



# The relationship between maternal knowledge and timeliness of basic immunization in infants aged 0-12 months

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## ABSTRACT

**Background:** The global infant mortality rate remains a significant concern, with a rate of 28.2 per 1,000 live births recorded in 2019. In Indonesia, the infant mortality rate reached 24 per 1,000 live births in 2022, and efforts to reduce this include immunization, as the World Health Organization (WHO) reports that around 1.5 million children die annually from preventable diseases, including a rising 15% mortality rate due to diphtheria in Indonesia in 2020.

**Purpose:** To analyze the relationship between maternal knowledge and timeliness of basic immunization in infants aged 0-12 months.

**Methods:** This study employs a quantitative research method with a correlational descriptive design and a cross-sectional approach, using purposive sampling to select a sample of 86 respondents. Data was collected through maternal knowledge questionnaires and observation sheets from mother and child notebooks, and the analysis was conducted using the Spearman test.

**Results:** The study found that the majority of mothers, 40 respondents (46.5%), had good knowledge about basic immunization, followed by 30 respondents (34.9%) with adequate knowledge, and 16 respondents (18.6%) with insufficient knowledge. At Puskesmas Rawalele, almost all basic immunizations for infants aged 0-12 months were administered on time (76.7%), and there was a significant relationship between maternal knowledge and the timeliness of basic immunization, with a p-value of < 0.001.

**Conclusion:** Maternal knowledge about basic immunization plays a crucial role in ensuring the timely administration of vaccines to infants. Consequently, public health initiatives focusing on increasing awareness and education about immunization among mothers could be instrumental in achieving higher compliance and better health outcomes for infants.

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## 1. Background

The issue of child health, particularly in developing countries, represents a significant concern within the field of public health. The infant mortality rate (IMR) remains alarmingly high worldwide. According to the World Bank, the global IMR in 2019 was 28.2 per 1,000 live births. In Indonesia, the IMR in 2022 was reported to be 24 per 1,000 live births. The World Health Organization (WHO) has highlighted that approximately 1.5 million children die annually from diseases that could be prevented through immunization. Specifically, in 2020, the mortality rate due to

diphtheria in Indonesia was about 15% and has shown a rising trend. The infant mortality rate serves as an indicator of a country's health development level and the quality of life of its population. Efforts to reduce IMR include implementing immunization programs, as mothers who can ensure complete immunization for their infants can prevent diseases that may lead to disability and death[1]–[3].

Immunization is one of the most successful and cost-effective public health interventions globally, preventing an estimated 2-3 million deaths

each year. The World Health Organization (WHO) emphasizes the importance of timely vaccination in early childhood to protect against various infectious diseases such as measles, diphtheria, pertussis, and poliomyelitis. Despite the proven benefits of immunization, achieving high coverage and timeliness remains a challenge in many parts of the world, particularly in low- and middle-income countries [2]–[5].

In Indonesia, the government has made significant efforts to increase immunization coverage through its national immunization program. Despite these efforts, challenges remain in achieving timely immunization for infants aged 0-12 months. The Indonesian Demographic and Health Survey (IDHS) highlights that while overall immunization coverage has improved, timeliness remains an issue, with many children receiving vaccines later than recommended [1], [3]

Maternal knowledge plays a critical role in the uptake and timeliness of infant immunization. Studies have shown that mothers with a good understanding of vaccination schedules, the diseases they prevent, and the importance of adhering to recommended timelines are more likely to ensure that their children receive vaccinations on time. Conversely, a lack of awareness or misconceptions about vaccines can lead to delays or missed vaccinations, thereby increasing the risk of outbreaks of vaccine-preventable diseases. Factors influencing maternal knowledge include education level, access to healthcare information, cultural beliefs, and socio-economic status. Healthcare systems worldwide have recognized the need for targeted educational interventions to improve maternal knowledge and address barriers to timely immunization [3], [5]–[7].

Maternal knowledge is a critical determinant of timely immunization in Indonesia. Cultural factors, such as traditional beliefs about health and vaccination, can influence maternal attitudes towards immunization. Additionally, disparities in education and access to healthcare services between urban and rural areas can result in differences in maternal knowledge and, consequently, immunization timeliness. Research in Indonesia has indicated that enhancing maternal education about the importance of vaccines and their schedules can significantly improve the timeliness of immunizations. Public health campaigns and community-based interventions focusing on educating mothers, particularly in rural and

underserved areas, are crucial for addressing these gaps [3], [6], [8], [9]

In 2021, the infant mortality rate at Puskesmas Rawalele was recorded at five infant deaths, according to the Subang health profile (2021). Additionally, the coverage for Complete Basic Immunization (IDL) at Puskesmas Rawalele showed a decline of 4.5% between July and December, achieving only 90.5% of the 95% target by December (Puskesmas Rawalele, 2022) [10]. A preliminary study conducted at Puskesmas Rawalele on March 9, 2023, revealed that among seven mothers questioned about basic immunization, four demonstrated insufficient knowledge on the subject. This lack of understanding could potentially affect the timeliness of immunization administration in infants. In light of these issues, the researcher is interested in conducting a study titled “the relationship between maternal knowledge and timeliness of basic immunization in infants aged 0-12 months”.

## 2. Methods

The methods follow the following structure:

### 2.1 Research design

The type of research employed is quantitative research. The study utilizes a descriptive correlational research design with a cross-sectional approach.

### 2.2 Setting and sample

This study was conducted at Puskesmas Kalijati Subang from April to May 2023. The sampling technique employed in this research was purposive sampling, with a sample size of 86 respondents.

### 2.3 Instruments and data collection

The independent variable, maternal knowledge, will be measured using a questionnaire on basic immunization knowledge developed by Eka Fitriani (2017), which has been validated and shown to be reliable with a Cronbach's Alpha of 0.746. The questionnaire comprises 16 items, including 1 question on the definition of immunization, 2 questions on the objectives of immunization, 9 questions on types of immunization, and 4 questions on the immunization schedule. Scoring is based on the Guttman scale, with correct answers scoring 1 and incorrect answers scoring 0. The dependent variable, the timeliness of basic immunization, will be measured by analyzing the KMS/KIA book.

## 2.4 Data analysis

The collected data will be processed and analyzed using statistical techniques. Data entry and processing will be conducted with the SPSS software, version 25. Given that the data is ordinal, the Spearman test will be employed for statistical analysis. Descriptive analysis will be presented based on frequency distribution and percentages.

## 2.5 Research ethics

The ethical principles of this research are providing informed consent, the right to autonomy, confidentiality, justice, and anonymity.

## 3. Results

Results analysis showed that In this study, the majority of respondents were aged 20-29 years (51.2%), most were high school graduates or equivalent (43.0%), and nearly all respondents were unemployed, being housewives (73.3%). Detailed information on the respondents' demographic characteristics is provided in Table 1.

**Table 1. Respondent characteristics**

Characteristics	Frequency	Percentage
Age		
20-29 year old	44	51.2%
30-39 year old	39	45.3%
40-49 year old	3	3.5%
Education level		
No School	0	0
Elementary School	14	16.3%
Junior High School	25	29.1%
High School	37	43.0%
College	10	11.6%
Occupation		
Housewife	63	73.3%
Farmer/Laborer	10	11.6%
Self-Employed	6	7.0%
Civil Servant	3	3.5%
Other	4	4.7%

The findings on maternal knowledge regarding basic immunization indicate that the majority of mothers possess good knowledge, comprising 40 respondents (46.5%), followed by 30 respondents (34.9%) with adequate knowledge. A total of 16 respondents (18.6%) have insufficient knowledge

about basic immunization. At Puskesmas Rawalele, the timeliness of basic immunizations to infants aged 0-12 months was timely in nearly all cases (76.7%). Detailed information on maternal knowledge is provided in Table 2.

**Table 2. Mother's knowledge and timeliness of basic immunizations**

Characteristics	Frequency	Percentage
Mother's Knowledge		
Less	16	18.6%
Moderate	30	34.9%
Good	40	46.5%
Timeliness of basic immunizations		
Not On Time	20	23.3
On Time	66	76.7

The results of the analysis The relationship between maternal knowledge and the timeliness of basic immunization for infants aged 0-12 months at Puskesmas Rawalele is significant, with a p-value of

less than 0.001, Detailed information regarding the relationship between these two variables is provided in Table 3.

**Table 3. Correlation of Mother's knowledge and timeliness of basic immunizations**

Mother's knowledge	Timeliness of basic immunizations				Total	
	Not on time		On time		F	%
	f	%	f	%		
Less	14	87.5	2	12.5	16	100.0
Moderate	5	16.7	25	83.3	30	100.0
Good	1	2.5	39	97.5	40	100.0
<i>p-value</i>	<b>0.001</b>					

**4. Discussion**

The analysis reveals a significant relationship between maternal knowledge and the timeliness of basic immunization for infants aged 0-12 months at Puskesmas Rawalele, with a p-value of less than 0.001. This indicates that higher levels of maternal knowledge are closely associated with more timely administration of immunizations.

The significant p-value underscores the critical role maternal education plays in public health. Educated mothers are better informed about the importance of timely immunizations, the immunization schedule, and the potential health risks of delayed vaccinations, leading to more diligent adherence to immunization schedules [9], [11], [12].

Maternal knowledge regarding the proper immunization schedule, the benefits of timely immunizations, and the consequences of delayed vaccinations significantly impacts the timeliness of immunization administration. Informed parents are more likely to ensure their children receive immunizations on schedule to avoid potential health risks[12]–[14].

A mother's role is pivotal in family health behaviors, including adherence to immunization schedules, which are crucial for a child's health. Immunizations are vital for newborns' growth, enhancing their immune systems. Despite this, many parents tend to delay vaccinations, undermining their effectiveness[3], [5], [15].

Immunization schedules are designed for optimal vaccine efficacy and immune response. Delays can hinder the body's ability to recognize pathogens, making timely immunizations essential. Parents often struggle with deciding the appropriate time for immunizations due to

concerns about side effects and lack of accurate information [5], [14], [15].

Thus, comprehensive maternal knowledge about immunizations is crucial. Common issues such as ignorance about the importance of immunizations, the appropriate timing, and fears of side effects can lead to preventable diseases in children. Educated mothers are more likely to seek timely immunizations for their children [3], [5], [6].

These results highlight the need for effective educational programs by healthcare providers to enhance maternal knowledge about immunizations. Tailored programs should address knowledge gaps and emphasize both the benefits of immunizations and the risks of non-compliance [4]–[6], [14]–[16].

Overall, the study emphasizes the importance of maternal education in achieving optimal health outcomes for infants. Targeted educational interventions can improve adherence to immunization schedules, reducing the incidence of vaccine-preventable diseases among infants.

**5. Conclusion**

The study concludes that maternal knowledge about basic immunization plays a crucial role in ensuring the timely administration of vaccines to infants. The significant correlation between mothers' understanding and the promptness of immunization suggests that enhancing maternal education could improve immunization rates and reduce delays. Consequently, public health initiatives focusing on increasing awareness and education about immunization among mothers could be instrumental in achieving higher compliance and better health outcomes for infants.

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