

ANALYSIS OF PREVALENCE TRENDS OF STUNTING, WASTING, AND UNDERWEIGHT IN TODDLERS IN INDONESIA 2021-2023

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ABSTRACT

Background: Malnutrition in toddlers, especially stunting, wasting, and underweight, is still a public health challenge in Indonesia. Although various interventions have been implemented, the trend of growth disorders still shows regional differences. This study aims to analyze the trend of changes in the prevalence of stunting, wasting, and underweight in toddlers in regional Indonesia from 2021-2023.

Method: This study used a descriptive design with a trend analysis approach. Data were obtained from the 2021-2022 Indonesian Nutrition Status Study (INSS) and the 2023 Indonesian Health Survey (IHS). The sample included toddlers aged 0-59 months who had complete anthropometric data. The analysis was conducted based on seven regional areas in Indonesia using descriptive statistical methods to identify patterns of changes in prevalence.

Result: The study showed that the prevalence of stunting decreased from 24.4% in 2021 to 21.5% in 2023. Wasting increased from 7.1% to 8.5% in 2023. Underweight showed a downward trend from 17% to 15.9%.

Conclusion: The highest prevalence of Stunting, Wasting, and Underweight during 2021-2023 was in the Eastern Indonesia Region, namely Nusa Tenggara and Maluku. Community-based interventions contributed to the reduction of stunting and underweight, but wasting remains a challenge that requires special attention. Policies that are more focused on improving food security and access to health services are needed to address nutritional disparities between regions.

Keywords: "Malnutrition, Toddlers, Trend Analysis, Stunting, Wasting, Underweight"

INTRODUCTION

Malnutrition is an imbalance between nutritional needs and intake that can cause deficiencies or excesses of energy, protein, and macro and micronutrients, which hurt children's growth and development. This condition is known as the double burden of malnutrition (Alfarisi et al., 2023). Stunting, wasting, and underweight are three key indicators of malnutrition that have a major impact on a child's overall growth and health. These three conditions often occur together, reflecting the dual nutritional challenges, especially in developing countries. Stunting occurs when a child is shorter than their age due to prolonged malnutrition. Wasting refers to a body weight that is disproportionate to their height, usually due to a short period of malnutrition or illness.

Meanwhile, underweight indicates a child's weight that is not appropriate for their age, which can be a sign of both chronic and acute malnutrition (Bahar et al., 2024).

UNICEF data in 2020 reported that around 149 million children under the age of five are stunted, 45 million are wasted, and 38.9 million are underweight worldwide. This condition not only affects children's physical growth but also has an impact on cognitive development and productivity in the future (UNICEF, WHO and Bank, 2020). Indonesia is a country with stunting rates that are still above WHO standards and is ranked fifth in the world in terms of stunting prevalence (Meri Agritubella et al., 2023). The results of the 2013 Basic Health Research reported that 19.6% were undernourished and severely malnourished (wasting), 37.2% were very short

and stunted, and 12.1% were very thin and underweight. While in 2018, 17.7% were undernourished and severely malnourished, 30.8% were very short and stunted, 10.2% were thin and severely underweight (Ministry of Health of the Republic of Indonesia, 2018). These data show that the wasting and underweight trends are still fluctuating from year to year. Although the stunting rate has decreased, the target of the National Medium-Term Development Plan (NM) to reduce wasting to 7% and stunting to 14% by 2024 has not been fully achieved.

Many studies have been conducted, but there is still inconsistent data on wasting, stunting, and underweight trends in Indonesia. A study conducted in India showed that wasting and stunting clusters often persist in a region for several years. This also occurs in several provinces in Indonesia, where areas with high stunting and wasting rates in previous years still show the same trend until 2023 (Singh et al., 2022). Although some regions have experienced a downward trend in growth disorders, this pattern does not occur evenly throughout Indonesia. According to Susianto and Sudaryanto (2024) and Khoiriyah and Nadhiroh (2024) There are still disparities between regions, with some areas showing significant improvements, while others are still facing increasing rates of wasting and underweight. A study by Meri Agritubella et al (2023) and Mulyati et al (2021) Shows that although there is a national downward trend in stunting and underweight, the prevalence of wasting in several regions is still increasing or fluctuating.

Further analysis is needed to understand the trend patterns of wasting, stunting, and underweight prevalence that occur as material for evaluating interventions that have been carried out in the Indonesian Region. This study aims to analyze the trend of wasting, stunting, and underweight prevalence in toddlers in Indonesia in 2021-2023, and to provide data-based recommendations to improve the

effectiveness of prevention and intervention programs in addressing nutritional problems in children. By analyzing the trend of stunting, wasting, and underweight prevalence, this study is expected to provide a deeper understanding of the factors that influence the nutritional status of toddlers, as well as evaluate the effectiveness of government policies and programs in addressing nutritional problems in Indonesia. The findings of this study can also be the basis for designing more targeted intervention strategies to improve the nutritional quality and welfare of toddlers in the future.

METHODS

This study uses a descriptive study design with a trend analysis approach to evaluate changes in the prevalence of stunting, wasting, and underweight in toddlers in Indonesia in 2023. This study uses aggregate data from 38 provinces from the 2021 Indonesian Nutrition Status Study (INSS), 2022 INSS, and the 2023 Indonesian Health Survey (IHS) with the population in this study covering all toddlers in Indonesia recorded in the 2021-2022 INSS and 2023 IHS. The samples in the INSS and IHS were selected using a stratified two-stage sampling technique based on predetermined inclusion and exclusion criteria, with inclusion criteria including toddlers who have valid anthropometric data, recorded in the 2023 INSS and IHS, and have complete information on nutritional status. Exclusion criteria include toddlers who have incomplete or invalid data and those who experience certain medical conditions that can affect growth, such as chronic diseases. In this study, the sample was 38 provinces that had complete data related to the prevalence of wasting, stunting, and underweight.

The research variables are the prevalence of wasting, stunting, and underweight toddlers. Toddlers are categorized as stunting if the Z-score of Height/Age <-2 SD, wasting if

Height/Age <-2 SD, and underweight if the Z-score of Weight/Age <-2 SD. The prevalence of stunting, wasting, and underweight is calculated using the formula of dividing the number of toddlers experiencing stunting, wasting, and underweight problems by the number of toddlers aged 0-59 months multiplied by 100%. The research instruments used were the 2021-2022 Indonesian Nutrition Status Study (INSS) and the 2023 Indonesian Health Survey (IHS) questionnaires which included data on height and weight, age, and gender of toddlers aged 0-59 months. Anthropometric measurements were carried out by trained enumerators with a minimum educational background of Diploma III Health to ensure the accuracy of the data obtained. Measurements were carried out by following the standard operating procedures (SOP) that had been set by the 2021-2022 Indonesian Nutrition Status Study (INSS) and the 2023 Indonesian Health Survey (IHS) teams. The data collection process was carried out by direct interviews and anthropometric measurements of each individual selected as a sample. Weighing using a digital scale with a precision of 0.05 kg, while measuring body length using a body length measuring tool with a precision of 0.1 cm, and measuring height using a stadiometer with a precision of 0.1 cm. The research procedure begins with the collection of secondary data from the 2021-2022 Indonesian Nutrition Status Study (INSS) and the 2023 Indonesian Health Survey (IHS), then the collected data is selected based on the inclusion and exclusion criteria that have been set. After that, the data is processed using statistical software and analyzed to see changes in the trend of the nutritional status of toddlers from 2021-2023. The statistical analysis used in this study is a descriptive analysis to see the trend of the prevalence of wasting, stunting, and underweight toddlers in seven Indonesian regions (Sumatra, Java-Bali, Sulawesi, Kalimantan, Nusa Tenggara, Maluku, and Papua) from 2021-2023. The data analysis

process uses SPSS software version 27 and Microsoft Excel to visualize data trends in the form of tables and graphs. The implementation of the Indonesian Health Survey has received approval and an ethical clearance letter from the National Health Research and Development Ethics Commission (KEPPKN) with the number HK.01.07/MENKES/156/2023.

RESULTS AND DISCUSSION

The problem of malnutrition, especially stunting, wasting, and underweight, remains a major challenge in Indonesia. The results of the study showed that although there was an improvement in the prevalence of growth disorders in toddlers, especially in terms of stunting and underweight, the wasting trend still showed significant fluctuations. Inequality between regions is still visible, with the Nusa Tenggara Region still having the highest prevalence. This shows that despite improvements on a national scale, there are still challenges in equalizing access to nutritious food throughout Indonesia. These findings are in line with government policies in strengthening specific and sensitive nutrition interventions, including a national program to reduce stunting rates (Sugianti and Devianti Putri, 2022). Nutrition improvement programs implemented by the Indonesian government have contributed to a decrease in the prevalence of stunting through direct intervention at the community level and government policy support, the prevalence of stunting has decreased significantly (Wulandari et al., 2021).

Various factors contribute to the high rate of malnutrition in toddlers in Indonesia. Factors such as low birth weight (LBW), short birth length, child age, gender, infectious diseases, and family socio-economic status have significant relationships with the incidence of stunting, underweight, and wasting. Research shows that children with LBW have a higher risk of stunting than

children with normal birth weight (Abimayu and Rahmawati, 2023). Other factors also show that food security and food diversity are some of the factors causing malnutrition (Socadevia and Nadhiroh, 2024). In addition, the mother's education level plays an important role in determining the nutritional status of the child. A study in West Java showed that children from mothers with low education have a higher risk of stunting and being underweight (Coal., 2024).

Table 1. Stunting Prevalence Trend Analysis in Toddlers Aged 0-59 Months Based on Indonesian Regions in 2021-2023

Regional	2021			2022			2023		
	Min	Max	$\bar{X} \pm SD$	Min	Max	$\bar{X} \pm SD$	Min	Max	$\bar{X} \pm SD$
Sumatra	17.6	33.2	22.8 $\pm$ 4.5	15.2	31.2	20.0 $\pm$ 4.8	13.5	29.4	19.2 $\pm$ 4.9
Java-Balinese	10.9	24.5	19.7 $\pm$ 5.0	8.0	20.8	17.0 $\pm$ 4.5	7.2	23.9	18.1 $\pm$ 5.3
Southeast	31.4	37.8	34.6 $\pm$ 4.5	32.7	35.3	34.0 $\pm$ 1.8	24.5	37.9	31.2 $\pm$ 9.4
Kalimantan	22.8	30.0	27.5 $\pm$ 2.9	22.1	27.8	25.0 $\pm$ 2.3	17.4	24.7	22.5 $\pm$ 2.9
Sulawesi	21.6	33.8	28.6 $\pm$ 4.0	20.5	35.0	27.0 $\pm$ 0.2	21.3	30.4	27.1 $\pm$ 3.2
Maluku	27.5	28.7	28.1 $\pm$ 0.8	26.1	26.1	26.1 $\pm$ 0	23.6	28.4	26.0 $\pm$ 3.3
Papua	26.2	29.5	27.8 $\pm$ 2.3	30.0	34.6	32.3 $\pm$ 3.2	24.8	39.3	31.0 $\pm$ 6.1
Indonesia	10.9	37.8	24.4$\pm$5.5	8.0	35.3	21.6$\pm$6.3	7.2	39.3	21.5$\pm$6.7

Figure 1 shows that during the 2021-2023 period, the prevalence of stunting experienced a significant decline except for the Papua

Table 1. Shows the trend of stunting prevalence in toddlers in Indonesia decreasing in 2021-2023. The Java-Bali Region with stunting prevalence decreased from 19.7% to 18.1%, the Sumatra Region decreased from 22.8% to 19.2%, in contrast to the Region which showed an increase from 27.8% to 31% and the Nusa Tenggara Region remained the highest although it decreased from 34.6% to 31.2%.

Region. The Nusa Tenggara Region with the highest prevalence of stunting during the 2021-2023 period.

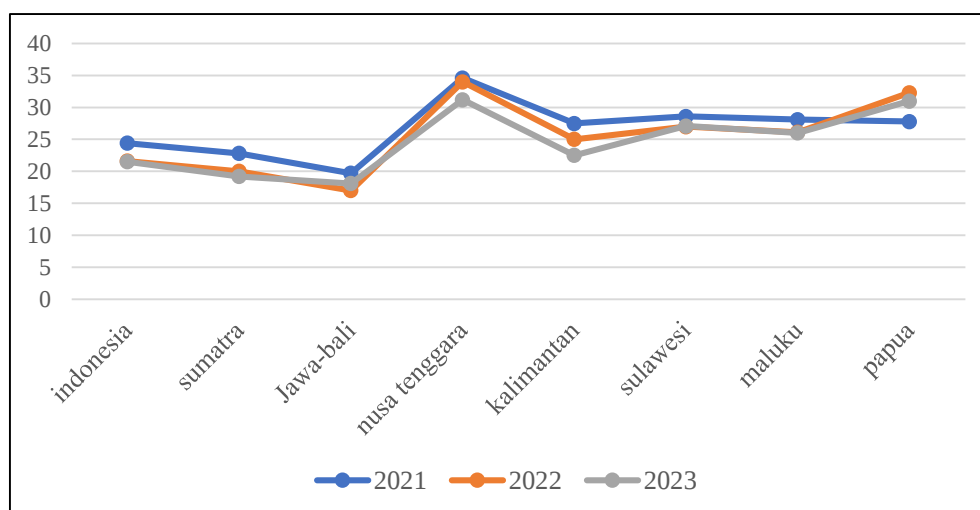


Figure 1. Stunting Prevalence Trend Analysis in Toddlers Aged 0-59 Months Based on Indonesian Regions in 2021-2023

Based on the results of the analysis of the Indonesian Nutritional Status Survey (Ministry of Health of the Republic of Indonesia, 2021, 2022) and the 2023 Indonesian Health Survey (Ministry of Health of the Republic of Indonesia, 2023), shows that Indonesia has

experienced a decline in stunting prevalence from 24.4% in 2021 to 21.5% in 2023. The Nusa Tenggara Regional Region has had the highest prevalence rate for the past 3 years, although the figure has decreased. In several regional areas of Indonesia, there has been a

significant decline and is already below the Indonesian average (21.5%), namely the Sumatra Regional Region (19.2%) and Java-Bali (18.1%) but is still above the national target (14%) so it still needs to be considered. Meanwhile, in the Eastern Indonesia region, it is still above the Indonesian average and still above the WHO target (20%). This decline shows the effectiveness of the government's community-based intervention program. The theory of community-based nutrition programs states that interventions tailored to local needs are more effective than policies that are simply implemented from the center (Febriati et al., 2024). The results of this study are in line with research conducted by Wulandari et al., (2021) and Jamaluddine et al., (2020) which shows that community-based nutrition improvement programs, especially in schools, can have a significant impact on reducing stunting rates. This supports the claim that community-based interventions can have a major impact on reducing stunting rates in more difficult-to-reach areas. Sensitive nutrition interventions contribute greatly to reducing stunting, a study conducted in Banyumas by Devi Sari (2023) shows that there is a significant decrease in the

prevalence of stunting from 30.2% to 16.6% in 2022. This is different from the results of research on the implementation of sensitive and specific nutritional intervention programs conducted by The Last Supper (2023) in Karo district, West Sumatra, which shows that this program has not been effective in reducing stunting. This study also contradicts the results of research conducted in India by Pavithra et al., (2019) and in Guatemala by Juarez et al., (2021) which states that despite improvements in some child nutrition indicators, there was no significant reduction in the prevalence of stunting in poorer areas. The study suggests that socio-economic constraints economic, food security, low maternal education levels, and limited access to quality health services reduce the impact of community-based interventions.

Table 2 shows that the prevalence of wasting during the period 2021-2023 experienced a significant increase. The Maluku Regional area has the highest prevalence rate (14.5%). Meanwhile, the Sumatra Regional area (8.4%) and the Java-Bali Regional area (7.3%) are below the Indonesian average (9.2%) in 2023.

Table 2. Wasting Prevalence Trend Analysis in Toddlers Aged 0-59 Months Based on Indonesian Regions in 2021-2023

Regional	2021			2022			2023		
	Min	Max	$\bar{X} \pm SD$	Min	Max	$\bar{X} \pm SD$	Min	Max	$\bar{X} \pm SD$
Sumatra	5.0	0.7	7.8±1.6	5.5	11.3	7.5±1.6	6.3	13.6	8.4 ±2.1
Java-Balinese	3.0	6.9	5.7±1.3	2.8	8.0	6.7±1.8	3.6	10.2	7.3 ±2.2
Southeast	7.5	10.1	8.8±1.8	8.7	10.7	9.7±1.4	8.6	13.6	11.1±3.5
Kalimantan	6.8	10.3	8.5±1.5	6.5	10.1	8.9±1.4	8.7	13.3	10.7 ±2.0
Sulawesi	6.2	10.2	7.7±1.6	6.6	11.3	8.7±1.6	9.1	12.9	10.9±1.8
Maluku	10.6	12.0	11.3±0.9	11.1	11.9	11.5±0.5	13.6	15.4	14.5± 1.2
Papua	8.8	10.8	9.8±1.4	10.5	11.8	11.1±0.9	10.9	18.2	13.8 ± 2.3
Indonesia	3.0	12.0	7.1±1.9	2.8	11.9	7.7±2.0	3.6	18.2	8.5±3.0

Figure 2 shows that during the period 2021-2023 the incidence of wasting increased significantly across all regions of Indonesia during 2021-2023. The Maluku Region occupied the highest point followed by the Papua Region which was in second place. The Java-Bali Region was at its lowest point during

the period 2021-2023. The phenomenon of the increasing trend of wasting prevalence that occurred in Indonesia between 2021 and 2023 highlights a more dynamic challenge in dealing with malnutrition in toddlers. The prevalence of wasting continues to increase from 2021 (7.1%) to 2023 (8.5%). The Maluku region was

recorded as having the highest prevalence, at 14.5%, while Java-Bali had the lowest prevalence at 7.3%, below the national average of 8.5%. On the other hand, Sumatra was also recorded below the national average with a prevalence rate of 8.5%. This is associated with unstable food security factors, climate change, and limited access to nutritious food. This phenomenon supports the theory of food security which states that environmental, economic, and social changes greatly affect the stability of the nutritional status of the community (Amalia et al., 2023). Research conducted by Mulyati et al., (2021) also shows that low birth weight and family income levels are closely related to wasting in toddlers. Japan is one of the countries that has succeeded in dealing with malnutrition in its country, based on data from the Global Nutrition Report, the prevalence of wasting in Japan is 2.3%. This figure is lower than the Southeast Asian average of 8.9%. This is because Japan has succeeded in developing the Shokoiku program based on nutrition education, in addition, Japan also focuses on building adequate sanitation infrastructure and encouraging good hygiene

practices (Kurotani et al., 2024). A study conducted in Bangladesh by Mumuni and Joseph Aleer (2023) and in Africa by (Wolfe and Channon, 2023) showed that seasonality and climate variation significantly influence wasting prevalence. Sharp decreases or increases in wasting prevalence are often related to seasonal changes, which are related to the quality of access to nutritious food, and this factor is also seen in Indonesia, where fluctuations in wasting prevalence appear to be related to unstable food security and climate change. Research by Wang, Yuan and Tang (2021), which discusses food security strategies and environmental sustainability, states that although food security strategies are implemented in environmental sustainability efforts, there is no significant impact seen in several regions related to the influence of climate change on the prevalence of wasting. This study argues that the effectiveness of strategies such as reducing food waste and waste management often does not have a clear impact on reducing wasting at the regional level.

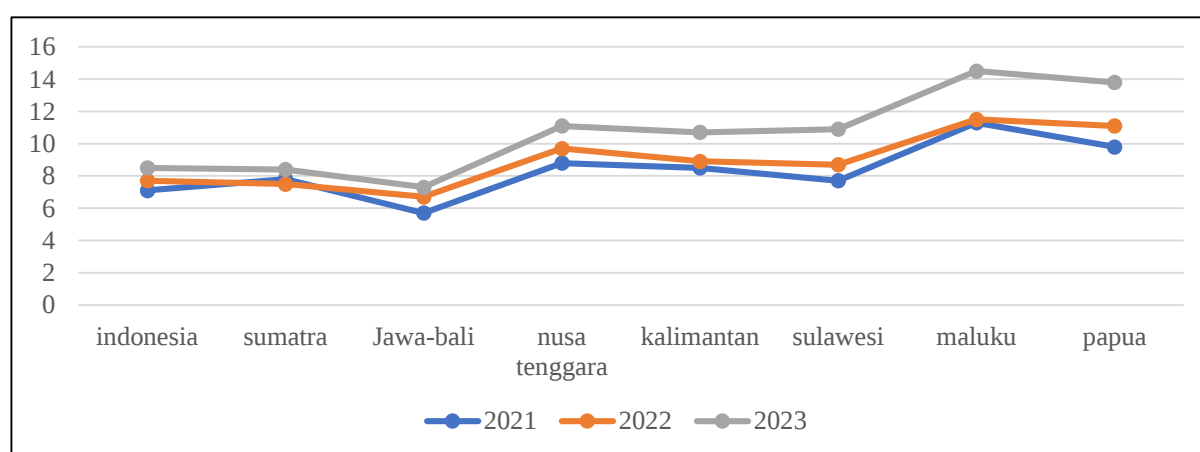


Figure 2. Wasting Prevalence Trend Analysis in Toddlers Aged 0-59 Months Based on Indonesian Regions in 2021-2023

Table 3 shows that the trend of underweight prevalence in Indonesia has decreased in the period 2021-2023, namely

from 17% to 12.9%. The highest prevalence is in the Nusa Tenggara Region (25.2%) and the lowest is in the Java-Bali Region (13.3%).

Table 3. Underweight Prevalence Trend Analysis in Toddlers Aged 0-59 Months Based on Indonesian Regions in 2021-2023

Regional	2021			2022			2023		
	Min	Max	$\bar{X} \pm SD$	Min	Max	$\bar{X} \pm SD$	Min	Max	$\bar{X} \pm SD$
Sumatra	12.9	23.8	16.6 $\pm$ 3.1	12.2	24.3	15.9 $\pm$ 3.4	8.9	22.6	13.9 $\pm$ 3.8
Java-Balinese	7.0	16.5	13.5 $\pm$ 3.2	6.6	17.6	14.0 $\pm$ 3.8	5.6	17.7	13.3 $\pm$ 3.7
Southeast	22.4	29.3	25.8 $\pm$ 4.8	24.2	28.4	26.3 $\pm$ 2.9	20.8	29.7	25.2 $\pm$ 6.2
Kalimantan	16.2	24.3	20.3 $\pm$ 3.6	17.3	23.0	20.5 $\pm$ 2.2	15.3	21.6	18.7 $\pm$ 2.6
Sulawesi	14.1	23.8	20.5 $\pm$ 3.6	13.4	25.0	20.7 $\pm$ 3.9	14.3	24.4	21.2 $\pm$ 3.7
Maluku	22.4	26.4	24.4 $\pm$ 2.8	23.0	23.4	23.2 $\pm$ 0.2	20.9	25.1	23.0 $\pm$ 2.9
Papua	19.3	19.9	19.6 $\pm$ 0.4	18.7	22.7	20.7 $\pm$ 2.8	15.4	23.9	20.3 $\pm$ 2.8
Indonesia	7.0	29.3	17.1$\pm$4.7	6.6	28.4	17.1$\pm$4.7	5.6	29.7	15.9$\pm$5.0

Figure 3 shows that during the period 2021-2023, the incidence of Underweight tends to decrease in several parts of Indonesia during 2021-2023. The Nusa Tenggara region is at the

highest point during the period 2021-2023. The Java-Bali region is at the lowest point and below the Indonesian average.

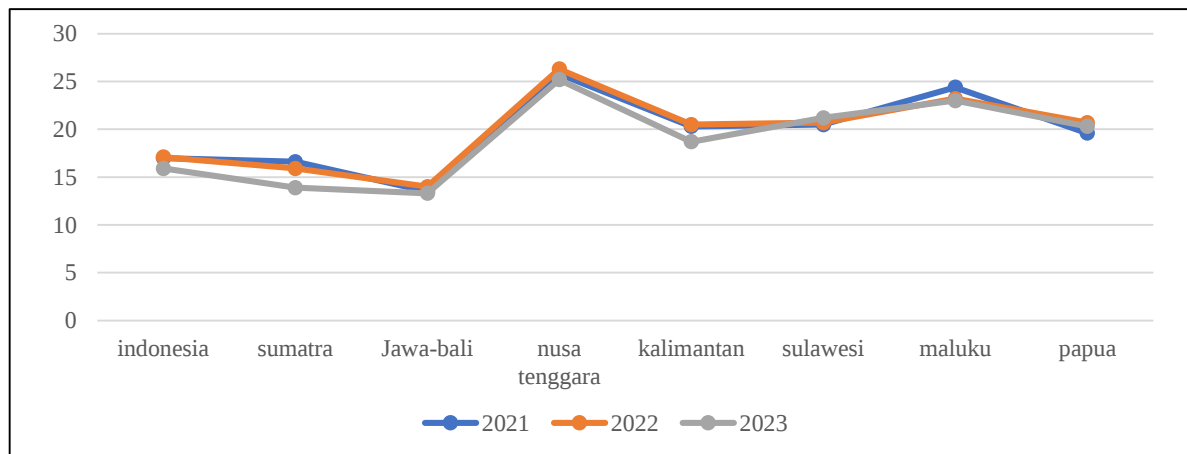


Figure 3. Underweight Prevalence Trend Analysis in Toddlers Aged 0-59 Months Based on Indonesian Regions in 2021-2023

A similar trend is also seen in the prevalence of underweight in several regions in Indonesia. Data shows a downward trend in underweight in the last three years, from 17% to 15.9%. The Sumatra Regional area recorded a significant decline from 16.6% to 13.9% and the Java-Bali Regional area was recorded as the Region with the lowest prevalence of 13.3%, both of these Regional areas are already below the national average. This decline was driven by increased public awareness of healthy eating patterns and more targeted social assistance program interventions. Although this study focused on stunting, the results showed that social assistance programs had a significant impact on the nutritional status of toddlers. This supports the importance of socio-economic

interventions in efforts to reduce nutritional problems in children (Sahara et al.,2024). This finding supports the theory of health disparities which states that the gap in nutritional status between regions can be reduced through awareness-raising programs and effective food distribution (Yahya and Ihwal, 2024). A study by Putri (2022) found that a nutrition counseling intervention combined with cash transfers significantly reduced the risk of underweight in children in developing countries. The counseling provided information on children's feeding and nutrition practices, as well as antenatal and postnatal care. The results showed an increase in height for age (H/A) and a decrease in the risk of underweight in the group that received the intervention. Other

studies have also shown that a combination of sensitive and specific interventions is key to success in reducing stunting and underweight. This approach has been proven effective in countries such as India, Peru, Senegal, Ethiopia, Nepal, and Myanmar. The programs involve various sectors and focus on improving nutrition and socio-economic conditions of the community (Sugianti and Devianti Putri, 2022)

This study has several advantages that make it a comprehensive study in analyzing growth disorder trends in Indonesian toddlers. This approach allows the study to provide an overview of the effectiveness of interventions that have been carried out and highlight areas that still face challenges in reducing malnutrition rates. In addition, this study uses secondary data from the Indonesian Nutritional Status Study (INSS) and the Indonesian Health Survey (IHS), which are national data with valid and standardized anthropometric measurement methods. By using verified data, the results of this study have a high level of reliability in describing the nutritional conditions of toddlers in Indonesia. Not only that, this study also provides an analysis based on seven regional areas, so that it can identify gaps between regions and become the basis for more targeted and specific policies. By highlighting stunting, wasting, and underweight trends, this study can provide input for the government in efforts to achieve national and global targets in reducing malnutrition rates. The results of this study also support the effectiveness of community-based interventions that have been implemented, especially in efforts to reduce stunting and underweight rates in several regions.

The main limitation of this study is the research period which only covers the period 2021-2023, so it does not allow for long-term analysis of the effectiveness of the nutrition intervention program. Focusing on a specific area, the results of this study do not yet fully reflect conditions throughout Indonesia. Socioeconomic factors, such as family income,

maternal education level, and access to health facilities, have not been fully studied in depth in this study.

CONCLUSION

This study shows that there is a significant change in the prevalence of stunting in toddlers in Indonesia during the period 2021-2023. The decreasing trend in the prevalence of stunting and underweight indicates the effectiveness of the nutritional interventions that have been implemented, although wasting still shows fluctuations in some regions. Regional disparities remain a challenge, especially in the Nusa Tenggara Region which has a high malnutrition rate. New findings show that community-based interventions are more effective in reducing malnutrition rates than general approaches. Fluctuations in wasting indicate the important role of food security and socio-economic conditions in children's nutritional status. These results strengthen the theory that sustainable nutrition interventions that are tailored to local conditions are more effective.

Suggestions for the government include strengthening nutrition policies by ensuring equitable distribution. Access to nutritious food and health services across the region, especially in areas with high malnutrition prevalence. Community-based intervention programs that have proven effective should be expanded with adequate budget and health workforce support. In addition, a multisectoral approach involving the agriculture, education, and social welfare sectors is needed to improve food security and family nutrition education. Suggestions for further research include expanding the time span to evaluate long-term malnutrition trends. A more in-depth analysis of socio-economic factors, food security, and climate change is needed to understand the causes of wasting fluctuations. In addition, an approach that combines secondary and primary data will provide a more comprehensive picture of the

effectiveness of various nutrition interventions in various regions.

ACKNOWLEDGMENT

Thank you to BKPK for facilitating the 2023 Indonesian Health Survey Report, so that further analysis can be carried out.

CONFLICT OF INTEREST

The authors have no conflicts of interest related to the material presented in this research.

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