questionnaire and a modified Hamilton anxiety scale. Data analysis was performed using the Chi-square test with an alternative Fisher's Exact Test at a significance level of 0.05. The results showed a significant relationship between mothers' knowledge level and anxiety ($p = 0.048$). Respondents with low knowledge levels tended to have higher anxiety levels compared to mothers with good knowledge. The conclusion of this study shows that maternal knowledge plays an important role in reducing anxiety regarding Pentabio immunization, so that structured education and effective health communication are needed in immunization services at primary health facilities.

Keywords: Anxiety; Immunization Effects; Maternal Knowledge; Pentabio Immunization; Toddlers.

1. INTRODUCTION

Immunization is one of the most effective public health interventions in preventing morbidity and mortality from infectious diseases in children. Globally, immunization is estimated to prevent more than 4.4 million deaths annually, especially in the toddler age group (WHO, 2024). Pentabio immunization (DPT-HB-Hib) is a multivalent vaccine recommended by WHO to prevent diphtheria, pertussis (whooping cough), tetanus, hepatitis B, and *Haemophilus influenzae* type b infection, which can cause pneumonia and meningitis (Oliveira et al., 2022). Despite the strong benefits of immunization, parental anxiety, especially among mothers, often hinders access to complete and timely immunization. This remains a global challenge that impacts basic immunization coverage in various countries, including Indonesia (Liu et al., 2023).

In Indonesia, immunization is part of a national program aimed at increasing coverage of complete basic immunizations for toddlers. However, according to a 2023 report from the Indonesian Ministry of Health, national Pentabio immunization coverage has yet to reach the Minimum Service Standards (SPM) target, with significant variation across regions. One of the causes of low immunization coverage is maternal anxiety about post-immunization side effects, such as fever, local pain, swelling, or other immunological reactions (Agustina & Putra, 2022). A national study conducted by Hernanda and Yulianti (2021) showed that more than 40% of

mothers experienced moderate to severe anxiety before their children received the Pentabio immunization, which resulted in delays or even refusals of immunization.

Maternal knowledge about immunization is a crucial factor contributing to attitudes and emotional responses, including anxiety. According to the *Health Belief Model (HBM)*, knowledge levels influence perceptions of risks, benefits, barriers, and beliefs about taking health actions (Glanz et al., 2020). Mothers with good knowledge tend to have a more rational understanding of the benefits of immunization and the risks of mild and temporary side effects (Saidah et al., 2022). Conversely, a lack of knowledge can increase anxiety, especially when combined with exposure to invalid information, misinformation, or social stigma (Ariani & Fitri, 2020). In the context of the COVID-19 pandemic, misinformation about vaccines has proliferated and influenced public perceptions of routine childhood immunization (Rahmah & Santoso, 2023). Previous research has demonstrated a relationship between maternal knowledge levels and anxiety about immunization. A study by Budiarti et al. (2021) found that mothers with good knowledge had lower anxiety levels before DPT-HB-Hib immunization. Similarly, research in Yogyakarta by Anggraeni and Prabowo (2022) showed a significant relationship between immunization knowledge and maternal acceptance and emotional well-being. However, several other studies reported conflicting results. Research by Kurniawan and Lestari (2023) found no significant relationship between knowledge levels and anxiety, stating that anxiety was more influenced by social environmental factors, previous experiences, and family support. This inconsistency indicates a *research gap* that requires further exploration, particularly in regional contexts with diverse community characteristics.

In primary health care in Indonesia, community health centers (Puskesmas) and community health centers (Pustu) play a crucial role in providing education, counseling, and accurate information about immunization to mothers and their families. However, education is often uneven, unstandardized, or conducted after immunizations have been administered, making it less effective in reducing pre-immunization anxiety (Suryaningsih et al., 2022). An internal report from the Lemo 1 Community Health Center (UPT Pustu Lemo 1) (2024) revealed cases of mothers displaying high levels of anxiety, crying, requesting immunization delays, or returning home without receiving immunization services. Furthermore, data indicate that some mothers have low knowledge about Pentabio immunization despite regularly attending integrated health posts (Posyandu). Given these conditions, this study is crucial to further understand the relationship between mothers' knowledge levels regarding Pentabio immunization and anxiety about the effects of immunization. This understanding is necessary to develop community-based education strategies to ensure effective immunization programs

and psychological acceptance by parents. Thus, the aim of this study was to analyze the relationship between the level of maternal knowledge about Pentabio immunization and the level of anxiety regarding the effects of immunization on children at Pustu Lemo 1. The findings of this study are expected to provide a scientific basis for the development of educational interventions, health promotion, and immunization service policies that are more responsive to the psychological conditions of mothers.

2. RESEARCH METHOD

Research design

This study used an observational analytical design with a cross-sectional approach, where maternal knowledge and anxiety were measured simultaneously without any specific intervention or treatment. This approach was chosen to directly identify the relationship between the two variables in the study population and to reflect actual conditions in the field.

Location and Time of Research

This research was conducted at the Lemo 1 Community Health Center (Pustu Lemo 1), a primary healthcare facility. This location was chosen because it serves as a routine Pentabio immunization center and has a history of fluctuating immunization rates over the past two years. The study was conducted from January to February 2025, covering the preparation, data collection, and analysis stages .

Research Population and Sample

The population in this study was all mothers who brought their children for Pentabio immunization at the Lemo 1 Community Health Center during the study period. The sample was determined using a purposive sampling technique, taking into account the inclusion criteria: mothers with children aged 2–6 months according to the Pentabio immunization schedule, able to read and write, and willing to participate by signing an informed consent. Meanwhile, exclusion criteria included mothers with a history of anxiety disorders or those undergoing psychological therapy, as well as respondents who did not complete the questionnaire. Based on these criteria, a sample of 30 respondents was obtained who met the requirements for analysis in this study.

Research Variables

This study consisted of two main variables: the independent variable and the dependent variable. The independent variable was the mother's level of knowledge regarding Pentabio immunization, measured using a structured knowledge questionnaire. The dependent variable

was the mother's level of anxiety regarding the effects of immunization, measured using an anxiety scale instrument that had been modified to suit the research needs.

Research Instruments

The research instrument consisted of two questionnaire sections. The first section was a 15-item Pentabio immunization knowledge questionnaire with a score of 0 for incorrect answers and 1 for correct answers. The second section was an anxiety level questionnaire using a modified Hamilton Anxiety Rating Scale (HARS), consisting of 14 items with a scoring range of 0–4 per item. The instrument's content validity was examined by two immunization experts and one health psychologist, with a *valid category*. The reliability test showed a Cronbach's Alpha value of 0.89, indicating excellent reliability.

Research Procedures

The research procedure began with coordination with the Community Health Center (Pustu) and an explanation of the research to potential respondents. After respondents agreed to provide informed consent, questionnaires were administered and completed independently in the immunization service room, accompanied by the researcher. The questionnaires took 10–15 minutes to complete. The researcher then checked the completeness of the answers and documented the data according to the tabulation format. If there were any missing answers, respondents were asked to complete them to prevent *missing data bias*.

Data Analysis

The data were analyzed through several stages. The first stage was a descriptive analysis to describe the distribution of respondents' knowledge and anxiety levels. The second stage was a Shapiro–Wilk normality test as a requirement for further testing because the sample size was <50. The third stage was a Chi-square test analysis to determine the relationship between the two variables. If the table requirements were not met, an alternative analysis used Fisher's Exact Test. All tests were conducted with a significance level of $\alpha = 0.05$, so a *p-value* <0.05 is interpreted as a statistically significant relationship.

3. RESULTS AND DISCUSSION

Results

Respondent Characteristics

This section presents an overview of the basic characteristics of the study respondents to provide demographic context and profiles of the mothers who participated in the study. Respondent characteristics include maternal age, highest level of education, and occupation, which are presented in the form of frequency distributions and percentages.

Table 1. Distribution of Respondent Characteristics (n = 30).

Characteristics	Category	Frequency (n)	Percentage (%)
Mother's Age	< 20 years	6	20.0
	20–35 years	20	66.7
	> 35 years	4	13.3
Education	Elementary School	3	10.0
	JUNIOR HIGH SCHOOL	7	23.3
	SENIOR HIGH SCHOOL	14	46.7
	College	6	20.0
Work	Housewife	18	60.0
	Self-employed	7	23.3
	Employee/Profession	5	16.7

Table 1 shows that the majority of respondents were in the 20–35 age group (66.7%), which is considered a healthy reproductive age. Based on education level, the majority of respondents had a high school education (46.7%), while the primary education group (SD) had the lowest percentage (10.0%). In terms of occupation, the majority of respondents were housewives (60.0%), followed by self-employed respondents (23.3%) and employees/professionals (16.7%). This distribution indicates that the majority of respondents had a secondary education background and did not work in the formal sector, which could potentially influence information-seeking patterns and emotional responses to immunization.

Mother's Level of Knowledge about Pentabio Immunization

This section presents the distribution of mothers' knowledge levels regarding Pentabio immunization based on the results of the questionnaire scores which have been categorized into three categories, namely good, sufficient, and less.

Table 2. Distribution of Mothers' Knowledge Levels regarding Pentabio Immunization (n = 30).

Knowledge Category	Frequency (n)	Percentage (%)
Good	10	33.3
Enough	13	43.3
Not enough	7	23.3
Total	30	100

Table 2 shows that the majority of respondents (13 respondents or 43.3%) had sufficient knowledge regarding Pentabio immunization. Ten respondents (33.3%) had good knowledge, while seven respondents (23.3%) had insufficient knowledge. This distribution indicates that although some mothers have sufficient understanding of Pentabio immunization, a significant

proportion still have insufficient knowledge, which can potentially influence attitudes and emotional responses, including anxiety, during the immunization procedure.

Maternal Anxiety Levels Regarding the Effects of Immunization

This section presents the distribution of maternal anxiety levels when children receive Pentabio immunization, based on the scores from the anxiety scale instrument which has been classified into four anxiety level categories.

Table 3. Distribution of Mothers' Anxiety Levels Regarding the Effects of Immunization (n = 30).

Anxiety Category	Frequency (n)	Percentage (%)
No Worries	5	16.7
Mild Anxiety	12	40.0
Moderate Anxiety	10	33.3
Severe Anxiety	3	10.0
Total	30	100

Table 3 shows that the majority of respondents were in the mild anxiety category, with 12 respondents (40.0%), followed by 10 respondents (33.3%) in the moderate anxiety category. Five respondents (16.7%) were in the no anxiety category, and three respondents (10.0%) were in the severe anxiety category. These findings indicate that the majority of mothers still experience anxiety regarding the Pentabio immunization procedure, although most experienced mild to moderate anxiety, rather than severe anxiety. This pattern may reflect a combination of concerns about immunization side effects and an understanding of the benefits of immunization for children.

Analysis of the Relationship between Mothers' Knowledge Level and Anxiety Levels Regarding the Effects of Immunization

This section presents the results of a bivariate analysis to determine the relationship between maternal knowledge regarding Pentabio immunization and anxiety levels regarding the effects of immunization. The analysis was performed using the Chi-square test. Due to the small frequency of some cells, the calculations were continued using Fisher's Exact Test as an alternative test to ensure the validity of the results.

Table 4. Relationship between Knowledge Level and Mother's Anxiety Level (n = 30).

Level of Knowledge	No Worries	Mild Anxiety	Moderate Anxiety	Severe Anxiety	Total n (%)
Good	4	4	2	0	10 (33.3)
Enough	1	6	5	1	13 (43.3)
Kurang	0	2	3	2	7 (23.3)
Total	5	12	10	3	30 (100)

Uji Fisher's Exact: $p = 0.048$

Table 4 shows differences in the distribution of anxiety levels based on mothers' knowledge of Pentabio immunization. Mothers with good knowledge tended to have lower anxiety, with the majority falling into the no-anxiety and mild-anxiety categories. Conversely, respondents with less knowledge tended to fall into the moderate-to-severe anxiety categories. Fisher's Exact Test showed a p-value of 0.048, indicating a statistically significant relationship between mothers' knowledge and anxiety levels regarding the effects of immunization. Therefore, the lower the mothers' knowledge, the higher the tendency for them to experience anxiety during the Pentabio immunization procedure.

Discussion

The results of this study indicate a significant relationship between maternal knowledge about Pentabio immunization and anxiety levels regarding the effects of immunization on children at the Lemo 1 Community Health Center. Fisher's exact test ($p = 0.048$) confirmed that the higher the maternal knowledge level regarding immunization, the lower the anxiety level. This finding reinforces the concept that knowledge plays a crucial role in shaping a person's risk perception, psychological responses, and health behaviors, including in the decision-making process regarding child immunization. Physiologically, anxiety is influenced by the perception of threat and uncertainty; when someone has a good understanding of a health procedure, the perception of threat tends to decrease, resulting in lower anxiety (Mulyani & Safitri, 2022).

This study aligns with the findings of Rahmawati and Handayani (2023), who reported that maternal knowledge about immunization was negatively associated with pre-vaccination anxiety in infants aged 2–6 months. A similar finding was also found in the study by Widyaningsih and Putra (2021), which showed that mothers with good knowledge tended to be calmer and more accepting of immunization procedures despite being aware of possible side effects such as fever or swelling. This relationship can be explained through *Information Processing Theory*, which states that individuals with sufficient information tend to process stimuli rationally, thereby reducing excessive emotional responses (Hendra et al., 2022). A similar study by Bararah and Yuniarti (2022) showed that mothers with low knowledge were twice as likely to experience moderate to severe anxiety before DPT-HB-Hib immunization. This suggests that ignorance about the vaccine's purpose, mechanism of action, and possible side effects can lead to fear, doubt, and resistance. On the other hand, research by Oktaviani and Dewi (2020) showed different results, finding no significant relationship between knowledge and anxiety. These differences are likely influenced by other aspects such as

previous immunization experience, family support, and exposure to information based on experience or opinion, rather than scientific fact.

In addition to knowledge, the effects of information from social media can also amplify or weaken anxiety. According to a study by Pranata and Suryanto (2022), exposure to invalid or provocative information about immunization can increase anxiety even if individuals have sufficient basic knowledge. This is relevant to conditions in Indonesian society, where the spread of hoaxes related to immunization remains a significant challenge in the child vaccination program (Zainuddin & Karimah, 2023). In some cases, misinformation even leads to vaccine refusal, particularly for multivalent immunizations like Pentabio, which are considered "riskier because they contain multiple antigens in one injection" (Fitriansyah & Nuraini, 2022). This study's findings can also be linked to the clinical concept of *anticipatory anxiety*, which is anxiety that arises before a medical procedure due to anticipated discomfort or side effects (Latifah & Nurhayati, 2021). Mild side effects such as fever and injection pain from Pentabio immunization can trigger anxiety, especially in mothers with previous negative experiences. Mahendra and Lisnawati's (2024) study strengthens this by finding that previous experiences play a major role in shaping anxiety, even more dominant than knowledge factors in certain populations.

The clinical implications of this research are crucial for primary care healthcare workers. Mothers with low knowledge and high anxiety require a more empathetic and personalized communication approach, not just technical information about immunization. A study by Darwin and Khalida (2023) found that individual counseling before vaccination can reduce maternal anxiety by up to 50% and increase compliance with basic immunizations. Furthermore, group-based educational interventions, such as mother-to-toddler classes or integrated health post (Posyandu) counseling, have been shown to improve mothers' understanding and emotional preparedness before immunization procedures (Saraswati et al., 2022). This study provides additional evidence that health education not only enhances cognitive aspects but also has emotional value in preparing parents for child health procedures. Therefore, education about immunization should be structured, using simple communication methods, visual media, and based on scientific evidence to ensure it is easily understood by all levels of education. This way, anxiety can be managed, immunization acceptance increases, and immunization coverage targets can be achieved.

4. CONCLUSION

This study aimed to determine the relationship between mothers' knowledge level regarding Pentabio immunization and their anxiety regarding the effects of immunization on children. The results showed a significant relationship between the two variables, with mothers with better knowledge tending to have lower levels of anxiety. This finding reinforces the concept that adequate understanding of health procedures can reduce perceived risk and uncertainty, thereby helping mothers feel more prepared and confident when their children receive immunizations. Scientifically, these results support the theory that knowledge influences not only health behaviors but also emotional responses in the context of medical services. The findings of this study provide important clinical implications, namely the need for structured education, effective communication, and the provision of accurate and easy-to-understand information to mothers before immunization procedures. With an appropriate educational approach, maternal anxiety can be minimized and acceptance of immunization can be increased. Furthermore, the results of this study can be used as a basis for developing health promotion programs, training cadres, and improving the quality of immunization services in primary health care facilities.

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