

# INSIGHTS INTO CHILDHOOD MALNUTRITION: AN ANALYSIS ON FOOD VULNERABILITY AND STUNTING USING 2021 INDONESIAN NUTRITIONAL STATUS SURVEY DATA

Yulianty Sanggalorang<sup>1\*</sup>, F. Ari Anggraini Sebayang<sup>2</sup>, Nancy S H Malonda<sup>1</sup>, Adisti A. Rumayar<sup>3</sup>

<sup>1</sup>Laboratory of Health Nutrition, Public Health Sciences Study Program, Faculty of Public Health, Sam Ratulangi University, Manado, Indonesia

<sup>2</sup>English Department, Faculty of Humanities, Sam Ratulangi University, Manado, Indonesia

<sup>3</sup>Laboratory of Health Policy Administration and Health Promotion, Public Health Sciences Study Program, Faculty of Public Health, Sam Ratulangi University, Manado, Indonesia

Email: y.sanggalorang@unsrat.ac.id

## ABSTRACT

*Stunting, a consequence of childhood malnutrition, stems from various factors, including unaddressed food vulnerability during the critical early stages of life, from conception to 24 months. Early loss of developmental opportunities, particularly that in relation to height, leads to an irreversible inability to achieve optimal growth. This study aimed to analyze the relationship between food vulnerability and stunting among children aged 0-59 months in the East Bolaang Mongondow Regency. The research utilized secondary data from the 2021 Indonesian Nutritional Status Survey (INSS), encompassing all selected households with children under five within the census blocks. After applying appropriate weighting procedures, the sample size was 8,893. The study included anthropometric measurements (body height/length) and assessments of various indicators of household food vulnerability (the inability of an individual or a group of individuals to obtain sufficient and appropriate food for a healthy and active life). The findings revealed significant correlations ( $p$ -value < 0.05) between food vulnerability status and stunting. Children from the food-vulnerable group had a 4.661 times higher risk of experiencing stunting compared to those from the food-secure group. This study concludes that food vulnerability is a significant risk factor in the development of stunting in children under five in Indonesia. Furthermore, factors associated with vulnerability such as limited access to nutritious food and food variety could contribute to hindering child growth. These findings have important implications for the development of nutritional policies and interventions in Indonesia. Enhancing food resilience and access to quality nutrition emerged as key strategies in reducing the prevalence of stunting in children under five.*

**Keywords:** children under five, Indonesian Nutritional Status Survey, food vulnerability, stunting

## INTRODUCTION

Human health and national development are significantly impacted by nutrition. In developing countries, particularly, solving health issues related to nutrition is essential to reaching sustainable development objectives. Studies have suggested that malnutrition, one of the significant health burdens, still affects millions of people, especially small children and pregnant women (Müller & Krawinkel, 2005; Mutiara Tasyrifah, 2021). Thus, cross-disciplinary research, comprehensive and successful policies, and initiatives are needed to enhance nutrition and health in developing nations. It is often advocated that strategies to reduce maternal, neonatal, and infant mortality as well as enhance general public health and well-being

should depend on addressing malnutrition (Semba & Bloem, 2008).

Stunting, as one of the malnutrition-related issues, undoubtedly plays a significant role in determining the health status and the success of a country's development (WHO, 2014). This condition, which is evident in children who are excessively small for their age because of malnutrition, is still a major public health concern in many developing countries, including Indonesia. Based on WHO's cut-off values for public health relevance for stunting, the prevalence of stunting in Indonesia is still between 30%-39% (Anastasia et al., 2023; Ayuningtyas et al., 2022). Furthermore, in contrast to the data of 2021, the 2022 Indonesian Nutritional Status Survey (INSS) data shows a

declining trend in stunting and overweight, whereas trends in wasting and underweight have grown. (Kemenkes RI, 2021, 2022). The frequency of stunting in Indonesia, according to INSS statistics, is 21.6% nationwide on average, well behind the national target of 14% by 2024, despite the indications of improvement in 2022 (Kemenkes RI, 2022; TNP2K, 2018). The report also indicates that half of eastern Indonesia, including Sulawesi, still has a higher prevalence of stunting compared to the other regions in the country (Anastasia et al., 2023; Ayuningtyas et al., 2022).

Despite the relatively higher prevalence of stunting in North Sulawesi, the 2022 INSS statistics reported a downtrend in this region, falling from 21.6% in 2021 to 20.5% in 2022. However, one noteworthy finding from the data in 2022 is that East Bolaang Mongondow Regency was the only area with a substantial increase in stunting prevalence (>5%) (Kemenkes RI, 2021, 2022). This is an interesting trend that has not yet been studied, thus it is necessary to investigate the factors that contribute to stunting in Bolaang Mongondow in 2021.

As a complex health problem, stunting has multiple causes, according to UNICEF, which can be broadly divided into three categories, including immediate, underlying, and enabling determinants (Anastasia et al., 2023; Suratni et al., 2023; Thahir, Li, Holmes, & Gordon, 2023; Torlesse, Cronin, Sebayang, & Nandy, 2016; UNICEF, 2021). These factors highlight the importance of addressing stunting in Indonesian children through comprehensive policies and programs that focus on improving maternal and child nutrition, promoting healthy feeding practices, and enhancing access to clean water and sanitation. As an underlying factor of stunting, food security has a significant role in under-five health status. Numerous research studies have demonstrated a correlation between food insecurity and increasing stunting and anemia in children aged 6-23 months who live in rural areas of Indonesia (Muslihah, Wilujeng, & Kusuma, 2022; Sanggelerang, Farmawati, & Sudargo, 2017; Yuliantini, Sukiyono, Yuliarso, & Sulisty, 2022). Stunted children and overweight/obese mothers are also predicted by household food insecurity in urban areas (Mahmudiono et al., 2018). Furthermore, according to UN food security report, nearly 70% of Indonesians, cannot afford

nutritious food, which may be a factor in the high rate of stunting among children under the age of five (Widyawati, 2023).

The investigation of food vulnerability and stunting in children 0-59 months old in East Bolaang Mongondow is the main topic of this study. The focus of the research location is East Bolaang Mongondow due to the significant increase in stunting rates from 2021 to 2022 in this regency. It emphasizes the importance of undertaking research on the relationship between food insecurity and stunting, as well as the consequences for children's growth and development, particularly in terms of height. It also considers the distinct data patterns found in this area. This study can provide an important new understanding of the complex dynamics of nutritional well-being, which will be useful information for the planning and execution of focused interventions aimed at reducing stunting and improving population health in general.

## METHODS

### Design and Sample

This study used secondary data from the INSS, which had been carried out in 2021 by the Agency of Health Development Policy of the Ministry of Health of the Republic of Indonesia. It utilized an analytical observational research design with a cross-sectional method. The INSS population in the East Bolaang Mongondow Regency included all households with children under five in census block groups. The research sample consisted of 8893 households with children under five, as defined by data weighting. As part of the study, mothers or other family members who were at least 17 years old were interviewed to collect the data. A two-stage stratified sampling procedure was used to choose the research sample.

### Measures

The dependent variable in this study was stunting, while the independent variables included parents' education and occupation and food vulnerability. The following are the operational definitions for every variable:

- a. Parents' education (mother and father) was classified into 2 categories, namely high (if they

attained senior high school diploma or higher than that) and low (if their education attainment was below senior high level).

- b. Parents' occupation was categorized into 2 groups: employed (if their occupation had any economic value) and unemployed (if their occupation did not have any economic value).
- c. Food vulnerability was defined as a condition of a household that had experienced financial issues or other challenges to obtain sufficient and nutritious foods. Households were categorized as vulnerable to food security if they experienced any of the eight conditions mentioned in the questionnaire at least once, meaning they answered "yes" to at least one of the eight questions. Food secure was defined as a condition if a household never experienced the aforementioned condition. The Food Vulnerability Questionnaire was adopted and adapted from the Food Insecurity Experience Scale (FIES), which was developed to capture a comprehensive picture of food insecurity at the household level.

Enumerators with nutrition-related educational backgrounds, who had completed training in data collection for the survey, collected the INSS 2021 data. Every tool used in the study including an anthropometric measuring device ("multi-fungsi" to measure respondent's height/length) and questionnaires, had undergone validation. Enumerators were equipped with instruments that met the same criteria; while the data was gathered at respondents' households through door-to-door strategy.

### **Analytic Strategy**

Since the dataset is not publicly available, a formal request for access to the raw dataset was proposed to the Ministry of Health's Agency of Health Development Policy before data analysis. After that, z-scores were computed to evaluate the toddlers' nutritional status using the WHO Anthro software. Before moving on to univariate and bivariate analyses, the dataset was first cleaned and coded. Aside from that, data weighting was also conducted prior to the univariate and bivariate analyses to guarantee the representativeness of the sample. This study used chi-square test computations in the context of bivariate analysis, using a significance level of  $p < 0.05$  to determine

statistical significance. Computerized statistical software was used to perform the statistical analyses in this study.

### **Ethical Considerations**

The Indonesian Nutritional Status Survey (INSS) was conducted with the authorization of the National Unity and Politics Agency in all provinces and regencies across Indonesia. The survey received support from the heads of health agencies throughout the country. During the research process, enumerators provided a comprehensive explanation of the study to potential respondents and obtained their informed consent for participation. Each respondent was presented with information regarding the research's nature, objectives, and potential benefits. It was emphasized that participation was voluntary. Respondents were assured that all data and information collected would remain confidential and exclusively used for research purposes. The findings from INSS were expected to contribute to the formulation of policies aimed at enhancing the implementation of health programs. Prior to utilizing the data in this study, official approval for its use was granted by the Indonesian Ministry of Health's Research and Development Agency, as indicated in the approval letter with reference number IR.03.01/H.I/5495/2023.

## **RESULTS AND DISCUSSIONS**

### **Overview of the food vulnerability in households with toddler samples**

The secondary data from the 2021 INSS in East Bolaang Mongondow comprised of 8893 children under five years old. The demographics of the respondents are summarized in Table 1, wherein the majority are female (51.8%), aged  $\geq 24$  months (58.1%), and living in rural areas (69%). Table 1 shows that more than half of the respondents had low educational backgrounds (57.2% of mothers and 52.9% of fathers). However, when comparing these proportions to the groups with higher educational levels revealed, no discernible differences were found. Furthermore, for parents' occupation, the majority fell into the employed category (95.5% for fathers and 57.2% for mothers).

**Table 1.** Characteristics of research sample

Sampe Characteristics		Frequency	Percent
Mother’s education	Low	4912	55.2
	High	3682	41.4
Father’s education	Low	4492	50.5
	High	3992	44.9
Mother’s occupation	Unemployed	3679	41.4
	Employed	4915	55.3
Father’s occupation	Unemployed	383	4.3
	Employed	8101	91.1

Data in **Table 2** revealed that many families in the study were in food vulnerable status (40.6%). This data indicates that 4 out of 10 households had experienced at least one condition out of the 8 conditions queried in the food vulnerability. Moreover, data in Table 2 shows that, although the proportions are relatively small; there were households with toddlers who expressed concern about not having enough food (11.5%) and being unable to consume healthy and nutritious food (9.1%). The findings also reveal that there were households which consumed only a limited variety of foods (18.9%), some households with toddlers skipped one mealtime (30.4%), and there were even households that ate less than they should (13.2%). Other surprising findings, although in small numbers, were also worth noting that there were still households that ran out of food, felt hungry but did not eat, and even went without eating for an entire day, each at 3.7%, 1.2%, and 2.1%, respectively.

Understanding the prevalence of food vulnerability and insecurity—two serious public health concerns—requires access to the data displayed in **Table 2**. Though the percentage of households with food security was higher than those with vulnerable status, yet this percentage was still meaningful; nearly half of the total respondents (40.6%). The data indicates that a significant segment of the population experiences food vulnerability and insecurity, highlighting the necessity of focused approaches to enhance the availability of wholesome food and mitigate food adversity.

The result of this study can be addressed in a larger context, including the issue of food insecurity, its causes, and potential remedies. It

**Table 2.** Food vulnerability in households with toddler samples

Categories		Frequency	Percent
Food vulnerability	Vulnerable	3607	40.6
	Secure	5286	59.4
	Total	8893	100.0
Description of food vulnerability variables			
Concern about not having enough food	Yes	1020	11.5
	No	7873	88.5
Unable to consume healthy and nutritious meals	Yes	809	9.1
	No	8084	90.9
Consume only a limited variety of foods	Yes	1684	18.9
	No	7209	81.1
Skip one mealtime	Yes	2706	30.4
	No	6187	69.6
Consume fewer calories than recommended	Yes	1175	13.2
	No	7683	86.4
	Don’t know	35	0.4
Run out of food	Yes	333	3.7
	No	8364	94.1
	Don’t know	195	2.2
Feel hungry but do not eat	Yes	107	1.2
	No	8786	98.8
Skip meals throughout the whole day	Yes	188	2.1
	No	8668	97.5
	Don’t know	37	0.4

also provides insights into the socioeconomic and demographic elements connected with food insecurity, as proven by the study conducted in Brazil’s Northeast region. The study revealed that 68.4% of the population in the area experienced food insecurity and that the degree of insecurity was influenced by variables like income, education, and involvement in social programs (da Silva et al., 2022). In line with the results of the study conducted in the Northeast area of Brazil, Bolaang Mongondow Regency’s INSS 2021 results in Table 1 also show that over half of the parents were poorly educated, which is likely to also contribute to the high percentage of household with vulnerable food status. Besides, the relatively high percentage of unemployed parents (50% of the mothers) in the present study also supports what was found in a previous study in Brazil. These

findings may clarify the substantial link between socioeconomic issues in the community with food insecurity and stunting.

Furthermore, the results presented in Table 2 can also be related to the effect of external forces on food insecurity, such as COVID-19 pandemic (as this research was conducted in 2021 during COVID-19 pandemic) and job loss. Though the present study did not examine the reasons underlying the unemployment status, it is likely that the pandemic could be associated with the job termination of the parents during the data collection, which eventually affected food insecurity. A previous study indicated that the COVID-19 pandemic has led to a rise in the likelihood of food insecurity for numerous households, highlighting the correlation between economic variables and food security (Milovanska-Farrington, 2021). Another study carried out in Bangladesh also found that food insecurity is one of the primary causes of vulnerability among the urban poor (Ara, 2022). Meanwhile, when linked to other health-related issues, a study in Brazil revealed that food insecurity was associated with unhealthy eating patterns and social vulnerability (da Silva et al., 2022). Inequalities in food security were linked to a lack of access to basic infrastructure, such as irrigation systems and agricultural supplies, according to a study conducted in Ethiopia that examined two nearby areas (Hidaru, Tolossa, & Tilahun, 2023).

In terms of the variables of food vulnerability, despite its relatively small proportion (11.5%), this study found that there were households that reported their concern about not having enough food to eat. A more alarming situation exists within this group, wherein families are unable to consume healthy and nutritious meals (9.1%), consume only a limited variety of foods (18.9%), skip one mealtime (30.4%), consume fewer calories than recommended (13.2%), and, notably, run out of food (3.7%). Consequently, some households find themselves compelled to feel hungry but do not eat (1.2%) and skip meals throughout the whole day (2.1%). Even though the percentage of families reporting each of these circumstances was relatively low, it is critical to take this issue seriously since multiple research findings indicate a link between food vulnerability and nutritional

problems in children (Kusuma & Pangesti, 2023; Rokhmah, Farianingsih, Ma'rufi, & Khoiron, 2022; Suryana, Hartono, & Suryana, 2021). Therefore, due to its complexity, food vulnerability necessitates multisectoral intervention to reduce (Ara, 2022; da Silva et al., 2022; Hidaru et al., 2023; Milovanska-Farrington, 2021).

According to a report from the National Food Agency, the Indonesian government has reportedly taken several significant actions to tackle the issue concerning food vulnerability including the formulation of a food security and vulnerability map, food and nutrition alertness movement, which utilizes the tools of the Food and Nutrition Vulnerability Early Warning System. Additionally, various programs, such as carrying out food rescue activities, accelerating the provision of food aid to families whose children are stunted, diversifying food consumption, encouraging the supply and stabilization of food prices throughout Indonesia, facilitating the transfer of food from surplus to deficit regions, and the use of government food, have also been conducted by the government (Badan Pangan Nasional, 2023). These are to ensure that food security is achieved at individual, household, and community levels.

### The relationship between food vulnerability and stunting

The results of the statistical analysis of the relationship between food vulnerability and stunting in children under five are detailed in **Table 3**.

The analysis results in **Table 3** indicate a significant association between food vulnerability and stunting in children under five years old ( $p$ -value < 0.05) with an odds ratio (OR) of 4.661. According to these statistics, children from food-vulnerable households were at a 4-time-higher risk of experiencing stunting compared to children

**Table 3.** The relationship between food vulnerability and stunting

Food vulnerability	Stunting				OR (95% CI)	p-value
	Yes		No			
	n	%	n	%		
Vulnerable	1418	68.7%	2189	32.0%	4.661 (4.192-5.183)	0.000
Secure	645	31.3%	4641	68.0%		

from food-secure households. The proportion of food-vulnerable households was higher (68.7%) compared to food-secure households (31.3%) in the stunted group.

As discussed earlier, the negative impacts of food vulnerability extend beyond mere dietary concerns, manifesting as a serious health issue, particularly among children under five as a vulnerable group to nutritional challenges. Findings presented in **Table 3** indicate a significant association between food vulnerability and stunting. Children within the food-vulnerable group face a 4.661 times higher risk of experiencing stunting compared to their counterparts in the food-secure group. This finding is similar to a study conducted in West Sumatra, which found that food consumption as food security for toddlers is one of the determinants of stunting (Arlinda, Riviwanto, Muslim, Gusti, & Yanti, 2022). In Indonesia, food vulnerability can have a major impact on toddlers' nutritional health. The research findings shed light on the way children's nutritional condition is affected by food insecurity, particularly considering the COVID-19 pandemic. The pandemic's consequences on food security have worsened maternal and child malnutrition; the main concerns are the restricted availability and high cost of nutritious food ingredients. Reduced food quantities as a result of inadequate access to and availability of household food have a negative impact on the nutritional status of families, particularly mothers and children (Maryani & Putri, 2020).

Aside from the food vulnerability factor that affects stunting, as a complex health problem, stunting also can be caused by a number of child-related, mother-related, and environmental factors. Previous studies revealed that child-related factors including low birth weight, non-exclusive breastfeeding, frequency of infectious diseases, inadequate protein intake, poor parental feeding style, and lack of supplementary feeding variability are associated with stunting (Gustina, Sofiana, Ayu, Wardani, & Lasari, 2020; Ibrahim, Khomsan, & Riyadi, 2023; Marfianti, Wirawan, & Weta, 2017; Najahah, Adhi, & Pinatih, 2013). The literature also emphasizes the link between toddler growth and nutrient status, highlighting the vital role that nutrition plays in the development of children

between the ages of three and four (Nurlela, Kridawati, & Ulfa, 2022). Additionally, a number of study findings have linked maternal variables to child stunting, including unsuitable gestational weight gain, irregular antenatal care (ANC) visits, low maternal education, unemployment, and low household income (Ayu, Sofiana, Wardani, & Haryanto, 2021; Gustina et al., 2020; Ibrahim et al., 2023; Najahah et al., 2013; Noviyanti, Sidiartha, Sawitri, & Adhi, 2019).

Environmental factors such as poor hygiene and sanitation, along with limited access to clean water, flooring type, and mycotoxin exposure have also been identified as leading factors predisposing children to stunting (Dwipayanti & Purnama, 2022; Marfianti et al., 2017; Widiyanto, Atmojo, & Darmayanti, 2019). Another study conducted in Palembang found that vulnerability perception is positively correlated with household food and water processing behavior, which can reduce the prevalence of stunting (Fadilah, Andean, & Trinita, 2020).

Based on the findings of this study, food vulnerability emerges as a contributing factor to a significant increase (>5%) in the prevalence of stunting in the Bolaang Mongondow Regency, North Sulawesi; in accordance with the results of the INSS for the years 2021 and 2022 (Kemenkes RI, 2021, 2022). It is crucial to address food vulnerability and stunting issues due to their long-term effects which eventually may affect other issues including poor cognitive development. The domino effect of this issue may be linked to lower educational attainment and reduced cognitive function, weakened immune systems that make children more susceptible to infections and diseases, decreased productivity and general well-being as adults, and an increased risk of obesity in later life, especially if children are exposed to unhealthy feeding practices and a poor diet (Mutiaras Tasyrifah, 2021; UNICEF, 2017, 2021; WHO & UNICEF, 2020).

It is important to highlight that this study exclusively concentrates on determinants pertaining to mothers and children while disregarding the examination of environmental factors, sanitation conditions, and access to clean water. Additionally, the scope of the study is limited to a specific regency within North Sulawesi.

Consequently, there is a pressing need for more-comprehensive research that encompasses a wider array of determinants and encompasses diverse socioeconomic backgrounds and geographical locations to gain a thorough understanding of the factors influencing stunting in Indonesia.

## CONCLUSION

This study concludes that food vulnerability is a risk factor for stunting among under-five children in Bolaang Mongondow Regency, North Sulawesi, Indonesia. Efforts to address food vulnerability and improve food security can help reduce the prevalence of stunting in the affected populations. The intervention associated with enhancing household food security, such as community empowerment for backyard utilization and repurposing non-productive land for agriculture, may serve as an alternative avenue alongside promoting dietary diversity.

## ACKNOWLEDGEMENT

This study was funded by the Center of Research and Community Services of Sam Ratulangi University under research contract number 317/UN12.13/LT/2023. The funding organization played no role in the research design, data collection, data analysis, or decisions regarding manuscript finalization and publication.

## REFERENCES

- Anastasia, H., Hadju, V., Hartono, R., Manjilala, S., Sirajuddin, Salam, A., & Atmarita. (2023). Determinants of stunting in children under five years old in South Sulawesi and West Sulawesi Province: 2013 and 2018 Indonesian Basic Health Survey. *PLoS ONE*, *18*(5 May), 1–17. <https://doi.org/10.1371/journal.pone.0281962>
- Ara, M. R. (2022). Assessment of Vulnerability and Sustainable Livelihood of the Urban Poor: a Study in Khulna City Corporation, Southwest Bangladesh. *Khulna University Studies*, *14*(December), 217–228. <https://doi.org/10.53808/kus.2017.14.1and2.1702-s>
- Arlinda, S., Riviwanto, M., Muslim, B., Gusti, A., & Yanti, D. D. (2022). Determinant Factors of Stunting in West Pasaman District, West Sumatera Indonesia. *Jurnal Kesehatan Lingkungan*, *14*(1), 37–44. <https://doi.org/10.20473/jkl.v14i1.2022.37-44>
- Ayu, S. M., Sofiana, L., Wardani, Y., & Haryanto, Y. (2021). Maternal social determinants of stunting events in Kulon Progo, Yogyakarta. *Public Health and Preventive Medicine Archive*, *9*(2), 116–119. <https://doi.org/10.15562/phpma.v9i2.407>
- Ayuningtyas, D., Hapsari, D., Rachmalina, R., Amir, V., Rachmawati, R., & Kusuma, D. (2022). Geographic and Socioeconomic Disparity in Child Undernutrition across 514 Districts in Indonesia. *Nutrients*, *14*(4), 1–17. <https://doi.org/10.3390/nu14040843>
- Badan Pangan Nasional. (2023). Badan Pangan Nasional Sinergikan Pengendalian Kerawanan Pangan dengan Daerah. Retrieved November 20, 2023, from <https://badanpangan.go.id/blog/post/badan-pangan-nasional-sinergikan-pengendalian-kerawanan-pangan-dengan-daerah>
- da Silva, C. S., Lima, M. de C., Oliveira, J. S., Tavares, F. C. de L. P., Sá Leal, V., Valente, F. L. S., ... Filho, M. B. (2022). Food insecurity in households in Pernambuco, Northeast region of Brazil: contributions to the discussion on the violation of the right to adequate food. *Saude e Sociedade*, *31*(4), 1–14. <https://doi.org/10.1590/S0104-12902022210617en>
- Dwipayanti, N. M. U., & Purnama, S. G. (2022). Neglected Water, Sanitation and Hygiene Aspects in Preventing Childhood Stunting. *Public Health and Preventive ...*, *10*(2), 108–110. <https://doi.org/10.53638/phpma.2022.v10.i2.p01>
- Fadilah, M., Andrean, A., & Trinita, M. (2020). Household Food And Water Processing Models To Reduce Stunting Prevalence In Toddlers In Indonesia. *Advances in Social Sciences Research Journal*, *7*(7), 918–926. <https://doi.org/10.14738/assrj.77.8766>
- Gustina, E., Sofiana, L., Ayu, S. M., Wardani, Y., & Lasari, D. I. (2020). Good parental feeding style reduces the risk of stunting among under-five children in Yogyakarta, Indonesia. *Public Health and Preventive Medicine Archive*, *8*(2), 120–125. <https://doi.org/10.15562/phpma.v8i2.306>
- Hidaru, A., Tolossa, D., & Tilahun, T. (2023). A comparative analysis of social vulnerability to household food security of Raya Kobo and Raya Alamata Weredas, Ethiopia. *Frontiers in Sustainable Food Systems*, *7*(June), 1–12. <https://doi.org/10.3389/fsufs.2023.1050987>

- Ibrahim, N. I. F., Khomsan, A., & Riyadi, H. (2023). Stunting is influenced by toddler and maternal characteristics, history of infectious disease, IYCF practices, and protein intake: case control study in Nabire coastal areas, Indonesia. *International Journal Of Community Medicine And Public Health*, 10(9), 3039–3046. <https://doi.org/10.18203/2394-6040.ijcmph20232658>
- Kemenkes RI. (2021). *Studi Status Gizi Indonesia*. Jakarta.
- Kemenkes RI. (2022). *Buku Saku Hasil Survei Status Gizi Indonesia (SSGI) 2022*. Kementerian Kesehatan Republik Indonesia. Retrieved from <https://www.badankebijakan.kemkes.go.id/buku-saku-hasil-survei-status-gizi-indonesia-ssgi-tahun-2022/>
- Kusuma, I. R., & Pangesti, W. D. (2023). IMPLEMENTASI MODEL EDUKASI BIMBINGAN PADA IBU HAMIL UNTUK PENCEGAHAN RESIKO STUNTING DI KABUPATEN BANYUMAS : STUDI KUALITATIF Implementation Coaching Education Method For Pregnant Women To Prevent Stunting Risk In Banyumas : Qualitative Study Program Studi. *Jurnal Kesehatan Reproduksi*, 13(2), 161–171.
- Mahmudiono, T., Nindya, T. S., Andrias, D. R., Megatsari, H., Rachmah, Q., & Rosenkranz, R. R. (2018). Comparison of maternal nutrition literacy, dietary diversity, and food security among households with and without double burden of malnutrition in Surabaya, Indonesia. *Malaysian Journal of Nutrition*, 24(3), 359–370.
- Marfianti, I., Wirawan, I. M. A., & Weta, I. W. (2017). Association of supplementary feeding with stunting among children in Kintamani, Bangli, Bali Province. *Public Health and Preventive Medicine Archive*, 5(2), 95–100. <https://doi.org/10.15562/phpma.v5i2.21>
- Maryani, S., & Putri, N. R. (2020). COMMUNITY-BASED FOOD SECURITY EFFORTS IN THE FRAMEWORK OF NUTRITION FOLLOWING MOTHER AND CHILDREN IN THE PANDEMIC Period (COVID - 19): LITERATURE REVIEW. *Journal of Midwifery Science: Basic and Applied Research*, 2(2), 43–47. <https://doi.org/10.31983/jomisbar.v2i2.6508>
- Milovanska-Farrington, S. (2021). Job Loss and Food Insecurity During the COVID-19 Pandemic. *SSRN Electronic Journal*, (14273). <https://doi.org/10.2139/ssrn.3823640>
- Müller, O., & Krawinkel, M. (2005). Malnutrition and health in developing countries. *CMAJ. Canadian Medical Association Journal*, 173(3), 279–286. <https://doi.org/10.1503/cmaj.050342>
- Muslihah, N., Wilujeng, C. S., & Kusuma, T. S. (2022). Household Food Insecurity, Inappropriate Complementary Feeding, and Associated with High Stunting and Anemia Among Children Aged 6–23 Months, in Madura Rural, Indonesia. *Current Developments in Nutrition*, 6, 933. <https://doi.org/10.1093/cdn/nzac067.053>
- Mutiara Tasyrifah, G. (2021). Literature Review: Causes of Stunting in Toddlers. *Muhammadiyah International Public Health and Medicine Proceeding*, 1(1), 339–346. <https://doi.org/10.53947/miphmp.v1i1.71>
- Najahah, I., Adhi, K. T., & Pinatih, G. I. (2013). Risk factors stunting for 12-36 month old children in Dasan Agung Community Health Centre, Mataram, West Nusa Tenggara Province. *University of Udayana*, 1(2), 134–141. <https://doi.org/10.53638/phpma.2013.v1.i2.p06>
- Noviyanti, N. P. A. W., Sidiartha, I. G. L., Sawitri, A. A. S., & Adhi, K. T. (2019). Gestational weight gain is a risk factor of stunting among children aged 6-23 months in Bangli District, Bali, Indonesia. *Public Health and Preventive Medicine Archive*, 7(1), 14–19. <https://doi.org/10.15562/phpma.v7i1.188>
- Nurlela, Kridawati, A., & Ulfa, L. (2022). Correlation Between The Nutrient Status And The Toddler Growth Of 3 And 4 Years Old In Rau Primary Health Center, Serang City In 2019. *Journal of Ageing And Family*, 2(1), 30–37. <https://doi.org/10.52643/joaf.v2i1.2169>
- Rokhmah, D., Farianingsih, Ma'rufi, I., & Khoiron. (2022). Study of Nutrition Food Access to Family With Stunting Toddlers in Stunting Countermeasures System in Lumajang Indonesia. *Amerta Nutrition*, 6(1SP), 32–37. <https://doi.org/10.20473/amnt.v6i1sp.2022.32-37>
- Sanggelerang, Y., Farmawati, A., & Sudargo, T. (2017). *Ketahanan Pangan Rumah Tangga Sebagai Faktor Risiko Kejadian Stunting Pada Anak Usia 3-5 Tahun Di Daerah Pesisir Kecamatan Siau Timur Kabupaten Sitaro* (Universitas Gadjah Mada). Universitas Gadjah Mada. Retrieved from <http://libmed.ugm.ac.id/showDetail.php?col=kyi&id=19846>
- Semba, R. D., & Bloem, M. W. (2008). Nutrition and Health in Developing Countries (Second



- Edition). In *Nutrition and Health Series* (Vol. 53). Humana Press. <https://doi.org/10.1007/978-1-59745-464-3>
- Suratri, M. A. L., Putro, G., Rachmat, B., Nurhayati, Ristrini, Pracoyo, N. E., ... Raharni. (2023). Risk Factors for Stunting among Children under Five Years in the Province of East Nusa Tenggara (NTT), Indonesia. *International Journal of Environmental Research and Public Health*, 20(2). <https://doi.org/10.3390/ijerph20021640>
- Suryana, A., Hartono, M. D., & Suryana, M. R. (2021). Impacts of the COVID-19 pandemic on food and nutrition security in Indonesia. *IOP Conference Series: Earth and Environmental Science*, 892(1). <https://doi.org/10.1088/1755-1315/892/1/012033>
- Thahir, A. I. A., Li, M., Holmes, A., & Gordon, A. (2023). Exploring Factors Associated with Stunting in 6-Month-Old Children: A Population-Based Cohort Study in Sulawesi, Indonesia. *Nutrients*, 15(15). <https://doi.org/10.3390/nu15153420>
- TNP2K. (2018). Strategi Nasional Percepatan Pencegahan Stunting 2018-2024 (National Strategy for Accelerating Stunting Prevention 2018-2024). In *Tim Nasional Percepatan Penanggulangan Kemiskinan (TNP2K) Sekretariat Wakil Presiden Republik Indonesia*. Retrieved from [http://tnp2k.go.id/filemanager/files/Rakornis 2018/Sesi 1\\_01\\_RakorStuntingTNP2K\\_Stranas\\_22Nov2018.pdf](http://tnp2k.go.id/filemanager/files/Rakornis%202018/Sesi%201_01_RakorStuntingTNP2K_Stranas_22Nov2018.pdf)
- Torlesse, H., Cronin, A. A., Sebayang, S. K., & Nandy, R. (2016). Determinants of stunting in Indonesian children: Evidence from a cross-sectional survey indicate a prominent role for the water, sanitation and hygiene sector in stunting reduction. *BMC Public Health*, 16(1), 1–11. <https://doi.org/10.1186/s12889-016-3339-8>
- UNICEF. (2017). *Malnutrition in Children*. Retrieved from <https://data.unicef.org/topic/nutrition/0Amalnutrition>
- UNICEF. (2021). Conceptual Framework on Maternal and Child Nutrition. *Nutrition and Child Development Section, Programme Group 3 United Nations Plaza New York, NY 10017, USA*, 2–3. Retrieved from [www.unicef.org/nutrition](http://www.unicef.org/nutrition)
- WHO. (2014). *Global Nutrition Targets 2025 Stunting Policy Brief*. Geneva. <https://doi.org/10.7591/cornell/9781501758898.003.0006>
- WHO, & UNICEF. (2020). *Global Strategy for Infant and Young Child Feeding*. Geneva: World Health Organization.
- Widiyanto, A., Atmojo, J. T., & Darmayanti, A. T. (2019). Pengaruh Faktor Kerawanan Pangan Dan Lingkungan Terhadap Stunting. *Interest : Jurnal Terpadu Ilmu Kesehatan*, 8(1), 2016–2021. <https://doi.org/10.37341/interest.v8i1.118>
- Widyawati, S. (2023). Advancing Indonesia's Food Systems Transformation: A Stocktaking Moment. Retrieved November 20, 2023, from United Nation in Indonesia website: <https://indonesia.un.org/en/240200-advancing-indonesia's-food-systems-transformation-stocktaking-moment>
- Yuliantini, E., Sukiyono, K., Yuliarso, M. Z., & Sulistyono, B. (2022). Food Security and Stunting Incidences in the Coastal Areas of Indonesia. *Open Access Macedonian Journal of Medical Sciences*, 10(F), 454–461. <https://doi.org/10.3889/oamjms.2022.9335>