Medical and Health Journal
Volume 5, Issue 2, 2026, pp. 330-337
e-ISSN: 2807-3541
Open Access: https://jos.unsoed.ac.id/index.php/mhj

Basic Immunization Status and Incidence of Measles Among Toddlers in Working Area of Limboto Public Health Center, Gorontalo Regency

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ARTICLE INFO

Article history:
Received January 8, 2026
Revised January 31, 2026
Accepted February 3, 2026
Available online February 8, 2026

Keywords:
Immunization, Measles, Toddlers, Incidance

ABSTRACT

Measles (campak) is a contagious disease that remains a health problem among toddlers and contributes to high morbidity and mortality rates in children. Globally, measles cases increased from 170,000 cases in 2022 to over 320,000 cases in 2023, with deaths occurring mainly in children who did not receive complete immunization. This condition indicates that basic immunization plays an important role in measles prevention. In Gorontalo Province, measles and rubella cases are still found in several districts/cities, with Gorontalo Regency having the highest number of cases. One of the preventive efforts is the provision of complete basic immunization to enhance immunity against the disease. This study aimed to determine the relationship between basic immunization status and the incidence of measles in toddlers in the working area of Limboto Health Center, Gorontalo Regency.This study was a quantitative study with an analytic observational design using a cross-sectional approach. The study population consisted of all toddlers in the working area of Limboto Health Center, Gorontalo Regency, with a total sample of 60 toddlers taken using a total sampling technique. The research instrument used a checklist sheet. Data analysis was conducted univariately and bivariately using the Chi-Square test. The study results showed that there was a relationship between basic immunization status and the incidence of measles in toddlers (p-value < 0.05). The conclusion of this study is that there is a relationship between basic immunization status and the incidence of measles in toddlers. Therefore, it is recommended that healthcare workers increase education for parents and improve complete basic immunization coverage as a preventive measure against measles in toddlers.

1. INTRODUCTION

Infants aged 0–59 months are a group that is in a phase of rapid growth and development, but are highly susceptible to infectious diseases due to their immune systems not yet being fully developed. During this golden age, toddlers need adequate health protection, one of which is through complete basic immunization. Toddlers who do not receive complete immunization have a higher risk of infectious diseases than those who have been immunized, so immunization plays an important role in reducing morbidity and mortality in the toddler age group (Rifky et al., 2025; Faradilla et al., 2023).

Immunization is an effort to provide active immunity through vaccines that stimulate the immune system to form specific antibodies to prevent certain diseases. Vaccines containing weakened or inactivated antigens aim to produce a protective immune response that can protect the body from various infectious diseases. Immunization programs have been proven effective in reducing morbidity, disability, and mortality from vaccine-preventable diseases, including measles and rubella (Masulilli et al., 2023).

Measles is a contagious disease caused by the measles virus and mainly affects children, with transmission through respiratory droplets when coughing and sneezing. This disease is one of the indicators of failure in basic immunization coverage, as measles cases are still found even

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though immunization programs have been implemented for a long time. Measles can cause serious complications such as pneumonia, encephalitis, severe diarrhea, malnutrition, and even death, especially in toddlers who do not receive optimal immunization protection (Widya et al., 2024).

Biologically, measles or Measles Rubella (MR) immunization works by stimulating the immune system to form specific antibodies and immunological memory. Toddlers who do not receive measles/MR immunization do not have adequate protective antibodies, so the body is unable to provide an effective immune response when exposed to the highly contagious measles virus. This condition makes toddlers more susceptible to measles infection and severe complications (Sari et al., 2020).

According to the World Health Organization (WHO), measles is still one of the leading causes of child mortality worldwide, especially in developing countries, even though safe and effective vaccines are available. Measles vaccination is estimated to have prevented approximately 57 million deaths, but in 2022 there were still around 136,000 deaths from measles globally, with cases increasing from 170,000 in 2022 to more than 320,000 cases in 2023. Most of these deaths occurred in children under five years of age who had not received complete immunization (WHO, 2024; Minta et al., 2023).

In Indonesia, incomplete basic immunization coverage in children aged 12–23 months is still relatively high. This condition is influenced by various factors, such as parents' misunderstanding of vaccines, concerns about the side effects of immunization, and limited access to health services, which ultimately increase the risk of diseases that can be prevented by immunization, including measles (Kondamudi et al., 2025).

A similar situation also occurs in the working area of the Limboto Community Health Center. Several villages show measles/MR immunization coverage that is still below the national target of 85%. In line with this low immunization coverage, the Limboto Community Health Center recorded the highest number of suspected measles cases in Gorontalo District in the January–June 2025 period (Gorontalo District Health Office, 2025). The high number of measles cases occurring alongside low basic immunization coverage raises strong suspicions of a link between basic immunization status and measles incidence among toddlers in this region.

Based on data from the Gorontalo Provincial Health Office, measles cases and suspected cases are still found in all districts/cities, with variations in surveillance coverage between regions. In the 12th week of 2025, there were 133 cases of measles and rubella in Gorontalo Province, consisting of suspected and confirmed cases, with the highest number in Gorontalo District with 60 cases, followed by Gorontalo City with 52 cases and Bone Bolango District with 21 cases (Gorontalo Provincial Health Office, 2025). In line with this, the achievement of Measles Rubella (MR) immunization in toddlers in Gorontalo Province showed a significant downward trend from 73.65% in 2024 to 42.52% in the second quarter of 2025. The decline in coverage also occurred at the district/city level, including Gorontalo District from 71.20% to 49.00%, Bone Bolango District from 83.85% to 36.79%, and Gorontalo City from 60.43% to 27.04% (Gorontalo Provincial Health Office, 2025).

Based on routine immunization reports in the Limboto Community Health Center working area, there are still several villages with immunization coverage below the national target of 85%, particularly for measles-rubella (MR) and rotavirus immunization. The villages of Hutuo, Hunggaluwa, Dutulanaa, and Kayubulan show lower immunization rates compared to other villages, indicating that there are still infants and toddlers who have not received complete immunizations according to schedule. In line with these conditions, data on vaccine-preventable diseases (PD3I) for the period January–June 2025 shows that the Limboto Community Health Center recorded the highest number of suspected measles cases in Gorontalo Regency, namely 60 cases, which is much higher than other community health centers such as Telaga Biru, Tilango, Batudaa, Telaga Jaya, and Batudaa Pantai (Gorontalo District Health Office, 2025).

Based on preliminary observations in the working area of the Limboto Community Health Center in Gorontalo Regency during the period January–May 2025, there were 60 cases of measles in toddlers. To obtain an initial picture of the factors related to this incident, preliminary interviews were conducted on September 12, 2025, with 12 mothers who had toddlers with a

history of measles or incomplete immunization status. The interview results showed that most toddlers had not received complete measles/MR immunization according to the recommended schedule, with 8 out of 12 toddlers having incomplete basic immunization status.

Based on the above description, this study aims to analyze the relationship between basic immunization status and measles cases in toddlers in the working area of the Limboto Community Health Center in Gorontalo Regency.

2. METHOD

This study is a quantitative study with an analytical observational design using a cross-sectional approach. The cross-sectional design was used to determine the relationship between basic immunization status and the incidence of measles in toddlers, where measurements of independent and dependent variables were conducted simultaneously at one point in time to determine the cause-and-effect relationship.

The population in this study was all toddlers in the working area of the Limboto Community Health Center in Gorontalo Regency in 2025. The research sample consisted of 60 toddlers who were recorded as visiting the health center during the last 6 months, using total sampling technique, considering that the population size was relatively small so that the entire population was used as a sample to minimize selection bias. The data sources in this study consisted of primary and secondary data. Primary data were obtained through direct data collection from the mothers of toddlers using a checklist containing information on the basic immunization status of toddlers. Secondary data were obtained from the medical records of the Limboto Community Health Center and measles surveillance reports to determine the status of measles cases in toddlers.

The research instrument used was a checklist compiled based on the research variables, including the basic immunization status and measles cases in toddlers. Basic immunization status was categorized as complete and incomplete according to the basic immunization standards of the Indonesian Ministry of Health. Measles incidence was determined based on the records and confirmation from health care facilities. The data analysis procedure was carried out through data processing stages, including editing, coding, entry, and cleaning. Data analysis was performed using univariate and bivariate methods. Univariate analysis was used to describe the frequency distribution of respondent characteristics, basic immunization status, and measles incidence. Bivariate analysis was used to determine the relationship between basic immunization status and measles incidence in toddlers using the Chi-Square (χ^2) test with a significance level of $\alpha = 0.05$.

Data analysis in this study was conducted using univariate and bivariate methods. Univariate analysis was used to describe the frequency distribution of respondent characteristics, basic immunization status, and measles incidence in toddlers. Bivariate analysis was used to determine the relationship between basic immunization status and measles incidence in toddlers using the Chi-Square (χ^2) test. The Chi-Square test was used to test the relationship between two categorical variables with a significance level of $\alpha = 0.05$. The decision criterion in the Chi-Square test was that if the p-value < α (0.05), then H_0 was rejected and H_1 was accepted, which meant that there was a significant relationship between basic immunization status and measles incidence in toddlers.

3. RESULT AND DISCUSSION

Result

Respondent Characteristics

Table 1. Distribution of Toddlers Based on Gender

Gender of Toddlers	N	%
Male	56,7	56.7
Famale	43,3	43.3
Total	60	100

Based on Table I, it can be seen that the majority of toddlers were male, with 34 respondents (56.7%).

Table 2. Distribution of Toddlers Based on Age

Gender of Toddlers	**N**	**%**
12-23 month	32	53.3
24-35 month	14	23.3
36-47 month	9	15.0
48-60 month	5	8.3
Total	60	100

Based on Table 2, it shows that most toddlers are in the 25-36 month age group, namely 32 toddlers (53.3%).

Table 3. Distribution of Respondents Based on Mother's Education

Education	**N**	**%**
Elementary School	23	38,.3
Junior High School	13	21.7
Senior High School	22	36.7
Bachelor's Degree	2	3.3
Total	60	100

Based on Table 3, it can be seen that the educational level of mothers is dominated by elementary school graduates, namely 23 people (38.3%).

Table 4. Distribution of Respondents Based on Mother's Age

Age	**N**	**%**
Remaja Akhir (17-25)	5	8.
Dewasa Awal (26-35)	50	83.3
Dewasa Akhir (36-45)	5	8.3
Total	60	100

Based on Table 4, it can be seen that most mothers are in the Early Adult group (26–35 years), namely 50 people (83.3%).

Table 5. Distribution of Respondents Based on Mother's Occupation

occupation	**N**	**%**
Housewife	43	71.1
Laborer	6	10
Trader	10	16.7
Civil servant	1	1.7
Total	60	100

Based on Table 5, it can be seen that most respondents work as housewives, namely 43 people (71.1%).

Univariate Analysis

Table 6. Distribution of Respondents Based on Basic Immunization Status in the Limboto Community Health Center Working Area

Imunisasi	**N**	**%**
Complete	27	45
Incomplete	33	55
Total	60	100

Based on Table 6, it can be seen that the majority of toddlers have incomplete basic immunization status, namely 33 toddlers (55%).

Table 7. Distribution of Respondents Based on Measles Incidence in the Limboto Community Health Center Working Area

Measles	N	%
Ever had	42	45.7
Never had	50	54,3
Total	60	100

Based on Table 7, it can be seen that the majority of toddlers experienced measles, namely 43 toddlers (71.1%).

Analisa Bivariat

Table 8. Distribution of Respondents Based on Measles Diagnosis and Basic Immunization Status in the Limboto Community Health Center Working Area

Measles	Immunization		N	*P-Value*
	Complete	Incomplete		
Ever	26	1	42	0,000
Never	15	16	50	
Total	43		17	

Based on Table 8, of the total 60 toddlers, most of the toddlers confirmed to have measles came from the group with incomplete basic immunization status, namely 16 toddlers (94.1%), while only 1 toddler (5.9%) came from the group with complete immunization. Conversely, in the group of infants not confirmed to have measles, the majority came from the group with complete immunization, namely 26 infants (60.5%), while 17 infants (39.5%) came from the group with incomplete immunization. The Chi-Square test results showed a p-value = 0.000 (< α = 0.05), so it can be concluded that there is a significant relationship between basic immunization status and measles cases in toddlers in the Limboto Community Health Center working area.

Discussion

The results of the study show that most toddlers in the Limboto Community Health Center working area have incomplete basic immunization status, namely 33 toddlers (55%), while toddlers with complete basic immunization status number 27 toddlers (45%). These findings illustrate that basic immunization coverage among toddlers in this area is still not optimal and has the potential to increase the risk of diseases that can be prevented by immunization.

Based on the results of the analysis of the relationship between basic immunization status and measles incidence in toddlers, it was found that of the 27 toddlers who had complete basic immunization, only 1 toddler (3.7%) was confirmed positive for measles, while 26 toddlers (96.3%) were not confirmed. Conversely, in the group of 33 toddlers with incomplete basic immunization, 16 toddlers (48.5%) were confirmed positive for measles and 17 toddlers (51.5%) were not confirmed. The results of the statistical test using the Chi-Square test showed a p-value = 0.000, which is smaller than the significance value of α = 0.05. This shows that there is a significant relationship between the status of basic immunization and the incidence of measles in toddlers in the working area of the Limboto Community Health Center, so that complete basic immunization plays an important role in preventing measles in toddlers.

Biologically, the relationship between basic immunization status and measles incidence can be explained through the mechanism of immunity formation. Measles or MR immunization stimulates the immune system to form specific antibodies and immunological memory that can protect the body from measles virus infection. Infants who do not receive complete basic immunization do not have optimal immunity, making the body more susceptible to infection when

exposed to the measles virus, which is highly contagious through droplets and air. The World Health Organization states that optimal protection against measles can only be obtained through complete basic immunization, as a single dose of the vaccine is not sufficient to provide full immunity (WHO, 2022).

This condition can be explained by the Health Belief Model (HBM) theory, which states that individual health behaviors, including mothers' decisions to vaccinate their children, are influenced by their perceptions of the benefits and perceived barriers. Mothers' concerns about the side effects of immunization, such as fever after vaccination, are one form of perceived barriers that can cause mothers to be reluctant or delay giving their toddlers further immunizations (Nabunome et al., 2023). The results of this study are in line with various previous studies, both nationally and internationally. The study by Sari et al. (2020) reported that children with incomplete immunization status had a 3–5 times greater risk of contracting measles than children with complete immunization. The study by Hilmy and Al Asyary (2023) also showed that complete basic immunization is a major protective factor in the prevention of measles in toddlers. In addition, studies by Nkenguye et al. (2024) and Mariana (2023) reported that although a small proportion of fully immunized children can still contract measles, the risk and severity of the disease are much lower than in children who are not fully immunized. The consistency of these findings with various previous studies strengthens the evidence that complete basic immunization plays an important role in reducing the incidence of measles.

The high proportion of toddlers with incomplete basic immunization in the Limboto Community Health Center working area may be influenced by various factors. Based on the Health Belief Model theory, individual health behaviors, including mothers' decisions to vaccinate their children, are influenced by perceptions of perceived benefits and perceived barriers. Mothers' concerns about the side effects of immunization, such as fever after vaccination, are a form of perceived barriers that can cause mothers to delay or discontinue their toddlers' immunization (Nabunome et al., 2023). Research by Sari, Rahmawati, and Putri (2020) also shows that concerns about side effects and the influence of traditional beliefs are still the main reasons for incomplete basic immunization in toddlers.

In addition, maternal characteristics also play a role in the completeness of infant immunization. Most of the mothers in this study were housewives. Although they have relatively more time to care for their children, housewives tend to have limited access to health information and rely more on information from their surroundings, which is not always accurate. This condition can increase vulnerability to myths and concerns about immunization. Research by Wulandari and Yanti (2021) states that housewives have a lower chance of receiving health education compared to working mothers, which results in low understanding and compliance with complete basic immunization.

The results of the study also show that not all toddlers with incomplete basic immunization experience measles. There were 17 toddlers (51.5%) with incomplete immunization status who were not confirmed to have measles. This shows that the incidence of measles is not only influenced by immunization status but also by other factors such as virus exposure intensity, housing density, home ventilation, nutritional status, population mobility, and history of contact with measles patients. Epidemiological theory states that susceptible individuals may remain healthy if they are not sufficiently exposed to the disease agent (Siregar et al., 2025). Studies by Miniharianti et al. (2024) and Putri et al. (2019) also confirm that the living environment and exposure intensity play an important role in determining the occurrence of measles infection.

The local context of the Limboto Community Health Center shows that there are still several villages with low basic immunization coverage and a fairly high incidence of measles. Of the 60 toddlers who were respondents, 17 toddlers (28.3%) were confirmed positive for measles. This figure shows that measles is still a public health problem that needs serious attention. This condition is in line with the report from the Ministry of Health of the Republic of Indonesia, which states that areas with low immunization coverage tend to have a higher risk of measles cases and the potential for extraordinary events (KLB). The results of this study have important implications for public health, particularly in efforts to strengthen basic immunization programs and increase

measles/MR immunization coverage. These findings confirm that increasing complete basic immunization coverage is a key strategy in preventing measles and controlling transmission in the community. Furthermore, the results of this study also emphasize the important role of health workers in providing comprehensive education to parents, conducting routine screening of toddlers' immunization status, and actively tracing toddlers who have not received complete basic immunization.

4. CONCLUSION

Based on the results of research in the Limboto Community Health Center working area, it was found that of the 60 toddlers studied, 33 toddlers (55%) had incomplete basic immunization status. The incidence of measles in toddlers showed that most toddlers, namely 43 toddlers (71.7%), were not confirmed to have measles. The results of the analysis using the Chi-Square test showed a p-value = 0.000 (< α = 0.05), which indicates a significant relationship between basic immunization status and the incidence of measles in toddlers in the working area of the Limboto Community Health Center in Gorontalo Regency. This study has several limitations. The cross-sectional study design cannot show a causal relationship between basic immunization status and measles cases. In addition, the limited sample size and potential recall bias from mothers of toddlers may affect the accuracy of the data obtained. Nevertheless, the results of this study still provide a meaningful picture of the relationship between basic immunization status and measles incidence in toddlers in the working area of the Limboto Community Health Center and can be used as a basis for further research with a larger design and sample size.

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