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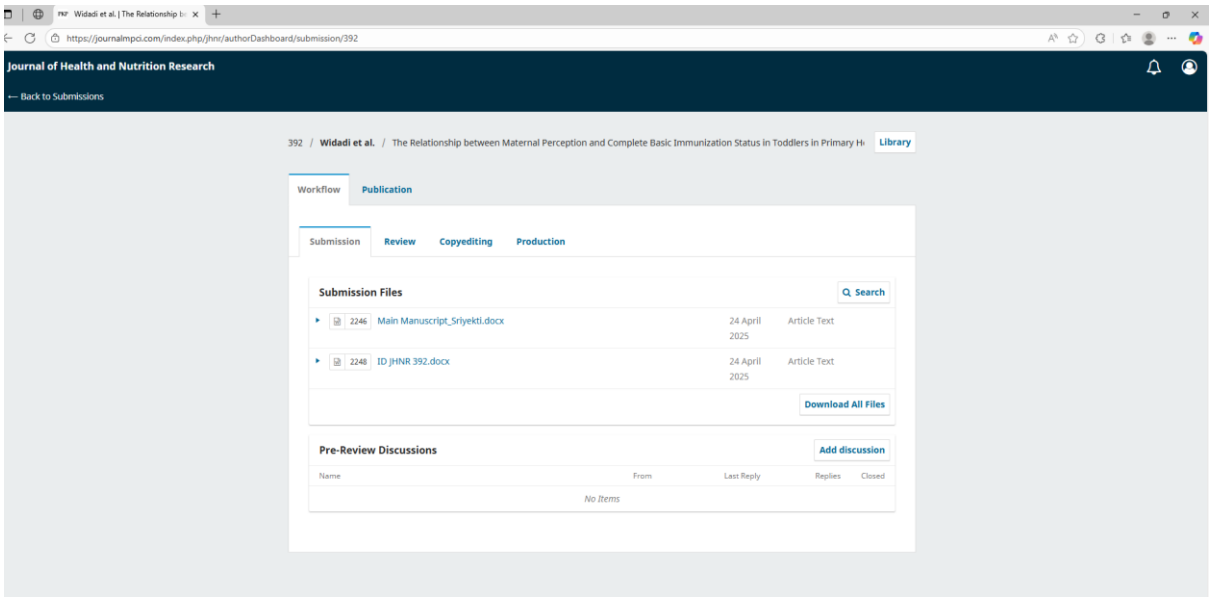

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The Relationship between Maternal Perception and Complete Basic Immunization Status in Toddlers in Primary Health Care

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ABSTRACT

Basic immunization coverage remains a challenge in Indonesia's public health efforts despite being a national priority program. Maternal perception is considered one of the factors that influence the completeness of immunization in children. This study aims to determine the relationship between maternal perceptions and the completeness of basic immunization status in toddlers in primary health care. This study is a quantitative study with a cross-sectional design involving 69 mothers who have children aged 9-24 months. Respondents were selected using a quota sampling technique. Data were collected through a standardized and validated questionnaire consisting of 10 items to measure maternal perceptions and basic immunization status, then analyzed descriptively and using the Chi-Square test. Most mothers (94.2%) had a positive perception of immunization, and 72.46% of children had received complete basic immunization. However, the results of statistical analysis showed no significant relationship between maternal perceptions and completeness of basic immunization (p = 0.3). Although the

majority of mothers had positive perceptions, it was not significantly associated with children's basic immunization status. This finding indicates that other factors, such as vaccine availability, access to health services, and social support, may have a greater role in influencing immunization practices.

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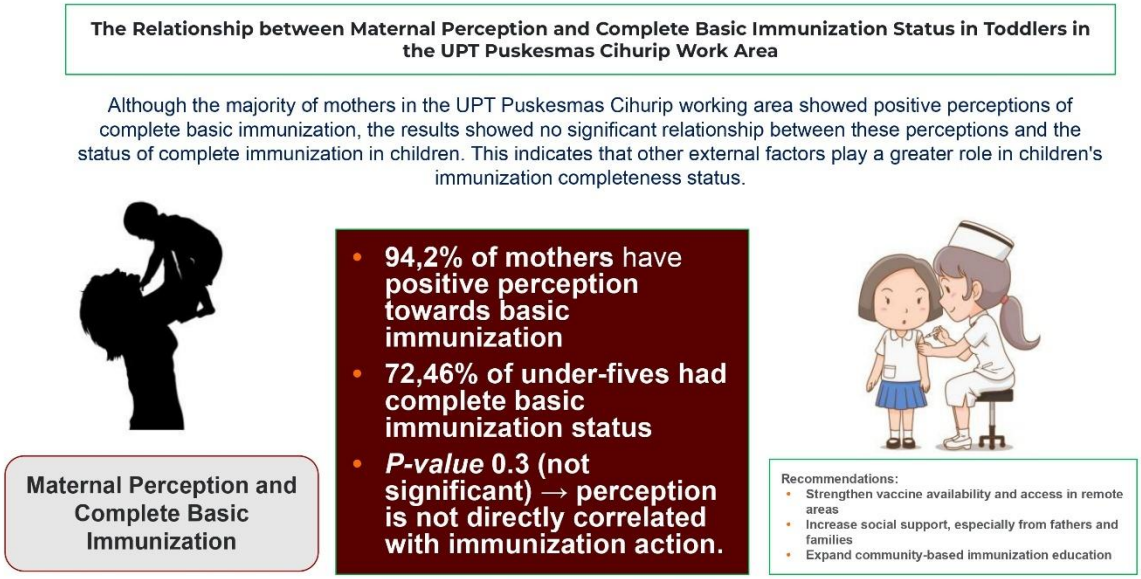
Key Messages:

- *Although the majority of mothers in the primary health care showed positive perceptions of complete basic immunization, the results showed no significant relationship between these perceptions and the status of complete immunization in children. This indicates that other external factors play a greater role in children's immunization completeness status.*



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Introduction

Immunization is one of the basic rights of children guaranteed in the public health service system in Indonesia (1). Child vaccination coverage is one of the five priority health programs in Indonesia. Despite its widespread availability, the implementation of immunization programs in Indonesia still faces various challenges, especially in ensuring equitable access for all children in Indonesia (2). According to a UNICEF report, over the past three years, around 67 million children worldwide have not been immunized, making it the biggest setback in routine childhood immunization coverage in three decades (3). In Indonesia, the downward trend in immunization coverage also affects the achievement of national targets. Data shows that in 2020, complete basic immunization coverage for infants aged 0 to 11 months was recorded at 84.2%. This figure increased slightly to 84.5% in 2021. However, there was a significant increase in the number of children who had not received any immunization at all, jumping from 10% in 2019 to 26% in 2021 (4).

The main purpose of immunization is to stimulate the formation of individual and group immunity, so that the risk of spreading Immunization Preventable Diseases (IPD3) can be minimized or even stopped (5). Basic immunization itself refers to the administration of initial vaccinations that aim to achieve an immune level above the protection threshold. In infants under 12 months of age, the types of basic immunizations required include BCG, measles, DPT, hepatitis B, IPV, and polio vaccines (6–8). However, basic immunization coverage in the community is inseparable from various determinants, especially those related to sociodemographic characteristics and parental behavior (2). Various studies suggest that parental knowledge, attitudes, and behaviors regarding basic immunization are interconnected and influenced by several factors such as education level, age, employment status, effectiveness of health promotion, and support from the social environment (9).

Immunization is part of the national health development priority agenda, as outlined in the 2020-2024 National Medium-Term Development Plan document. (10). However, its implementation was hampered during the COVID-19 pandemic, which triggered a drastic decline in the coverage of routine immunization services until early 2022 (11). The decline has an impact on the increasing number of cases of diseases that can be prevented through immunization (12). National data shows that more than 1.5 million children were not fully immunized from 2017 to 2021 (13). The achievement of complete basic immunization (IDL) in West Java province also shows a decrease, which is 87.4% in 2020 and 89.9% in 2021; this figure still does not reach the national target (14). This suggests that disruptions to the continuity of immunization programs during the pandemic have a medium-term impact on public health status.

Perception can be defined as a view or judgment that develops in society and is often formed based on what is visible to the naked eye (15). This finding confirms that internal maternal factors play an important role in determining the success of basic immunization coverage in children. Parents' decision to provide or not

provide complete basic immunization to their children is strongly influenced by their perception of immunization itself. Individual perceptions are formed through interactions with various factors, such as the social environment, social rules, and community life principles that apply to the quality of health services available, past personal experiences, and individual needs and motivations. These factors indirectly shape parents' frame of mind in assessing the benefits and risks of immunization, which then becomes the basis for decision-making related to compliance with the child immunization program (16).

The results of research conducted by (17) showed a significant relationship between maternal characteristics including age, education level, and employment status with compliance in providing immunization to children. In addition, cognitive and affective aspects such as the level of knowledge, attitudes, and actions of mothers towards immunization also have a significant correlation with the level of compliance, with a significance value of p = 0.01 for each variable. The COVID-19 pandemic has had a significant impact on the global public's perception of the importance of childhood vaccinations. A UNICEF report found that positive perceptions of childhood vaccinations have decreased in 52 out of 55 countries surveyed. In several nations, including the Republic of Korea, Papua New Guinea, Ghana, Senegal, and Japan, childhood vaccination rates dropped by over one-third. This suggests a decline in public confidence in immunizations during the pandemic, which could lead to lower immunization coverage and a heightened risk of outbreaks of vaccine-preventable diseases (3).

Initial findings from a preliminary study conducted in the primary health care with a simple Rapid Convenience Assessment (RCA) approach, it was found that 40% of respondent mothers had not provided complete basic immunization to their children. The main reason is the mother's perception that immunization has no urgency, as well as the belief that the absence of immunization will not harm the child's health. This happened even though health workers in the area have made various educational efforts, including providing counseling to parents about the importance of immunization as a step to build children's immunity, which aims to prevent the onset of PD3I diseases. Based on this background explanation, this study aims to examine how mothers' perceptions are associated with the completeness of basic immunizations among toddlers at primary health care facilities.

METHODS

The research applied a quantitative method using a cross-sectional study design. The target population comprised 323 mothers with children under two years old who reside in the primary health care areas of West Java, Indonesia. Samples were chosen according to specific inclusion criteria, which included mothers residing in the same area who have children aged 9 to 24 months. Quota sampling was used as the sampling technique, and the final sample size consisted of 62 participants, but to anticipate the possibility of missing data due to the absence of respondents, the number was increased by 10%, so that the total sample used in this study was 69 people.

Data was obtained through filling out a questionnaire aimed at measuring mothers' perceptions related to complete basic immunization in children, which has also been tested for validity and reliability in the working area in primary health care at West Java, Indonesia. The questionnaire consisted of 10 questions, of which 5 were positive and 5 were negative. The results of the validity test showed that the calculated r value for the 10 question items was greater than the r table value, which was between 0.641 to 0.871, while the r table was 0.4227. Thus, it can be concluded that all items in the questionnaire are valid. The reliability test for this instrument was conducted on 10 questions, resulting in a Cronbach alpha value of 0.854, which indicates that this questionnaire is reliable because the Cronbach alpha coefficient value ≥ 0.60.

The initial stage in data collection was that the respondents were given a consent form and given an explanation of the purpose and benefits of the study as well as the respondents' rights (autonomy) as research subjects and they were allowed to decide whether they would participate. The respondents were informed that their confidentiality would be protected. Data was collected during July 2024. This study conducted demographic data analysis, respondent characteristics data analysis, as well as analysis of each variable. The data will be presented using frequency distribution tables in the main variable analysis. The collected data is then calculated as the value of the score. The frequency of each variable for the perception variable (Positive = 65 people and Negative = people). As for the complete basic immunization status of children (Complete = 50 people and Incomplete = 19 People). The data in this study have obtained written consent from the

respondents.

CODE OF HEALTH ETHICS

Ethical approval for this study was granted by the Research Ethics Committee of STIKes Karsa Husada Garut, under the approval number 002072/KEP STIKes Karsa Husada Garut/2024.

RESULTS

A total of 69 mothers who have children aged two years or less and live in the primary health care setting were sampled in this study. Data on the characteristics of respondents were then classified based on several demographic aspects, including age, latest education level, number of children owned, and employment status.

Table 1. Demographic Characteristics of Respondents (n=69)

Characteristics of Respondents	Frequency (*f*)	Percentage (%)
Age		
<20	5	7,25
21 – 30	45	65,22
31 – 40	14	20,29
>40	5	7,25
Education		
Elementary School	29	42,03
Junior High School	28	40,58
Senior High School	12	17,39
Number of children		
1 Person	25	36,23
2 – 3 Person	39	56,52
4 – 5 Person	3	4,35
>5 Person	2	2,90
Employment Status		
Work	0	0
Not Work	69	100

According to the data in Table 1, most respondents fall within the 21 to 30-year age range (45%), and the predominant level of education is elementary school (42.03%). In addition, most respondents had two to three children (56.52%), and all of them did not a job or were unemployed (100%).

Table 2. Perceptions of mothers in the primary health care (n=69)

Perceptions	Frequency (*f*)	Percentage (%)
Positive	65	94,2
Negative	4	5,8

Based on the data in Table 2, it is known that most mothers in the primary health care have a positive perception of basic immunization in toddlers (94.2%), while only a small proportion of respondents showed a negative perception (5.8%).

Table 3. Complete Basic Immunization Status of Toddlers in the primary health care (n=69)

Basic Immunization Status	Frequency (*f*)	Percentage (%)
Complete	50	72,46
Incomplete	19	27,54

The data in Table 3 shows that most toddlers have received complete basic immunizations, with 50 children, or 72.46% achieving basic complete immunization and a small proportion of toddlers have incomplete immunization status, namely 19 children or 27.54%.

Table 4. Relationship between Maternal Perception and Complete Basic Immunization Status in primary health care (n=69)

Perception	Complete		Incomplete		*p-value*	OR
	f	%	*f*	%		
Negative	2	2,9	2	2,9	0,3	0,318
Positive	48	69,57	17	24,64		

The analysis presented in Table 4 reveals that 65 respondents (94.20%) had a positive perception of immunization. The Chi-square test yielded a p-value of 0.3 ($p > 0.05$), leading to the acceptance of the null hypothesis (H_0). These findings indicate that there is no significant correlation between mothers' perceptions and the completeness of basic immunization status in toddlers within primary health care settings.

DISCUSSION

Perception is an individual's interpretation of an object or event based on experience, knowledge, and stimuli received through the five senses. In the context of health, perceptions often reflect subjectively formed beliefs or opinions and are influenced by how individuals interpret visible or perceived information from the surrounding environment (15). The findings in Table 4 indicate that most respondents held a positive perception of immunization. This is supported by the Chi-Square test results, which produced a p-value of 0.3 ($p > 0.05$), suggesting no significant relationship between maternal perception and the completion of basic immunization in children. Consistent with these results, there was no relationship found between maternal perception and immunization status in 12-month-old infants (18). Although most mothers have a positive perception of immunization, it is not always followed by concrete actions in completing basic immunization of children, because it can be influenced by various factors beyond individual control.

Complete basic immunization status is influenced by several factors that can be divided into enabling factors and reinforcing factors. Enabling factors related to the completeness of child immunization include the availability and ease of accessing available health facilities and infrastructure, which play an important role in determining the status of basic immunization in children, this includes the availability of vaccines, distance or accessibility to health services, and service time (19,20). The study revealed that the unavailability of vaccines at the time of the immunization schedule was one of the main factors that led to children not getting immunized. Vaccine availability was shown to be a determining factor that influenced participants' decisions not to complete basic immunizations (21). Incomplete vaccines at health care facilities such as puskesmas can cause a sense of disappointment among the community, This condition has the potential to reduce the motivation of the community to re-access immunization services, which has an impact on the incomplete immunization status of children. (22). Mothers with closer home distances to immunization service facilities tend to be 3.13 times more likely to complete basic immunization in their babies compared to respondents who have a greater home distance, This suggests that geographical accessibility plays an important role in determining the completeness of basic immunization (23).

Meanwhile, push factors include support from the closest social environment, such as husband or parents, knowledge, and socio-cultural conditions, which include habits and traditions that support the provision of complete immunization to children (24,25). Family support is closely related to the traditions that apply in the family environment, if the family tradition is accustomed to providing immunization to children, family members tend to provide support for the implementation of immunization (24,26). In the family setting, both fathers and mothers play a role in maintaining children's health. However, in a patriarchal culture, the father's dominance as a decision-maker makes his involvement very influential on the completeness of

immunization, as women have limited autonomy in decision-making (27). Gender inequality embedded in social structures means that mothers do not have full control over decision-making regarding their children's health. Despite mothers' positive views on immunization, the dominant role of fathers in decision-making can be a significant barrier in ensuring complete immunization of children, given mothers' limitations in influencing such decisions (28). Fathers' support plays an important role in shaping mothers' attitudes towards child immunization, so fathers' involvement and approval can increase the likelihood of mothers to provide complete immunization. The results showed that most fathers had inadequate knowledge related to child immunization. This condition indicates that father's involvement in the immunization process plays an important role. Fathers who participate and accompany their children during immunization tend to have better knowledge about immunization schedules and completeness, which in turn can contribute to improving children's immunization status (29,30).

Maternal knowledge regarding understanding of the types of basic immunizations, preventable diseases, immunization schedules, the number of doses given, and the benefits of immunization, as well as attitudes and support from health workers, including the provision of information and counseling about immunization, influences the mother's decision to complete her child's immunization (31). There are barriers for parents to fulfill immunization in children, such as fear of developmental delays, as well as concerns about the risks of immunization in children (32). In addition, parents' perceptions of immunization are often influenced by concerns about possible side effects that can be experienced by children after immunization, this can cause doubts and anxiety in parents, thus becoming one of the inhibiting factors in making decisions to immunize children (33). The role of health workers is very important in reducing negative perceptions and increasing the completeness of immunization in children. Research shows that mothers who experience negative attitudes from health workers are 3.8 times more likely not to be fully immunized, compared to mothers who are fully immunized (34).

CONCLUSION

The results showed that most respondents had a positive perception of complete basic immunization (94.2%), and the majority of children had received complete basic immunization (72.46%). However, statistical analysis showed that there was no significant relationship between maternal perception and complete basic immunization status of children ($p = 0.3$). This finding indicates that mothers' positive perception of immunization is not always directly proportional to the implementation of complete basic immunization. This indicates that other factors, such as access to health services, vaccine availability, geographical distance, and social support from the surrounding environment, may have a more dominant influence on children's immunization completeness.

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All authors contributed to this manuscript, including conceptualization, literature and theory search, direction and guidance, and feedback on the manuscript.

CONFLICTS OF INTEREST

The authors declare no conflict of interest.

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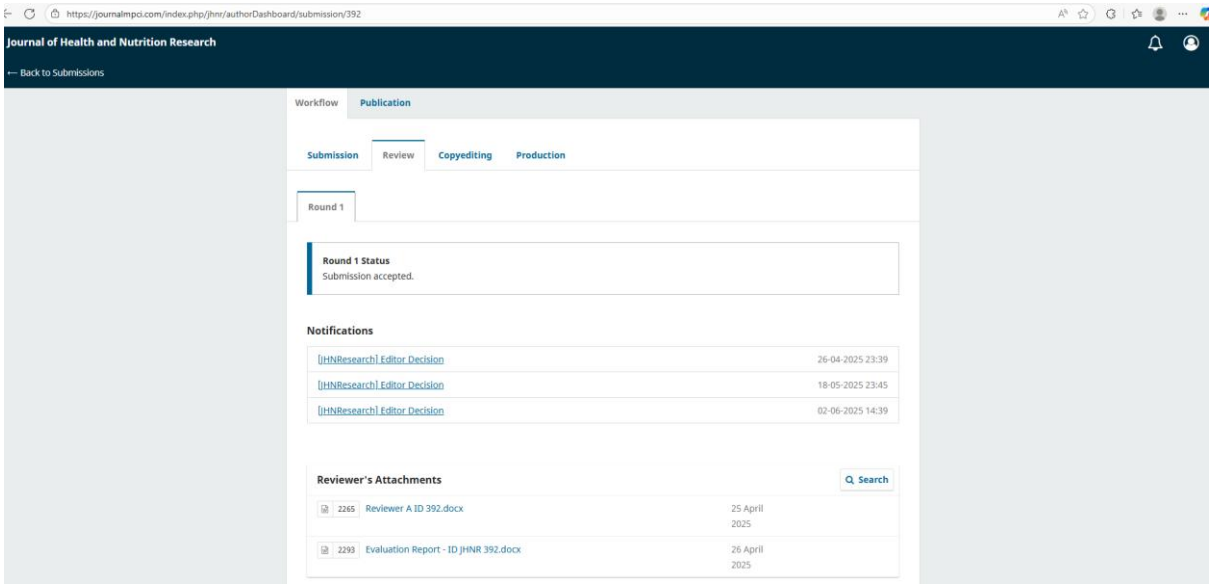

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The Relationship between Maternal Perception and Complete Basic Immunization Status in Toddlers in Primary Health Care in Garut City

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ABSTRACT

Introduction: Basic immunization coverage remains a challenge in Indonesia's public health efforts despite being a national priority program. Maternal perception is considered one of the factors that influence the completeness of immunization in children. Maternal perceptions of immunization can play an important role in determining the completeness of child immunization, as the decision to provide immunization is often influenced by the mother's beliefs and knowledge about the benefits of vaccines. **Objectives:** This study aims to determine the relationship between maternal perceptions and the completeness of basic immunization status in toddlers in primary health care. **Methods:** This study is a quantitative study with a cross-sectional design involving 69 mothers who have children aged 9-24 months. Respondents were selected using a quota sampling technique. Data were collected through a standardized and validated questionnaire in the Indonesian version. The data were analyzed univariately using frequency distribution and bivariately with the Chi-Square test. **Results**: Most mothers (94.2%) had a positive perception of

immunization, and 72.46% of children had received complete basic immunization. However, the results of statistical analysis showed no significant relationship between maternal perceptions and completeness of basic immunization (p = 0.3; OR= 0,31).
Conclusion: Although the majority of mothers had positive perceptions, it was not significantly associated with children's basic immunization status. This finding indicates that other factors, such as vaccine availability, access to health services, and social support, may have a greater role in influencing immunization practices.

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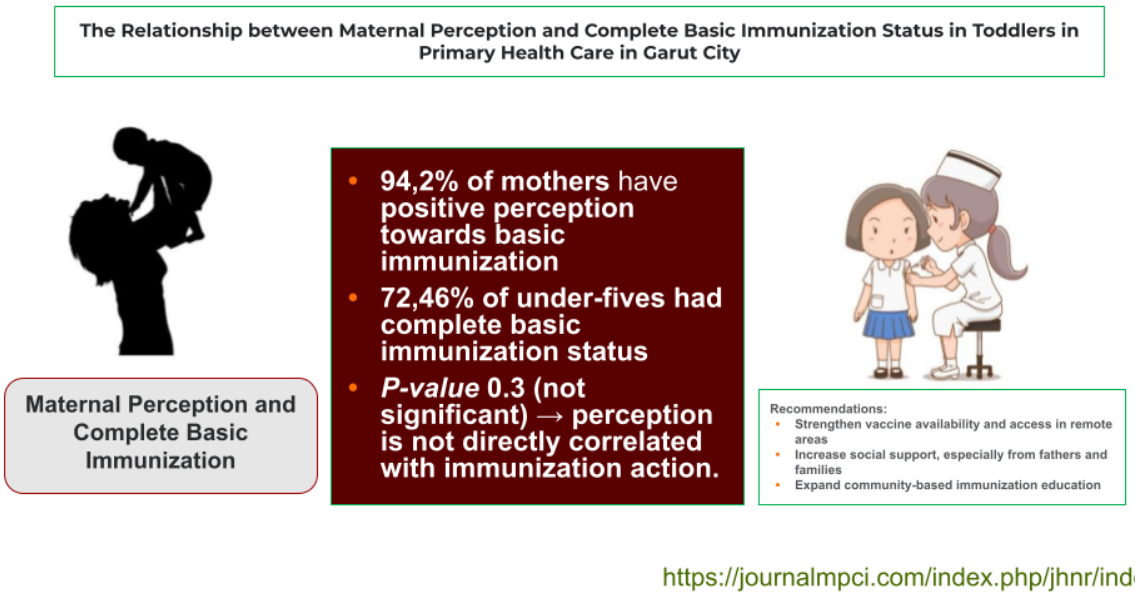

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Immunization is a procedure that aims to protect against infections and infectious diseases through the administration of a substance in the form of a vaccine into the body (6). Immunization can be given through various methods, such as injection, oral administration, or application through the skin. The mechanism of action is to stimulate the individual's immune system to produce specific antibodies in the blood circulation, thus preventing infection and inhibiting the development of future disease (7). This process is the basis of immunization efforts in achieving protection not only at the individual level but also at group coverage in the community, so that the risk of spreading Immunization Preventable Diseases (IPD3) can be minimized or even stopped (8). Basic immunization itself refers to the administration of initial vaccines that aim to achieve an immune level above the protection threshold. In infants under 12 months of age, the types of basic immunizations required include BCG, measles, DPT, hepatitis B, IPV, and polio vaccines (9–11). However, basic immunization coverage in the community is inseparable from various determinants, especially those related to sociodemographic characteristics and parental behavior (2). Various studies suggest that parental knowledge, attitudes, and behaviors regarding basic immunization are interconnected and influenced by several factors such as education level, age, employment status, effectiveness of health promotion, and support from the social environment (12).

Immunization is part of the national health development priority agenda, as outlined in the 2020-2024 National Medium-Term Development Plan document. (13). However, its implementation was hampered during the COVID-19 pandemic, which triggered a drastic decline in the coverage of routine immunization services until early 2022 (14). The decline has an impact on the increasing number of cases of diseases that can be prevented through immunization (15). National data shows that more than 1.5 million children were not fully

immunized from 2017 to 2021 (16). The achievement of complete basic immunization (IDL) in West Java province also shows a decrease, which is 87.4% in 2020 and 89.9% in 2021; this figure still does not reach the national target (17). This suggests that disruptions to the continuity of immunization programs during the pandemic have a medium-term impact on public health status.

One of the most influential factors and key to increasing the coverage of complete childhood immunization is maternal perception (18,19). Individual perceptions, including a mother's perceptions are formed through interactions with various factors, such as the social environment, social rules, and community life principles that apply to the quality of health services available, past personal experiences, and individual needs and motivations (20). These factors indirectly shape parents' frame of mind in assessing the benefits and risks of immunization, which then becomes the basis for decision-making related to compliance with the child immunization program (20). Maternal perceptions of the importance of the immunization program, resulting in a high level of adherence to the child's basic immunization schedule (21). Studies show that mothers with a high perception are 59,75 times more likely to complete their children's immunization compared to mothers with lower perceptions (19).

The results of research conducted by Yuda et al., (2018) showed a significant relationship between maternal characteristics, including age, education level, and employment status, with compliance in providing immunization to children (22). In addition, cognitive and affective aspects such as the level of knowledge, attitudes, and actions of mothers towards immunization also have a significant correlation with the level of compliance, with a significance value of p = 0.01 for each variable. The COVID-19 pandemic has had a significant impact on the global public's perception of the importance of childhood vaccines. A UNICEF report found that positive perceptions of childhood vaccines have decreased in 52 out of 55 countries surveyed. In several nations, including the Republic of Korea, Papua New Guinea, Ghana, Senegal, and Japan, childhood vaccines rates dropped by over one-third. This suggests a decline in public confidence in immunizations during the pandemic, which could lead to lower immunization coverage and a heightened risk of outbreaks of vaccine-preventable diseases (3).

Initial findings from a preliminary study conducted in the primary health care with a simple Rapid Convenience Assessment (RCA) approach, it was found that 40% of respondent mothers had not provided complete basic immunization to their children. The main reason is the mother's perception that immunization has no urgency, as well as the belief that the absence of immunization will not harm the child's health. This happened even though health workers in the area have made various educational efforts, including providing counseling to parents about the importance of immunization as a step to build children's immunity, which aims to prevent the onset of PD3I diseases. Based on this background explanation, this study aims to examine how mothers' perceptions are associated with the completeness of basic immunizations among toddlers at primary health care facilities.

METHODS

Study Design

The study employed a quantitative approach with a cross-sectional research design.

Population and Sample

The target population comprised 323 mothers with children under two years old who reside in the primary health care areas of West Java, Indonesia. Quota sampling was used as the sampling technique, and the final sample size consisted of 62 participants, but to anticipate the possibility of missing data due to the absence of respondents, the number was increased by 10%, so that the total sample used in this study was 69 people. The inclusion criteria used in this study are mothers who have children 9-24 months, live in the working area of the community health center around Garut, understand Indonesian, and are willing to become respondents by signing informed consent. Exclusion criteria include

mothers who have children with chronic diseases or immunosuppressed conditions, as well as children who have a history of severe allergies to vaccine components. This study did not limit the socioeconomic status of respondents, so it involved mothers from various socioeconomic backgrounds as long as they met the inclusion criteria.

Data Collection and Research Instrument

Data was obtained through filling out a questionnaire aimed at measuring mothers' perceptions related to complete basic immunization in children, which has also been tested for validity and reliability in the working area in primary health care at West Java, Indonesia. The maternal perception questionnaire that has been developed in Indonesia based on Hemadiyan's (2017) consists of 10 questions, of which 5 questions are positive and 5 questions are negative (23). The results of the validity test showed that the calculated r value for the 10 question items was greater than the r table value, which was between 0.641 to 0.871, while the r table was 0.4227. Thus, it can be concluded that all items in the questionnaire are valid. The reliability test for this instrument was conducted on 10 questions, resulting in a Cronbach alpha value of 0.854, which indicates that this questionnaire is reliable because the Cronbach alpha coefficient value ≥ 0.60.

The initial stage in data collection was that the respondents were given a consent form and given an explanation of the purpose and benefits of the study as well as the respondents' rights (autonomy) as research subjects and they were allowed to decide whether they would participate. The respondents were informed that their confidentiality would be protected. Data was collected during July 2024. The data in this study have obtained written consent from the respondents.

Data Analysis

To investigate the relationship between maternal perception (independent variable) and the completeness of a child's basic immunization status (dependent variable), a Chi-Square test was conducted. Both variables were measured on a categorical scale (ordinal and nominal), making the Chi-Square test an appropriate method for assessing the association between the two categorical variables. The Chi-Square test is commonly used to examine whether there is a significant difference between observed and expected frequencies in categorical data. In this analysis, the maternal perception was categorized as positive or negative, while the child's immunization status was classified as complete or incomplete. This study conducted demographic data analysis, respondent characteristics data analysis, as well as analysis of each variable. The collected data is then calculated as the value of the score. The frequency of each variable for the perception variable (Positive = 65 people and Negative = people). As for the complete basic immunization status of children (Complete = 50 people and Incomplete = 19 People).

To determine the strength of the association, the p-value obtained from the Chi-Square test was assessed. A p-value greater than 0.05 would suggest that there is no significant relationship between the variables, whereas a p-value less than 0.05 would indicate a statistically significant association. Additionally, an Odds Ratio (OR) was calculated to evaluate the likelihood of a child having complete immunization based on the maternal perception. The OR provides a measure of the strength and direction of the association, with values less than 1 suggesting a negative association and values greater than 1 indicating a positive association. This analysis provides valuable insights into whether maternal perception plays a role in determining the immunization status of children within the studied population.

CODE OF HEALTH ETHICS

Ethical approval for this study was granted by the Research Ethics Committee of STIKes Karsa Husada Garut, under the approval number 002072/KEP STIKes Karsa Husada Garut/2024.

RESULTS

A total of 69 mothers who have children aged two years or less and live in the primary health care setting were sampled in this study. Data on the characteristics of respondents were then classified based on several demographic aspects, including age, latest education level, number of children owned, and employment status.

Table 1. Demographic Characteristics of Respondents (n=69)

Characteristics of Respondents	Frequency (*f*)	Percentage (%)
Age		
<20	5	7,25
21 – 30	45	65,22

31 – 40	14	20,29
>40	5	7,25
Education		
Elementary School	29	42,03
Junior High School	28	40,58
Senior High School	12	17,39
Number of children		
1 Person	25	36,23
2 – 3 Person	39	56,52
4 – 5 Person	3	4,35
>5 Person	2	2,90
Employment Status		
Work	0	0
Not Work	69	100

According to the data in Table 1, most respondents fall within the 21 to 30-year age range (45%), and the predominant level of education is elementary school (42.03%). In addition, most respondents had two to three children (56.52%), and all of them did not a job or were unemployed (100%).

Table 2. Perceptions of mothers in the primary health care (n=69)

Perceptions	Frequency (*f*)	Percentage (%)
Positive	65	94,2
Negative	4	5,8

Based on the data in Table 2, it is known that most mothers in the primary health care have a positive perception of basic immunization in toddlers (94.2%), while only a small proportion of respondents showed a negative perception (5.8%).

Table 3. Complete Basic Immunization Status of Toddlers in the primary health care (n=69)

Basic Immunization Status	Frequency (*f*)	Percentage (%)
Complete	50	72,46
Incomplete	19	27,54

The data in Table 3 shows that most toddlers have received complete basic immunizations, with 50 children, or 72.46% achieving basic complete immunization and a small proportion of toddlers have incomplete immunization status, namely 19 children or 27.54%.

Table 4. Relationship between Maternal Perception and Complete Basic Immunization Status in primary health care (n=69)

Perception	Complete		Incomplete		*p-value*	OR (95% CI)
	f	%	*f*	%		
Negative	2	2,9	2	2,9	0,3	0,318 (0,46-2,71)
Positive	48	69,57	17	24,64		

[a]*Abbreviation, OR = Odd Ratio*

The analysis presented in Table 4 reveals that 65 respondents (94.20%) had a positive perception of immunization. The Chi-square test yielded a p-value of 0.3 ($p > 0.05$), leading to the acceptance of the null hypothesis (H_0). These findings indicate that there is no significant correlation between mothers' perceptions and the completeness of basic immunization status in toddlers within primary health care settings.

The OR value of 0.318 indicates that the possibility of complete immunization in toddlers who have a positive perception of immunization is lower compared to toddlers who have a negative perception of immunization. Specifically, the OR value of less than 1 indicates that positive perception does not increase the possibility of complete basic immunization in toddlers, and even tends to be lower.

DISCUSSION

Perception is an individual's interpretation of an object or event based on experience, knowledge, and stimuli received through the five senses. In the context of health, perceptions often reflect subjectively formed beliefs or opinions and are influenced by how individuals interpret visible or perceived information from the surrounding environment (24). Table 1 shows that the majority of mothers were aged 20-30 years (65.22%). Mothers aged 20-30 are included in the reproductive age, as well as the ability to think rationally regarding the fulfillment of decisions regarding health (25). Mothers aged ≤ 30 years are more likely to complete basic immunization for their children compared to mothers aged > 30 years (26). Previous study reported that mother under 30 years old are twice as likely to complete their child's immunization schedule compared to older mothers, younger mothers may have more time and energy to attend immunization sessions, be more open to new information, and be more receptive to advice from health workers regarding the importance of immunization (27).

Table 1 indicates that the majority of mothers had 2-3 children (56.52%), consistent with studies suggesting that having more children can enhance experience, which in turn positively influences perceptions of immunization (28). Mothers with less than three children were more likely to complete child immunization, compared to mothers with more children; mothers with more than three children had a lower likelihood of completing their child's immunization schedule (27). All mothers in this study were not working, as shown in Table 1. This is in line with Fathiregun's (2012) study, which showed that most non-working mothers had more time to attend immunization sessions and had fewer distractions from work commitments (27).

The results presented in Table 2 indicate that the majority of respondents had a positive view of immunization, while Table 3 shows that most children were up to date with their immunizations. The Chi-Square test results in Table 4 yielded a p-value of 0.3, implying that there is no significant correlation between maternal perception and the completion of basic immunizations in children. These findings are further supported by the lack of any relationship between maternal perception and immunization status in infants aged 12 months (29). Although most mothers have a positive perception of immunization, it is not always followed by concrete actions in completing basic immunization of children, because it can be influenced by various factors beyond individual control.

Complete basic immunization status is influenced by several factors that can be divided into enabling factors and reinforcing factors. Enabling factors related to the completeness of child immunization include the availability and ease of accessing available health facilities and infrastructure, which play an important role in determining the status of basic immunization in children, this includes the availability of vaccines, distance or accessibility to health services, and service time (30,31). The study revealed that the unavailability of vaccines at the time of the immunization schedule was one of the main factors that led to children not getting immunized. Vaccine availability was shown to be a determining factor that influenced participants' decisions not to complete basic immunizations (32). Incomplete vaccines at health care facilities such as puskesmas can cause a sense of disappointment among the community, this condition has the potential to reduce the motivation of the community to re-access immunization services, which has an impact on the incomplete immunization status of children. (33). Mothers with closer home distances to immunization service facilities tend to be 3.13 times more likely to complete basic immunization in their babies compared to respondents who have a greater home distance, This suggests that geographical accessibility plays an important role in determining the completeness of basic immunization (34).

Meanwhile, reinforcing factors include support from the closest social environment, such as husband or parents, knowledge, and socio-cultural conditions, which include habits and traditions that support the provision of complete immunization to children (35,36). Family support is closely related to the traditions that apply in the family environment. If the family tradition is accustomed to providing immunization to children,

family members tend to provide support for the implementation of immunization (35,37). In the family setting, both fathers and mothers play a role in maintaining children's health. However, in a patriarchal culture, the father's dominance as a decision-maker makes his involvement very influential on the completeness of immunization, as women have limited autonomy in decision-making (38). Gender inequality embedded in social structures means that mothers do not have full control over decision-making regarding their children's health. Despite mothers' positive views on immunization, the dominant role of fathers in decision-making can be a significant barrier in ensuring complete immunization of children, given mothers' limitations in influencing such decisions (39). Fathers' support plays an important role in shaping mothers' attitudes towards child immunization, so fathers' involvement and approval can increase the likelihood of mothers providing complete immunization. The results showed that most fathers had inadequate knowledge related to child immunization. This condition indicates that the father's involvement in the immunization process plays an important role. Fathers who participate and accompany their children during immunization tend to have better knowledge about immunization schedules and completeness, which in turn can contribute to improving children's immunization status (40,41).

Maternal knowledge regarding understanding of the types of basic immunizations, preventable diseases, immunization schedules, the number of doses given, and the benefits of immunization, as well as attitudes and support from health workers, including the provision of information and counseling about immunization, influences the mother's decision to complete her child's immunization (42). There are barriers for parents to fulfill immunization in children, such as fear of developmental delays, as well as concerns about the risks of immunization in children (43). In addition, parents' perceptions of immunization are often influenced by concerns about possible side effects that can be experienced by children after immunization. This can cause doubts and anxiety in parents, thus becoming one of the inhibiting factors in making decisions to immunize children (44). The role of health workers is very important in reducing negative perceptions and increasing the completeness of immunization in children. Research shows that mothers who experience negative attitudes from health workers are 3.8 times more likely not to be fully immunized, compared to fully immunized mothers (45).

From a methodological point of view, several limitations may have contributed to the non-significant results in this study. The relatively small sample size (n=69) and uneven distribution of mothers' perceptions, where most respondents had positive perceptions (94.2%), may reduce statistical power and variability. In addition, this study did not control for potential confounding variables such as maternal education level, family decision-making, cultural beliefs, and access to health facilities, which may independently influence immunization behaviour. Future studies are recommended to use larger and more diverse samples to increase the reliability of findings, enhance statistical power, and reduce bias due to uneven data distribution. This approach will also improve the generalizability of results to broader populations. Furthermore, the use of multivariate analysis is essential to control for potential confounding variables and to provide a more in-depth understanding of the various factors influencing the completeness of childhood immunization.

CONCLUSION

The results showed that most respondents had a positive perception of complete basic immunization (94.2%), and the majority of children had received complete basic immunization (72.46%). However, statistical analysis showed that there was no significant relationship between maternal perception and complete basic immunization status of children. This finding indicates that mothers' positive perception of immunization is not always directly proportional to the implementation of complete basic immunization. This indicates that other factors, such as access to health services, vaccine availability, geographical distance, and social support from the surrounding environment, may have a more dominant influence on children's immunization completeness. Future studies are encouraged to explore additional variables that may influence immunization uptake. Factors such as accessibility of health services, availability of vaccines, distance to health facilities, and the role of family or community support may provide further insights into immunization behavior. The use of multivariate analysis is advised to control for potential confounding

variables and to obtain a more comprehensive understanding of the factors affecting immunization completeness.

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CONFLICTS OF INTEREST

The authors declare no conflict of interest.

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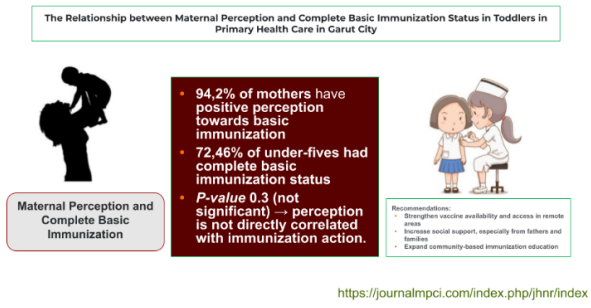
Hasil revisi dari reviewer

Title Manuscript	:	The Relationship between Maternal Perception and Complete Basic Immunization Status in Toddlers in Primary Health Care
ID Manuscript	:	ID 392

No.	Comment Reviewer B	Response
1	**Title** • Is the title clear, concise, and reflective of the study's content? **Complete**	Thank you for the comment.
2	**Abstract** • Please mark each point required in the abstract including Introduction/background, Aim, Methods, Result, Conclusion.	Thank you for your valuable feedback. We have revised the abstract to clearly delineate each section (Introduction, Objectives, Methods, Results, and Conclusion). As below: *"**Introduction:** Basic immunization coverage remains a challenge in Indonesia's public health efforts despite being*

		a national priority program. Maternal perception is considered one of the factors that influence the completeness of immunization in children. Maternal perceptions of immunization can play an important role in determining the completeness of child immunization, as the decision to provide immunization is often influenced by the mother's beliefs and knowledge about the benefits of vaccines. ***Objectives:*** *This study aims to determine the relationship between maternal perceptions and the completeness of basic immunization status in toddlers in primary health care.* ***Methods:*** *This study is a quantitative study with a cross-sectional design involving 69 mothers who have children aged 9-24 months. Respondents were selected using a quota sampling technique. Data were collected through a standardized and validated questionnaire in the Indonesian version. The data were analyzed univariately using frequency distribution and bivariately with the Chi-Square test.* ***Results:*** *Most mothers (94.2%) had a positive perception of immunization, and 72.46% of children had received complete basic immunization. However, the results of statistical analysis showed no significant relationship between maternal perceptions and completeness of basic immunization (p = 0.3; OR= 0,31).* ***Conclusion:*** *Although the majority of mothers had positive perceptions, it was not significantly associated with children's basic immunization status. This finding indicates that other factors, such as vaccine availability, access to health services, and social support, may have a greater role in influencing immunization practices."*	
	• The abstract length is out of JHNR guideline (200 – 300 words limit). Please find it here https://www.journalmpci.com/	Thank you for your valuable feedback. The abstract has been revised and shortened to fit within the 200–300 word limit. As below: *"****Introduction:*** *Basic immunization coverage remains a challenge in Indonesia's public health efforts despite being a national priority program. Maternal perception is considered one of the factors that influence the completeness of immunization in children. Maternal perceptions of immunization can play an important role in determining the completeness of child immunization, as the decision to provide immunization is often influenced by the mother's beliefs and knowledge about the benefits of vaccines.* ***Objectives:*** *This study aims to determine the relationship between maternal perceptions and the completeness of basic immunization status in toddlers in primary health care.* ***Methods:*** *This study is a quantitative study with a cross-sectional design involving 69 mothers who have children aged 9-24 months. Respondents were selected using a quota sampling technique. Data were collected through a standardized and validated questionnaire in the Indonesian version. The data were analyzed univariately using frequency distribution and bivariately with the Chi-Square test.* ***Results:*** *Most mothers (94.2%) had a positive perception of immunization, and 72.46% of children had received complete basic immunization. However, the results of statistical analysis showed no significant relationship between maternal perceptions and completeness of basic immunization (p = 0.3; OR= 0,31).* ***Conclusion:*** *Although the majority of mothers had positive perceptions, it was not significantly associated with children's basic immunization status. This finding indicates that other factors, such as vaccine*	

		availability, access to health services, and social support, may have a greater role in influencing immunization practices."
	• Please add more introduction (1 sentences) how maternal perception could have effect on toddlers' immunization status.	Thank you for your insightful comment. We have revised an additional sentence that has been added in the abstract's background section to address the influence of maternal perception. As below: *"Maternal perceptions of immunization can play an important role in determining the completeness of child immunization, as the decision to provide immunization is often influenced by the mother's beliefs and knowledge about the benefits of vaccines."*
	• Graphical abstract contains too many words, please modify it by removing 2 sentences just below the tittle box.	Thank you for your constructive comment. We have removed two sentences from the graphical abstract to meet the journal's guidelines. As below: 
3	**Introduction** • Please replace the word vaccinations with vaccines	Thank you for the comment. We have replaced the word "vaccinations" with "vaccines" to ensure proper terminology is used throughout the section. As below: *"Child vacciness coverage is one of the five priority health programs in Indonesia. Despite its widespread availability, the implementation of immunization…"* *"….the types of basic immunizations required include BCG, measles, DPT, hepatitis B, IPV, and polio vaccines (9–11)"* *"… The COVID-19 pandemic has had a significant impact on the global public's perception of the importance of childhood vaccines. A UNICEF report found that positive perceptions of childhood vaccines have decreased in 52 out of 55 countries surveyed. In several nations, including the Republic of Korea, Papua New Guinea, Ghana, Senegal, and Japan, childhood vaccines rates dropped by over one-third. This suggests a decline in public confidence in immunizations during the pandemic, which could lead to lower immunization coverage and a heightened risk of outbreaks of vaccine-preventable diseases (3)."*
	• Please mention the author(s) and publication year of the study (17) cited in opening 5th paragraph.	Thank you for the comment. We have now included the author names and publication year for the referenced study. As below: *"The results of research conducted by Yuda et al., (2018) showed a significant relationship between maternal characteristics, including age, education level, and employment status, with compliance in providing immunization to children (22)."*
	• Please add reference(s) for sentences 1-3 in the last paragraph.	Thank you for your valuable feedback. The paragraph does not include references because it is based on preliminary data collected before the formal study.
4	**Method** • Please include respondent characteristics collected.	Thank you for your constructive comment. We have revised respondent characteristics such as including age range, geographic location, and health conditions. As below:

		"The inclusion criteria used in this study are mothers who have children 9-24 months, live in the working area of the community health center around Garut, understand Indonesian, and are willing to become respondents by signing informed consent."	
	• Besides area of living, please mention all inclusion criteria applied in the current study as this could be important information for future study.	Thank you for your constructive comment. We have listed all inclusion and exclusion criteria explicitly. As below: *"The inclusion criteria used in this study are mothers who have children 9-24 months, live in the working area of the community health center around Garut, understand Indonesian, and are willing to become respondents by signing informed consent. Exclusion criteria include mothers who have children with chronic diseases or immunosuppressed conditions, as well as children who have a history of severe allergies to vaccine components. This study did not limit the socioeconomic status of respondents, so it involved mothers from various socioeconomic backgrounds as long as they met the inclusion criteria."*	
	• Please provide the references of questionnaires or used for building the questionnaires in the current study.	Thank you for your constructive comment. The questionnaire used was developed based on Hemadiyan (2017), which has now been cited appropriately. As below: *"The maternal perception questionnaire that has been developed in Indonesia based on Hemadiyan's (2017) consists of 10 questions, of which 5 questions are positive and 5 questions are negative (23)."*	
	• Please include the references to justify authors' claim towards each values mentioned.	Thank you for your constructive comment. References have been added to justify the validity and reliability values cited.	
	• Please remove the 4th sentence in the last paragraph	Thank you for your valuable feedback. The sentence has been removed.	
	• Please move the last sentence in the last paragraph to the end of 1st paragraph.	Thank you for your valuable feedback. The sentence has been relocated as suggested. As below: *"The study employed a quantitative approach with a cross-sectional research design."*	
	• Please include how Statistical analysis has been carried out in the study.	Thank you for your constructive comment. We have revised a paragraph explaining the use of the Chi-square test and Odds Ratio (OR) has been added. As below: "*To determine the strength of the association, the p-value obtained from the Chi-Square test was assessed. A p-value greater than 0.05 would suggest that there is no significant relationship between the variables, whereas a p-value less than 0.05 would indicate a statistically significant association. Additionally, an Odds Ratio (OR) was calculated to evaluate the likelihood of a child having complete immunization based on the maternal perception. The OR provides a measure of the strength and direction of the association, with values less than 1 suggesting a negative association and values greater than 1 indicating a positive association. This analysis provides valuable insights into whether maternal perception plays a role in determining the immunization status of children within the studied population."*	
5	**Result** • Data are clearly reported in the section but, please describe the abbreviation OR in table 4.	Thank you for your comment. We have revised a footnote has been added to Table 4 to clarify that OR refers to "Odds Ratio.". Please kindly check table 4.	
6	**Discussion**		

	• To add more findings of the current study, please add more data interpretation from result section (e.g., table 1 and 3) to the discussion. It too focused on data on table 4 which the main aim of the current study but it might have been provided by previous study.	Thank you for your insightful comment. We have incorporated the interpretation of data from Table 1 (age, education, etc.) and Table 3 (immunization completeness) into the discussion. As below: *"Table 1 indicates that the majority of mothers had 2-3 children (56.52%), consistent with studies suggesting that having more children can enhance experience, which in turn positively influences perceptions of immunization (28). Mothers with less than three children were more likely to complete child immunization, compared to mothers with more children; mothers with more than three children had a lower likelihood of completing their child's immunization schedule (27). All mothers in this study were not working, as shown in Table 1. This is in line with Fathiregun's (2012) study, which showed that most non-working mothers had more time to attend immunization sessions and had fewer distractions from work commitments (27).* *The results presented in Table 2 indicate that the majority of respondents had a positive view of immunization, while Table 3 shows that most children were up to date with their immunizations. The Chi-Square test results in Table 4 yielded a p-value of 0.3, implying that there is no significant correlation between maternal perception and the completion of basic immunizations in children. These findings are further supported by the lack of any relationship between maternal perception and immunization status in infants aged 12 months (29). Although most mothers have a positive perception of immunization, it is not always followed by concrete actions in completing basic immunization of children, because it can be influenced by various factors beyond individual control. "*	
7	**Conclusion** • Please include recommendation for future study.	Thank you for your constructive comment. We have revised recommendations for future research, including the need for multivariate analysis and exploration of other influencing factors, which have been added. As below: *"Future studies are encouraged to explore additional variables that may influence immunization uptake. Factors such as accessibility of health services, availability of vaccines, distance to health facilities, and the role of family or community support may provide further insights into immunization behavior. The use of multivariate analysis is advised to control for potential confounding variables and to obtain a more comprehensive understanding of the factors affecting immunization completeness*."	
8	**References** • Following comments in Introduction and Methods, please correct the references list accordingly.	Thank your for your comment. We have updated and corrected the references list to reflect all additions.	
9	**English Proficiency** • Some places require writing concisely but overall, the quality of writing is good.	Thank you for the feedback. We have revised the manuscript for conciseness and clarity throughout.	
10	**Additional comments/suggestions by the reviewer about the article** • This study seeks to ascertain the correlation between maternal perceptions and the adequacy of basic	Thank you for summarizing the focus of our study. We appreciate your overall positive impression and constructive feedback, which helped us improve the clarity and quality of the manuscript.	

	vaccination status in toddlers within primary health care settings.	
	• Overall, the current manuscript reads well and reviewer appreciates the efforts.	We sincerely appreciate your kind words and constructive suggestions that helped improve our manuscript.

Title Manuscript : The Relationship between Maternal Perception and Complete Basic Immunization Status in Toddlers in Primary Health Care
ID Manuscript : ID 392

No.	Comment Reviewer A	Response
1	**Title** • Specify in the title where the study took place and/or what population they represented	Thank you for the suggestion. We have revised the title to specify the study location. The revised title is: *"The Relationship between Maternal Perception and Complete Basic Immunization Status in Toddlers in Primary Health Care in Garut City."*
2	**Introduction** • The introduction is informative but could benefit from smoother transitions between paragraphs. For example, the transition from the global issue of child immunization to the specific focus on Indonesia could be made more fluid.	Thank you for your comment. We have improved the transition between global, regional, and national issues to create a more coherent flow of ideas. As below: *"According to a UNICEF report, over the past three years, around 67 million children worldwide have not been immunized, making it the biggest setback in routine childhood immunization coverage in three decades (3). This phenomenon of declining immunization coverage not only occurs at the global level, but also occurs in the Asian region, which is recorded as the region with the highest rate of non-compliance (4). In line with conditions, Indonesia, as part of Asia, is experiencing a downward trend in immunization coverage also affects the achievement of national targets. Data shows that in 2020, complete basic immunization coverage for infants aged 0 to 11 months was recorded at 84.2%. This figure increased slightly to 84.5% in 2021. However, there was a significant increase in the number of children who had not received any immunization at all, jumping from 10% in 2019 to 26% in 2021 (5)."*
	• It was stated that "The main purpose of immunization is to stimulate the formation of individual and group	Thank you for your valuable feedback. We have revised a new paragraph that was added to explain the definition,

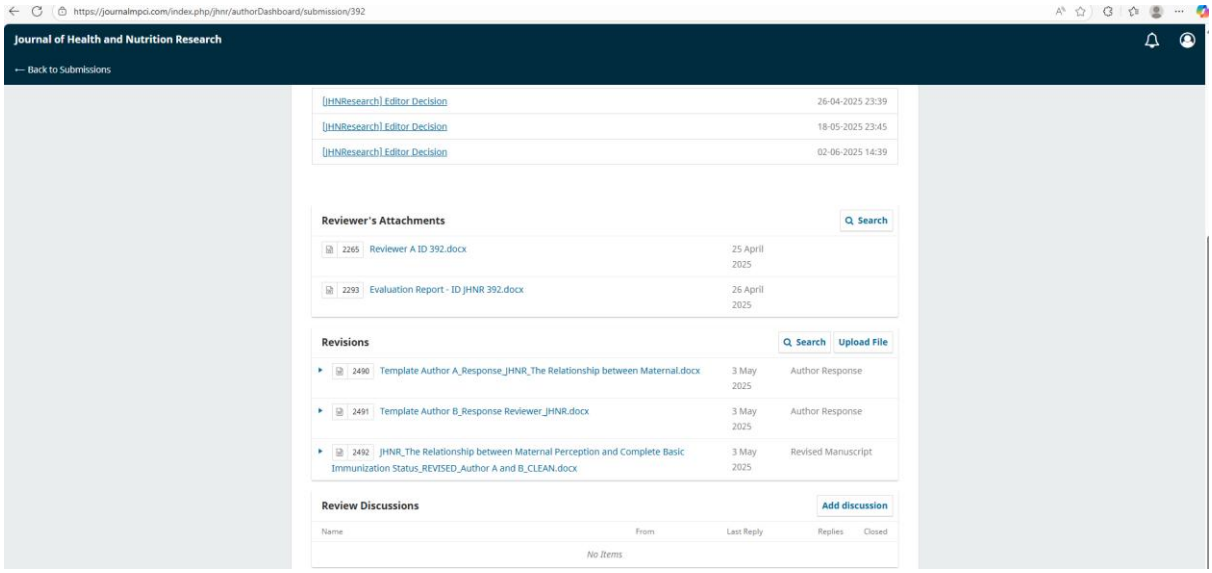
	immunity, so that the risk of spreading Immunization Preventable Diseases (IPD3) can be minimized or even stopped." Explain immunization and its mechanism & purpose in more details before exploring the public health purpose of mass immunization	mechanism, and purpose of immunization, including how vaccines stimulate the immune system. As below: *"Immunization is a procedure that aims to protect against infections and infectious diseases through the administration of a substance in the form of a vaccine into the body (6). Immunization can be given through various methods, such as injection, oral administration, or application through the skin. The mechanism of action is to stimulate the individual's immune system to produce specific antibodies in the blood circulation, thus preventing infection and inhibiting the development of future disease (7). This process is the basis of immunization efforts in achieving protection not only at the individual level but also at group coverage in the community, so that the risk of spreading Immunization Preventable Diseases (IPD3) can be minimized or even stopped (8)."*	
	• The introduction touches upon several concepts (e.g., social environment, parental attitudes, and knowledge), but these could be more closely tied to the central thesis of the study. Specifically, the importance of maternal perception could be emphasized earlier, as it is the core variable in the study. More emphasis should be placed on the concept of "maternal perception" early in the introduction to clarify	Thank you for your insightful comment. We revised the introduction to introduce the concept of maternal perception earlier and clarify its central role in the study. As below: *"One of the most influential factors and key to increasing the coverage of complete childhood immunization is maternal perception (18,19). Individual perceptions, including a mother's perceptions are formed through interactions with various factors, such as the social environment, social rules, and community life principles that apply to the quality of health services available, past personal experiences, and individual needs and motivations (20). These factors indirectly shape parents' frame of mind in assessing the benefits and risks of immunization, which then becomes the basis for decision-making related to compliance with the child immunization program (20). Maternal perceptions of the importance of the immunization program, resulting in a high level of adherence to the child's basic immunization schedule (21). Studies show that mothers with a high perception are 59,75 times more likely to complete their children's immunization compared to mothers with lower perceptions (19)."*	
	• Some sentences are long and could be broken up for better readability. For example, the sentence "This finding confirms that internal maternal factors play an important role..." can be simplified for clarity.	Thank you for your constructive comment. We have simplified and shortened complex sentences for improved clarity and scientific readability. As below: *"Individual perceptions, including a mother's perceptions are formed through interactions with various factors, such as the social environment, social rules, and community life principles that apply to the quality of health services available, past personal experiences, and individual needs and motivations (20)."*	
3	**Method** • The description of the data collection process could benefit from further detail. Specifically, how were the participants selected within the primary health care setting, and were there any inclusion or exclusion criteria (e.g., socioeconomic status, geographic location)? This would help the reader understand the representativeness of the sample.	Thank you for your valuable feedback. We have expanded this section by clearly outlining the inclusion and exclusion criteria, including age range, geographic location, and health conditions. As below: *"The inclusion criteria used in this study are mothers who have children 9-24 months, live in the working area of the community health center around Garut, understand Indonesian, and are willing to become respondents by signing informed consent. Exclusion criteria include mothers who have children with chronic diseases or immunosuppressed conditions, as well as children who have a history of severe allergies to vaccine components. This study did not limit the socioeconomic status of*	

		respondents, so it involved mothers from various socioeconomic backgrounds as long as they met the inclusion criteria."	
	• The statistical methods for analyzing the relationship between maternal perception and immunization status were not mentioned in this section. In addition, more clarity on statistical control for confounding variables (if any) would strengthen the analysis.	Thank you for your constructive comment. We have specified that a Chi-Square test was used and added justification for this choice. We also acknowledged the absence of control for confounding variables and addressed this in the discussion as a study limitation. As below: *"To investigate the relationship between maternal perception (independent variable) and the completeness of a child's basic immunization status (dependent variable), a Chi-Square test was conducted. Both variables were measured on a categorical scale (ordinal and nominal), making the Chi-Square test an appropriate method for assessing the association between the two categorical variables. The Chi-Square test is commonly used to examine whether there is a significant difference between observed and expected frequencies in categorical data. In this analysis, the maternal perception was categorized as positive or negative, while the child's immunization status was classified as complete or incomplete. This study conducted demographic data analysis, respondent characteristics data analysis, as well as analysis of each variable. The collected data is then calculated as the value of the score. The frequency of each variable for the perception variable (Positive = 65 people and Negative = people). As for the complete basic immunization status of children (Complete = 50 people and Incomplete = 19 People).* *To determine the strength of the association, the p-value obtained from the Chi-Square test was assessed. A p-value greater than 0.05 would suggest that there is no significant relationship between the variables, whereas a p-value less than 0.05 would indicate a statistically significant association. Additionally, an Odds Ratio (OR) was calculated to evaluate the likelihood of a child having complete immunization based on the maternal perception. The OR provides a measure of the strength and direction of the association, with values less than 1 suggesting a negative association and values greater than 1 indicating a positive association. This analysis provides valuable insights into whether maternal perception plays a role in determining the immunization status of children within the studied population."*	
4	**Result** • The results of the odds ratio (OR) were not mentioned nor explained in the text. In addition, given the non-significant result, the inclusion of confidence intervals for the OR would help in understanding the practical significance of this study's finding, if any.	Thank you for your constructive comment. The OR (0.31) has been included and interpreted in the results section. While confidence intervals are (0.46-2.71). Please kindly check Table 4. We have revised as below: *"The OR value of 0.318 indicates that the possibility of complete immunization in toddlers who have a positive perception of immunization is lower compared to toddlers who have a negative perception of immunization. Specifically, the OR value of less than 1 indicates that positive perception does not increase the possibility of complete basic immunization in toddlers, and even tends to be lower."*	
5	**Discussion** • It would be useful to discuss potential reasons for the outcome of statistical insignificance in this study. Was the	Thank you for your constructive comment. We have included a discussion about the small sample size, uneven	

	sample size too small to detect a difference? Could other variables have influenced the results?	distribution of responses, and other possible contributing factors. As below: *"From a methodological point of view, several limitations may have contributed to the non-significant results in this study. The relatively small sample size (n=69) and uneven distribution of mothers' perceptions, where most respondents had positive perceptions (94.2%), may reduce statistical power and variability."*	
	• The study concludes that there is no significant relationship between maternal perception and immunization status, but the discussion could further benefit from a deeper analysis of why this result might occur. For example, were there other hidden biases in the sample, such as socioeconomic status or urban-rural divide, that might have masked the expected correlation?	Thank you for your valuable feedback. We added a discussion on unmeasured variables, including cultural and economic factors, and emphasized the need for multivariate analysis in future research. As below: "*In addition, this study did not control for potential confounding variables such as maternal education level, family decision-making, cultural beliefs, and access to health facilities, which may independently influence immunization behaviour."*	
	• "push factors" should be changed to "reinforcing factors"	Thank you for your comment. We have revised the term "push factors" to "reinforcing factors" throughout the discussion section. As below: *"Complete basic immunization status is influenced by several factors that can be divided into enabling factors and reinforcing factors."* *"Meanwhile, reinforcing factors include support from the closest social environment…"*	
	• Limitations and suggestions for future studies were not discussed in this section.	Thank you for your insightful comment. We have now included a paragraph on study limitations and provided recommendations for future studies, including larger and more diverse samples and advanced statistical analysis. As below: *"Future studies are recommended to use larger and more diverse samples to increase the reliability of findings, enhance statistical power, and reduce bias due to uneven data distribution. This approach will also improve the generalizability of results to broader populations. Furthermore, the use of multivariate analysis is essential to control for potential confounding variables and to provide a more in-depth understanding of the various factors influencing the completeness of childhood immunization."*	
6	**Conclusion** • The conclusion lacks a clear call for further research, for example to explore why external factors (such as healthcare access, social support, socioeconomic status, or vaccine availability) might have a stronger impact on immunization.	Thank you for your comment. The conclusion now includes a clear call for future research into factors such as health service access, social support, and vaccine availability, and recommends the use of multivariate analysis. As below: *"...This finding indicates that mothers' positive perception of immunization is not always directly proportional to the implementation of complete basic immunization. This indicates that other factors, such as access to health services, vaccine availability, geographical distance, and social support from the surrounding environment, may have a more dominant influence on children's immunization completeness. Future studies are encouraged to explore additional variables that may influence immunization uptake. Factors such as accessibility of health services, availability of vaccines, distance to health facilities, and the role of family or community support may provide further insights into immunization behavior. The use of multivariate analysis is advised to control for potential confounding variables and*	

		to obtain a more comprehensive understanding of the factors affecting immunization completeness."
7	**References** • There are sufficient number of relevant references.	Thank you. In addition, we updated and added several recent references to support our discussion points.
8.	**English Proficiency** • The overall English is understandable but could benefit from proofreading for scientific rigor and flow	The manuscript has been thoroughly revised for grammar, clarity, and scientific tone.

3. Mengirimkan Hasil Revisi (3 May 2025)



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The Relationship between Maternal Perception and Complete Basic Immunization Status in Toddlers in Primary Health Care in Garut City

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ORIGINAL ARTICLES

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ABSTRACT

Basic immunization coverage remains a challenge in Indonesia's public health efforts despite being a national priority program. Maternal perception is considered one of the factors that influence the completeness of immunization in children. Maternal perceptions of immunization can play an important role in determining the completeness of child immunization, as the decision to provide immunization is often influenced by the mother's beliefs and knowledge about the benefits of vaccines. This study aims to determine the relationship between maternal perceptions and the completeness of basic immunization status in toddlers in primary health care. This study is a quantitative study with a cross-sectional design involving 69 mothers who have children aged 9-24 months. Respondents were selected using a quota sampling technique. Data were collected through a standardized and validated questionnaire in the Indonesian version. The data were analyzed univariately using frequency distribution and bivariately with the Chi-Square test. Most mothers (94.2%) had a positive perception of immunization, and 72.46% of children had received complete basic immunization. However, the

results of statistical analysis showed no significant relationship between maternal perceptions and completeness of basic immunization (p = 0.3; OR= 0,31). Although the majority of mothers had positive perceptions, it was not significantly associated with children's basic immunization status. This finding indicates that other factors, such as vaccine availability, access to health services, and social support, may have a greater role in influencing immunization practices.

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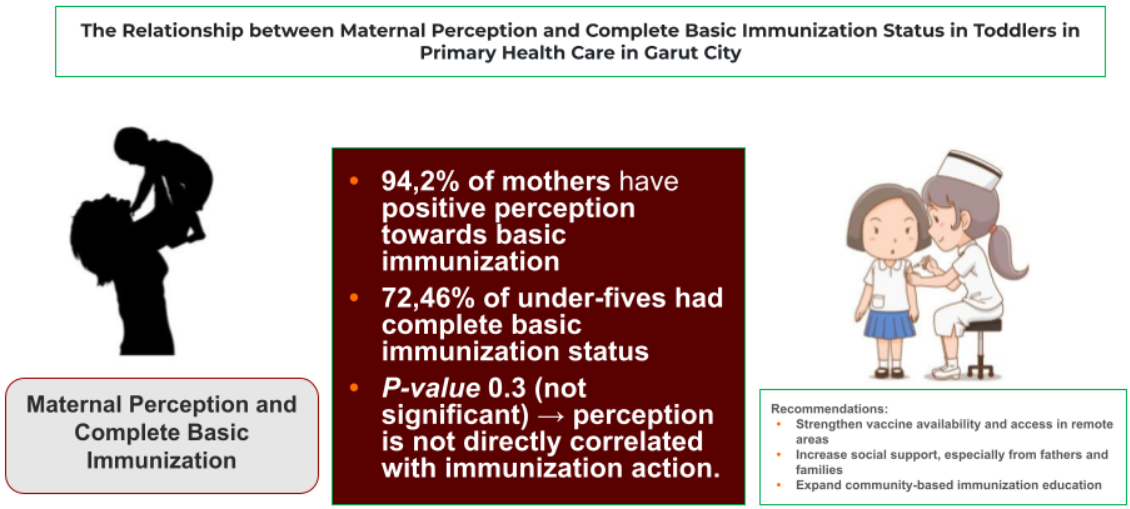
Key Messages:

- Although the majority of mothers in the primary health care showed positive perceptions of complete basic immunization, the results showed no significant relationship between these perceptions and the status of complete immunization in children. This indicates that other external factors play a greater role in children's immunization completeness status.

GRAPHICAL ABSTRACT



https://journalmpci.com/index.php/jhnr/index

Introduction

Immunization is one of the basic rights of children guaranteed in the public health service system in Indonesia (1). Child vacciness coverage is one of the five priority health programs in Indonesia. Despite its widespread availability, the implementation of immunization programs in Indonesia still faces various challenges, especially in ensuring equitable access for all children in Indonesia (2). According to a UNICEF report, over the past three years, around 67 million children worldwide have not been immunized, making it the biggest setback in routine childhood immunization coverage in three decades (3). This phenomenon of declining immunization coverage not only occurs at the global level, but also occurs in the Asian region, which is recorded as the region with the highest rate of non-compliance (4). In line with conditions, Indonesia, as part of Asia, is experiencing a downward trend in immunization coverage also affects the achievement of national targets. Data shows that in 2020, complete basic immunization coverage for infants aged 0 to 11 months was recorded at 84.2%. This figure increased slightly to 84.5% in 2021. However, there was a significant increase in the number of children who had not received any immunization at all, jumping from 10% in 2019 to 26% in 2021 (5).

Immunization is a procedure that aims to protect against infections and infectious diseases through the administration of a substance in the form of a vaccine into the body (6). Immunization can be given through various methods, such as injection, oral administration, or application through the skin. The mechanism of action is to stimulate the individual's immune system to produce specific antibodies in the blood circulation, thus preventing infection and inhibiting the development of future disease (7). This process is the basis of immunization efforts in achieving protection not only at the individual level but also at group coverage in the community, so that the risk of spreading Immunization Preventable Diseases (IPD3) can be minimized or even stopped (8). Basic immunization itself refers to the administration of initial vaccines that aim to achieve an immune level above the protection threshold. In infants under 12 months of age, the types of basic immunizations required include BCG, measles, DPT, hepatitis B, IPV, and polio vaccines (9–11). However, basic immunization coverage in the community is inseparable from various determinants, especially those related to sociodemographic characteristics and parental behavior (2). Various studies suggest that parental knowledge, attitudes, and behaviors regarding basic immunization are interconnected

and influenced by several factors such as education level, age, employment status, effectiveness of health promotion, and support from the social environment (12).

Immunization is part of the national health development priority agenda, as outlined in the 2020-2024 National Medium-Term Development Plan document. (13). However, its implementation was hampered during the COVID-19 pandemic, which triggered a drastic decline in the coverage of routine immunization services until early 2022 (14). The decline has an impact on the increasing number of cases of diseases that can be prevented through immunization (15). National data shows that more than 1.5 million children were not fully immunized from 2017 to 2021 (16). The achievement of complete basic immunization (IDL) in West Java province also shows a decrease, which is 87.4% in 2020 and 89.9% in 2021; this figure still does not reach the national target (17). This suggests that disruptions to the continuity of immunization programs during the pandemic have a medium-term impact on public health status.

One of the most influential factors and key to increasing the coverage of complete childhood immunization is maternal perception (18,19). Individual perceptions, including a mother's perceptions are formed through interactions with various factors, such as the social environment, social rules, and community life principles that apply to the quality of health services available, past personal experiences, and individual needs and motivations (20). These factors indirectly shape parents' frame of mind in assessing the benefits and risks of immunization, which then becomes the basis for decision-making related to compliance with the child immunization program (20). Maternal perceptions of the importance of the immunization program, resulting in a high level of adherence to the child's basic immunization schedule (21). Studies show that mothers with a high perception are 59,75 times more likely to complete their children's immunization compared to mothers with lower perceptions (19).

The results of research conducted by Yuda et al., (2018) showed a significant relationship between maternal characteristics, including age, education level, and employment status, with compliance in providing immunization to children (22). In addition, cognitive and affective aspects such as the level of knowledge, attitudes, and actions of mothers towards immunization also have a significant correlation with the level of compliance, with a significance value of $p = 0.01$ for each variable. The COVID-19 pandemic has had a significant impact on the global public's perception of the importance of childhood vaccines. A UNICEF report found that positive perceptions of childhood vaccines have decreased in 52 out of 55 countries surveyed. In several nations, including the Republic of Korea, Papua New Guinea, Ghana, Senegal, and Japan, childhood vaccines rates dropped by over one-third. This suggests a decline in public confidence in immunizations during the pandemic, which could lead to lower immunization coverage and a heightened risk of outbreaks of vaccine-preventable diseases (3).

Initial findings from a preliminary study conducted in the primary health care with a simple Rapid Convenience Assessment (RCA) approach, it was found that 40% of respondent mothers had not provided complete basic immunization to their children. The main reason is the mother's perception that immunization has no urgency, as well as the belief that the absence of immunization will not harm the child's health. This happened even though health workers in the area have made various educational efforts, including providing counseling to parents about the importance of immunization as a step to build children's immunity, which aims to prevent the onset of PD3I diseases. Based on this background explanation, this study aims to examine

how mothers' perceptions are associated with the completeness of basic immunizations among toddlers at primary health care facilities.

METHODS

The study employed a quantitative approach with a cross-sectional research design. The target population comprised 323 mothers with children under two years old who reside in the primary health care areas of West Java, Indonesia. Quota sampling was used as the sampling technique, and the final sample size consisted of 62 participants, but to anticipate the possibility of missing data due to the absence of respondents, the number was increased by 10%, so that the total sample used in this study was 69 people. The inclusion criteria used in this study are mothers who have children 9-24 months, live in the working area of the community health center around Garut, understand Indonesian, and are willing to become respondents by signing informed consent. Exclusion criteria include mothers who have children with chronic diseases or immunosuppressed conditions, as well as children who have a history of severe allergies to vaccine components. This study did not limit the socioeconomic status of respondents, so it involved mothers from various socioeconomic backgrounds as long as they met the inclusion criteria.

Data Collection and Research Instrument

Data was obtained through filling out a questionnaire aimed at measuring mothers' perceptions related to complete basic immunization in children, which has also been tested for validity and reliability in the working area in primary health care at West Java, Indonesia. The maternal perception questionnaire that has been developed in Indonesia based on Hemadiyan's (2017) consists of 10 questions, of which 5 questions are positive and 5 questions are negative (23). The results of the validity test showed that the calculated r value for the 10 question items was greater than the r table value, which was between 0.641 to 0.871, while the r table was 0.4227. Thus, it can be concluded that all items in the questionnaire are valid. The reliability test for this instrument was conducted on 10 questions, resulting in a Cronbach alpha value of 0.854, which indicates that this questionnaire is reliable because the Cronbach alpha coefficient value ≥ 0.60.

The initial stage in data collection was that the respondents were given a consent form and given an explanation of the purpose and benefits of the study as well as the respondents' rights (autonomy) as research subjects and they were allowed to decide whether they would participate. The respondents were informed that their confidentiality would be protected. Data was collected during July 2024. The data in this study have obtained written consent from the respondents.

Data Analysis

To investigate the relationship between maternal perception (independent variable) and the completeness of a child's basic immunization status (dependent variable), a Chi-Square test was conducted. Both variables were measured on a categorical scale (ordinal and nominal), making the Chi-Square test an appropriate method for assessing the association between the two categorical variables. The Chi-Square test is commonly used to examine whether there is a significant difference between observed and expected frequencies in categorical data. In this analysis, the maternal perception was categorized as positive or negative, while the child's immunization status was classified as complete or incomplete. This study conducted demographic data analysis, respondent characteristics data analysis, as well as analysis of each variable. The collected data is then calculated as the value of the score. The frequency of each variable for the perception variable (Positive = 65 people and Negative = people). As for the complete basic immunization status of children (Complete = 50 people and Incomplete = 19 People).

To determine the strength of the association, the p-value obtained from the Chi-Square test was assessed. A p-value greater than 0.05 would suggest that there is no significant relationship between the variables, whereas a p-value less than 0.05 would indicate a statistically significant association. Additionally, an Odds Ratio (OR) was calculated to evaluate the likelihood of a child having complete immunization based on the maternal perception. The OR provides a measure of the strength and direction of the association, with values less than 1 suggesting a negative association and values greater than 1 indicating a positive association. This analysis provides valuable insights into whether maternal perception plays a role in determining the immunization status of children within the studied population.

CODE OF HEALTH ETHICS

Ethical approval for this study was granted by the Research Ethics Committee of STIKes Karsa Husada Garut, under the approval number 002072/KEP STIKes Karsa Husada Garut/2024.

RESULTS

A total of 69 mothers who have children aged two years or less and live in the primary health care setting were sampled in this study. Data on the characteristics of respondents were then classified based on several demographic aspects, including age, latest education level, number of children owned, and employment status. According to the data in Table 1, most respondents fall within the 21 to 30-year age range (45%), and the predominant level of education is elementary school (42.03%). In addition, most respondents had two to three children (56.52%), and all of them did not a job or were unemployed (100%).

Table 1. Demographic Characteristics of Respondents (n=69)

Characteristics of Respondents	n	%
Age		
<20	5	7,25
21 – 30	45	65,22
31 – 40	14	20,29
>40	5	7,25
Education		
Elementary School	29	42,03
Junior High School	28	40,58
Senior High School	12	17,39
Number of children		
1 Person	25	36,23
2 – 3 Person	39	56,52
4 – 5 Person	3	4,35
>5 Person	2	2,90
Employment Status		
Work	0	0
Not Work	69	100

Table 2. Relationship between Maternal Perception and Complete Basic Immunization Status in primary health care (n=69)

Perception	Complete		Incomplete		*p-value*	OR (95% CI)
	n	%	*n*	%		
Negative	2	2,9	2	2,9	0,3	0,318 (0,46-2,71)
Positive	48	69,57	17	24,64		

[a]*Abbreviation, OR = Odd Ratio*

The analysis presented in Table 4 reveals that 65 respondents (94.20%) had a positive perception of immunization. The Chi-square test yielded a p-value of 0.3 ($p > 0.05$), leading to the acceptance of the null hypothesis (H_0). These findings indicate that there is no significant correlation between mothers' perceptions and the completeness of basic immunization status in toddlers within primary health care settings. The OR value of 0.318 indicates that the possibility of complete immunization in toddlers who have a positive perception of immunization is lower compared to toddlers who have a negative perception of immunization. Specifically, the OR value of less than 1 indicates that positive perception does not increase the possibility of complete basic immunization in toddlers, and even tends to be lower.

DISCUSSION

Perception is an individual's interpretation of an object or event based on experience, knowledge, and stimuli received through the five senses. In the context of health, perceptions often reflect subjectively formed beliefs or opinions and are influenced by how individuals interpret visible or perceived information from the surrounding environment (24). Table 1 shows that the majority of mothers were aged 20-30 years (65.22%). Mothers aged 20-30 are included in the reproductive age, as well as the ability to think rationally regarding the fulfillment of decisions regarding health (25). Mothers aged ≤ 30 years are more likely to complete basic immunization for their children compared to mothers aged > 30 years (26). Previous study reported that mother under 30 years old are twice as likely to complete their child's immunization schedule compared to older mothers, younger mothers may have more time and energy to attend immunization sessions, be more open to new information, and be more receptive to advice from health workers regarding the importance of immunization (27).

Table 1 indicates that the majority of mothers had 2-3 children (56.52%), consistent with studies suggesting that having more children can enhance experience, which in turn positively influences perceptions of immunization (28). Mothers with less than three children were more likely to complete child immunization, compared to mothers with more children; mothers with more than three children had a lower likelihood of completing their child's immunization schedule (27). All mothers in this study were not working, as shown in Table 1. This is in line with Fathiregun's (2012) study, which showed that most non-working mothers had more time to attend immunization sessions and had fewer distractions from work commitments (27).

The results presented in Table 2 indicate that the majority of respondents had a positive view of immunization, while Table 3 shows that most children were up to date with their immunizations. The Chi-Square test results in Table 4 yielded a p-value of 0.3, implying that there is no significant correlation between maternal perception and the completion of basic immunizations in children. These findings are further supported by the lack of any relationship between maternal perception and immunization status in infants aged 12 months (29). Although most mothers have a positive perception of immunization, it is not always followed by concrete actions in completing basic immunization of children, because it can be influenced by various factors beyond individual control.

Complete basic immunization status is influenced by several factors that can be divided into enabling factors and reinforcing factors. Enabling factors related to the completeness of child immunization include the availability and ease of accessing available health facilities and

infrastructure, which play an important role in determining the status of basic immunization in children, this includes the availability of vaccines, distance or accessibility to health services, and service time (30,31). The study revealed that the unavailability of vaccines at the time of the immunization schedule was one of the main factors that led to children not getting immunized. Vaccine availability was shown to be a determining factor that influenced participants' decisions not to complete basic immunizations (32). Incomplete vaccines at health care facilities such as puskesmas can cause a sense of disappointment among the community, this condition has the potential to reduce the motivation of the community to re-access immunization services, which has an impact on the incomplete immunization status of children. (33). Mothers with closer home distances to immunization service facilities tend to be 3.13 times more likely to complete basic immunization in their babies compared to respondents who have a greater home distance, This suggests that geographical accessibility plays an important role in determining the completeness of basic immunization (34).

Meanwhile, reinforcing factors include support from the closest social environment, such as husband or parents, knowledge, and socio-cultural conditions, which include habits and traditions that support the provision of complete immunization to children (35,36). Family support is closely related to the traditions that apply in the family environment. If the family tradition is accustomed to providing immunization to children, family members tend to provide support for the implementation of immunization (35,37). In the family setting, both fathers and mothers play a role in maintaining children's health. However, in a patriarchal culture, the father's dominance as a decision-maker makes his involvement very influential on the completeness of immunization, as women have limited autonomy in decision-making (38). Gender inequality embedded in social structures means that mothers do not have full control over decision-making regarding their children's health. Despite mothers' positive views on immunization, the dominant role of fathers in decision-making can be a significant barrier in ensuring complete immunization of children, given mothers' limitations in influencing such decisions (39). Fathers' support plays an important role in shaping mothers' attitudes towards child immunization, so fathers' involvement and approval can increase the likelihood of mothers providing complete immunization. The results showed that most fathers had inadequate knowledge related to child immunization. This condition indicates that the father's involvement in the immunization process plays an important role. Fathers who participate and accompany their children during immunization tend to have better knowledge about immunization schedules and completeness, which in turn can contribute to improving children's immunization status (40,41).

Maternal knowledge regarding understanding of the types of basic immunizations, preventable diseases, immunization schedules, the number of doses given, and the benefits of immunization, as well as attitudes and support from health workers, including the provision of information and counseling about immunization, influences the mother's decision to complete her child's immunization (42). There are barriers for parents to fulfill immunization in children, such as fear of developmental delays, as well as concerns about the risks of immunization in children (43). In addition, parents' perceptions of immunization are often influenced by concerns about possible side effects that can be experienced by children after immunization. This can cause doubts and anxiety in parents, thus becoming one of the inhibiting factors in making decisions to immunize children (44). The role of health workers is very important in reducing negative perceptions and increasing the completeness of immunization in children. Research shows that mothers who experience negative attitudes from health workers are 3.8

times more likely not to be fully immunized, compared to fully immunized mothers (45). Strengthening health promotion performance in developing promotive and preventive programs is recommended, particularly in improving complete basic immunization programs (46).

From a methodological point of view, several limitations may have contributed to the non-significant results in this study. The relatively small sample size (n=69) and uneven distribution of mothers' perceptions, where most respondents had positive perceptions (94.2%), may reduce statistical power and variability. In addition, this study did not control for potential confounding variables such as maternal education level, family decision-making, cultural beliefs, and access to health facilities, which may independently influence immunization behaviour. Future studies are recommended to use larger and more diverse samples to increase the reliability of findings, enhance statistical power, and reduce bias due to uneven data distribution. This approach will also improve the generalizability of results to broader populations. Furthermore, the use of multivariate analysis is essential to control for potential confounding variables and to provide a more in-depth understanding of the various factors influencing the completeness of childhood immunization.

CONCLUSION

The results showed that most respondents had a positive perception of complete basic immunization (94.2%), and the majority of children had received complete basic immunization (72.46%). However, statistical analysis showed that there was no significant relationship between maternal perception and complete basic immunization status of children. This finding indicates that mothers' positive perception of immunization is not always directly proportional to the implementation of complete basic immunization. This indicates that other factors, such as access to health services, vaccine availability, geographical distance, and social support from the surrounding environment, may have a more dominant influence on children's immunization completeness. Future studies are encouraged to explore additional variables that may influence immunization uptake. Factors such as accessibility of health services, availability of vaccines, distance to health facilities, and the role of family or community support may provide further insights into immunization behavior. The use of multivariate analysis is advised to control for potential confounding variables and to obtain a more comprehensive understanding of the factors affecting immunization completeness.

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CONFLICTS OF INTEREST

The authors declare no conflict of interest.

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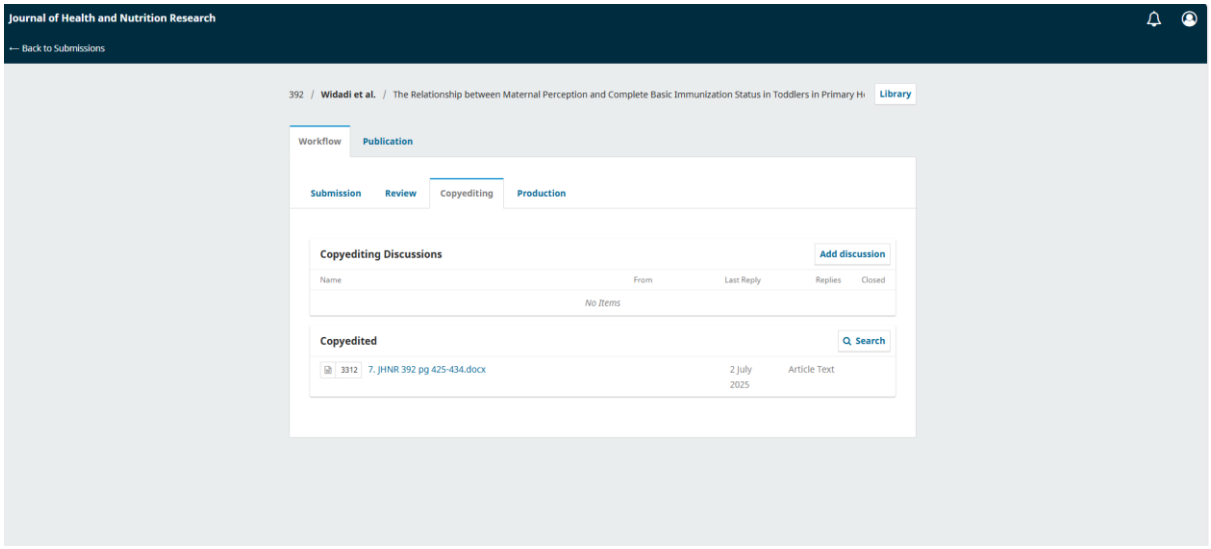
4. Copy editing



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