



Ecological Analysis of Stunting Toddlers in East Nusa Tenggara Province 2021

Yulianti Nataya Rame Kana¹, Mohammad Zainal Fatah¹, Muji Sulistyowati¹
¹Faculty of Public Health, Universitas Airlangga, Surabaya

Email correspondence: ramekana@gmail.com

<p>Track Record Article</p> <p>Accepted: 02 June 2023 Revised: 12 December 2023 Published: 22 December 2023</p> <p>How to cite : Kana, Y. N. R., Fatah, M. Z., & Sulistyowati, M. (2023). Ecological Analysis of Stunting Toddlers in East Nusa Tenggara Province 2021. <i>Contagion : Scientific Periodical of Public Health and Coastal Health</i>, 5(4), 1339–1348.</p>	<p style="text-align: center;">Abstract</p> <p><i>Stunting is a chronic condition that results in stunted growth of children under five due to malnutrition for a long time. The objective of this study is to analyze the factors associated with the occurrence of stunting in East Nusa Tenggara Province in the year 2021. An ecological approach is employed in this study, utilizing secondary data obtained from the 2021 East Nusa Tenggara Province Health Profile report. This research was conducted from January to March 2023. Analysis was carried out on a total of 22 districts/cities, with a population of 388,760 toddlers which included the entire sample size, namely toddlers with stunting incidents totaling 81,354 toddlers. The main variable predicted is the proportion of stunted toddlers. Predictor variables consist of the percentage of ANC visits, the proportion of LBW history and the percentage of exclusive breastfeeding. Bivariate analysis involved the utilization of cross-tabulation to examine the relationships between variables. The results of the study show that the prevalence of stunting status in toddlers is in the moderate category (16.04-24.07%). This happened as the coverage of ANC visits in districts/cities was in the low category (40.0-61.6%), history of LBW in districts/cities was in the low category (3.0-6.6%) and breastfeeding exclusively in districts/cities that are in the high category (65.67-93.0%). Stunting among toddlers in the province of East Nusa Tenggara in 2021 is in the moderate category along with ANC visits in districts/cities which are in the low category, history of LBW in districts/cities is in the low category and exclusive breastfeeding in districts/cities is also in the low category. To accelerate stunting prevention in Indonesia, it is essential to have synchronized efforts in planning, implementation, and monitoring at all government levels, including villages. The active involvement of all stakeholders is crucial in achieving this goal.</i></p> <p>Keyword: <i>Community nutrition, Ecological analysis, Secondary data, Stuned</i></p>
--	--

INTRODUCTION

The period of early childhood is a critical phase in the survival and development of children. Stunting refers to a persistent condition characterized by impaired growth and development in children under the age of five as a consequence of prolonged malnutrition. The WHO Child Growth Standard defines stunting as a condition where the body length index for age, also known as TB/U, falls below a z-score of less than -2 standard deviations. Stunting refers to a long-term nutritional issue seen in young children, characterized by a diminished height in relation to their peers of the same age. Children affected by stunting are more prone to illness, and as adults, they face a higher likelihood of developing chronic diseases later in life. In addition, stunting can affect the level of intelligence of children. The problem of stunting in toddlers needs special attention (Pusat Data dan Informasi Kementerian Kesehatan RI, 2018).

The occurrence of stunting among toddlers is impacted by a range of factors, which include characteristics specific to the child, parental factors, socio-economic circumstances, and environmental elements. These factors comprise aspects such as a history of low birth weight, immunization status, family size, inadequate intake of essential nutrients (such as energy, iron, protein, calcium, and zinc), colostrum feeding, breastfeeding practices (including age, type, and frequency), hygiene practices like handwashing, maternal occupation, maternal knowledge, low household income, previous infectious diseases, environmental cleanliness and sanitation, parental height (especially the mother's height), and deficiencies in vitamins C and D (Halim et al., 2021).

Globally, stunting is considered a common health problem in children (Black, 2008; Budiastutik, 2019). Around 151 million (22%) children under five in 2017 experienced stunting. Indonesia is one of the developing countries in Asia with more than half of children experiencing stunting (WHO & UNICEF, 2018; Young et al., 2018). According to Pusat Data dan Informasi Kementerian Kesehatan RI (2018) the issue of stunting is prevalent among the majority of young children in impoverished and developing nations like Indonesia. Globally, Indonesia holds the 17th position out of 117 countries in terms of stunting prevalence. Compared to several other middle-income countries like Malaysia (20%) and Thailand (10.5%), Indonesia exhibits a higher prevalence of stunting (Budiastutik, 2019; Pratiwi, 2019).

Stunting among young children remains an unresolved health issue worldwide, including in Indonesia. The primary focus of the Indonesian government is to decrease the prevalence of stunting in toddlers, making it a key priority on their agenda. The Vice Presidential Secretariat plays a coordinating role in expediting stunting prevention efforts to ensure coherence in planning, implementation, and monitoring and evaluation across various government levels, including village levels. They strive to engage all stakeholders in accelerating stunting prevention, with the goal of reducing the prevalence to 14% (Tim Percepatan Pencegahan Stunting, 2020).

Based on the 2022 Indonesian Nutrition Status Survey (SSGI) nutritional status report conducted by Badan Kebijakan Pembangunan Kesehatan. Kementerian Kesehatan (2022), information was obtained that the highest prevalence of stunting in toddlers (height for age) was in the province of East Nusa Tenggara, namely 35.3%. When compared with the average prevalence of stunting in children under five in Indonesia, of 4.558.899 or 21.6%, the province of East Nusa Tenggara still needs special attention.

Stunting in the province of East Nusa Tenggara children needs prevention strategies, such as early intervention on risk factors. Thus, identification of risk factors is necessary for

better intervention strategies. Risk factors for stunting can be categorized as internal and external (Prendergast & Humphrey, 2014). Internal risk factors are chronic malnutrition, intrauterine growth retardation (IUGR), non-exclusive breastfeeding, and chronic infections (Prendergast & Humphrey, 2014; Caulfield et al., 2006; Black et al., 2008; Millward, 2017) External factors include poor sanitation, poor water sources, low socio-economic level of parents, and large number of family members in a same household (Millward, 2017; Vilcins, 2018; Semba, 2008; Fikadu, 2014).

The objective of this study is to examine the impact of antenatal care (ANC) visits, history of low birth weight (LBW), and exclusive breastfeeding on the occurrence of stunting among toddlers in all districts and cities of East Nusa Tenggara Province in 2021. Employing an ecological approach, this research aims to offer insights into the prevailing trends across Indonesia, thereby serving as a foundation for future policy-making endeavors.

METHODS

The research was conducted utilizing an ecological analysis approach, which primarily involves making comparisons between groups rather than individuals. The analysis was based on aggregate data collected at the district/city level. Ecological analysis considers variables that are measured in an aggregated form, including measurements that pertain to the environment or have a global scope (Laksono, 2022; Morgenstern, 1995).

This study was carried out using secondary data from Dinas Kesehatan Provinsi Nusa Tenggara Timur (2021). This report was officially issued by the East Nusa Tenggara Provincial Health Service. This research was conducted from January to March 2023. The units analyzed in this research were districts/cities. All regencies/cities in East Nusa Tenggara Province analyzed totaled 22 regencies/cities. Comprehensive analysis was carried out on a total of 22 districts/cities, with a population of 388,760 toddlers which included the entire sample size, namely toddlers with stunting incidents totaling 81,354 toddlers. The main variable predicted is the proportion of stunted toddlers, namely the total number of stunting incidents reported in each district/city. Predictor variables consist of the percentage of ANC visits by district/city, the proportion of LBW history recorded in each district/city, and the percentage of exclusive breastfeeding recorded in each district/city. Each variable was divided into three strata, with an equal number of points subtracted for statistical purposes. Descriptive analysis was used using cross tabulation to test the data.

Table 1. Source of Ecological Analysis Data from The East Nusa Tenggara Province Health Profile 2021

Source	Variable Type	Variable Name
East Nusa Tenggara Province Health Profile for 2021	dependent	Proportion of Stunting in Toddlers
	Independent	Percentage of ANC Visits
	Independent	Proportion of LBW history
	Independent	Percentage of Exclusive Breastfeeding

The proportion of stunting among toddlers serves as the dependent variable in this study. Alongside this dependent variable, three independent variables were analyzed: the percentage of ANC visits, the proportion of children with a history of low birth weight (LBW), and the percentage of exclusive breastfeeding. The data were subjected to both univariate and bivariate analyses. Bivariate analysis involved the use of cross-tabulation to examine the relationships between variables. The entire analysis process was conducted using SPSS 26 software.

RESULTS

Statistical descriptions of stunting in toddlers in East Nusa Tenggara Province in 2021 and three related variables are shown in table 2. The distribution of stunting in toddlers as the dependent variable and history of LBW as one of the independent variables listed in the table has a negative meaning, namely the higher the proportion number indicates the high problem of stunting in toddlers. Meanwhile, the 2 independent variables in this study, namely ANC visits and exclusive breastfeeding, have a positive meaning, namely the higher the percentage, the better the score.

Table 2 shows a statistical description of the proportion of stunting among toddlers in East Nusa Tenggara Province in 2021 and three related variables, namely ANC visits, history of LBW and exclusive breastfeeding. The distribution of the dependent variable, namely the proportion of stunting in children under five, has a negative meaning, namely the greater the proportion number indicates the high incidence of stunting in children under five. The three independent variables in this study have a positive meaning, that is, the greater the proportion number, the better the value.

Table 2, it is known that the average proportion of stunting in children under five from 22 districts/cities in East Nusa Tenggara Province is 19.94% with a minimum value of 8% and a maximum value of 32.1%. Based on the 2021 East Nusa Tenggara Health Profile, it is known that the lowest score comes from Central Sumba Regency, while the highest number comes from South Central Timor Regency. (Dinas Kesehatan Provinsi Nusa Tenggara Timur, 2021).

Table 2. Description of Variable Statistics Related to Stunting in Toddlers in East Nusa Tenggara Province in 2021

	Stunting in Toddlers	ANC Visit	LBW History	Exclusive Breastfeeding
N	22	22	22	22
Mean	19.936	66.59	6.91	70.55
Median	19.950	64.50	7.00	78.50
Mode	18.9	57	7	72
Std. Deviation	6.3255	15.519	2.844	23.112
Variance	40.012	240.825	8.087	534.165
Range	24.1	65	11	82
Minimum	8.0	40	3	11
Maximum	32.1	105	14	93

Table 3 shows the results of the cross-tabulation of the variable proportion of stunting in children under five with the independent variable the proportion of ANC visits in East Nusa Tenggara Province. In Table 3, it can be seen that in the low ANC visit category ((40.0-61.6%), it is dominated by stunting in toddlers in the moderate category (16.04-24.07%), which in 7 districts/cities. Meanwhile, visits ANC is in the moderate category (61.7-83.3%), dominated by stunting in toddlers in the low category (8.0-16.03%), which in 4 districts/cities, then ANC visits are in the high category (83.4-105.0 %) seems to be dominated by stunting in toddlers in the high category (24.08-32.1%), which in 2 districts/cities. This scientifically proven that the higher the percentage of ANC visits in a district/city, the lower the proportion of stunting in toddlers.

Table 3. Results of Cross-tabulation of the Proportion of Stunting in Toddlers and the Proportion of ANC Visits in East Nusa Tenggara Province in 2021

ANC Visit	Stunting in Toddlers					
	Low (8,0-16,03%)		Moderate (16,04-24,07%)		High (24,08-32,1%)	
	n	%	n	%	n	%
Low (40,0-61,6%)	1	16,5	7	63,6	2	40
Moderate (61,7-83,3%)	4	67	3	27,3	1	20
High (83,4-105,0%)	1	16,5	1	9,1	2	40
Total	6	100	11	100	5	100

Table 4 shows the results of the cross-tabulation of the variable proportion of stunting in under-fives with the independent variable the proportion of LBW history. In Table 4, it is known that in the low LBW history category (3.0-6.6%), stunting is seen in the moderate category (16.04-24.07%), which in 5 districts/cities. Meanwhile, the history of LBW in the moderate category (6.7-10.3%) was dominated by stunting in toddlers in the moderate category (16.04-24.07%), which in 4 districts/cities. Then the history of LBW was in the high category (10.4-14.0%), dominated by stunting in toddlers in the moderate category (16.04-24.07%),

namely 2 districts/cities. This scientifically proven that the higher the proportion of LBW in a district/city, the higher the proportion of stunting in toddlers.

Table 4. Cross Tabulation of the Proportion of Stunting in Toddlers and the Proportion of LBW History in East Nusa Tenggara Province in 2021

LBW History	Stunting in Toddlers					
	Low (8,0-16,03%)		Moderate (16,04-24,07%)		High (24,08-32,1%)	
	n	%	n	%	n	%
Low (3,0-6,6%)	2	33,3	5	45,4	2	40
Moderate (6,7-10,3%)	4	66,7	4	36,4	2	40
High (10,4-14,0%)	0	0	2	18,2	1	20
Total	6	100	11	100	5	100

Table 5 shown the results of the cross-tabulation of the variable proportion of stunting in toddlers with the independent variable proportion of exclusive breastfeeding. In table 5 it can be seen that exclusive breastfeeding is in the low category (11.0-38.32%), dominated by stunting in toddlers in the high category (24.08-32.1%), which in 2 districts/cities. Furthermore, exclusive breastfeeding in the moderate category (38.33-65.66%) was dominated by stunting in toddlers who were in the moderate category (16.04-24.07%), which in 1 district/city. Meanwhile, exclusive breastfeeding in the high category (65.67-93.0%) was dominated by stunting in toddlers in the moderate category (16.04-24.07%), which in 9 districts/cities. This scientifically proven that the higher the percentage of exclusive breastfeeding in a district/city, the lower the proportion of stunting in toddlers.

Table 5. Cross Tabulation of the Proportion of Stunting in Toddlers and the Proportion of Exclusive Breastfeeding in East Nusa Tenggara Province in 2021

Exclusive Breastfeeding	Stunting in Toddlers					
	Low (8,0-16,03%)		Moderate (16,04-24,07%)		High (24,08-32,1%)	
	n	%	n	%	n	%
Low (11,0-38,32%)	0	0	1	9,1	2	40
Moderate (38,33-65,66%)	0	0	1	9,1	1	20
High (65,67-93,0%)	6	100	9	81,8	2	40
Total	6	100	11	100	5	100

DISCUSSION

This study adopts an ecological approach, emphasizing comparisons between groups. The analysis focuses on a group of 22 districts/cities within East Nusa Tenggara Province, where the average prevalence of stunting among toddlers is 19.94%. The study encompasses a total of 22 regencies/cities within East Nusa Tenggara Province. The government of the Republic of Indonesia's main objective of reducing the prevalence of stunting in children under the age of five by 14% by 2024 has not been achieved as of now. In this study, three variables

associated with stunting in toddlers were examined: the percentage of ANC visits, the proportion of infants with a history of low birth weight, and the percentage of exclusive breastfeeding. These variables were analyzed for each district/city within the province of East Nusa Tenggara.

The coverage of ANC visits refers to the proportion of pregnant women who have received the recommended standard antenatal care at least four times throughout each trimester, in comparison to the total number of pregnant women within a specific work area over the course of one year. The study findings indicate that a majority of the districts/cities in East Nusa Tenggara province have a low coverage of ANC visits, which corresponds to a moderate prevalence of stunting in toddlers. It states that the more districts/cities with low antenatal visits, the more districts/cities with stunting in toddlers in the moderate and high categories. Consistent with these findings, there is a significant association between ANC visits and the occurrence of stunting in infants. Specifically, the quality of antenatal care, including the frequency of ANC visits and adherence to ANC service standards, demonstrates a significant correlation with the incidence of stunting (Wahyuni et al., 2021; Yenita, 2021). Health service factors such as antenatal care are associated with stunting in children under five. Access to ANC visits during pregnancy is important for mothers to know about healthy eating patterns during pregnancy and the importance of breastfeeding and complementary feeding practices. A study conducted (Kahssay et al., 2020) stated that toddlers whose mothers did not perform advanced ANC were 2.81 times more stunted than mothers who performed advanced ANC. Therefore, ANC for pregnant women is very important to do in order to prevent the incidence of stunting in toddlers.

Low birth weight affects the growth and development of toddlers. Low birth weight can result in delays in the growth and development of children and can affect a decrease in children's intelligence and can be a risk factor for anemia in children (Oktaviani et al., 2021). Based on the findings of this study, it shows that most districts/cities in the East Nusa Tenggara province with a history of LBW are in the low category along with stunting in toddlers in the moderate category. This scientifically proven that the more districts/cities with moderate LBW history, the more districts/cities with stunting in toddlers in the moderate category. This is different from other studies which state that a child's weight at birth is not related to stunting (Hadisuyitno et al., 2021) In line with this study, children with low birth weight experience a much higher probability of stunting compared to children with normal birth weight or in other words, low birth weight increases the incidence of stunting in children (Halli, 2022; Putri,

2022). Thus, toddlers who have low birth weight have the possibility of experiencing stunting which has an impact on the toddler's growth and development.

Exclusive breastfeeding is breastfeeding without supplementation of food or other drinks except medicine for babies up to 6 months old. Based on the findings of this study, it shows that most of the districts/cities in the East Nusa Tenggara province with exclusive breastfeeding are in the high category, this is in line with stunting in toddlers in the moderate category. This scientifically proven that the more districts/cities with exclusive breastfeeding in the high category, the more districts/cities with stunting in toddlers in the moderate category. In line with this study, exclusive breastfeeding is a risk factor for stunting in toddlers (Halim et al., 2021). Early initiation of exclusive breastfeeding has been scientifically proven to prevent or minimize the risk of stunting in infants. This is attributed to the fact that breast milk contains an adequate supply of both micro and macro nutrients, including colostrum, which provides essential immunity to infants. Furthermore, the presence of iron, lactose, and other minerals in breast milk significantly supports the development of the baby's brain (Setyowati et al., 2022). Therefore, exclusive breastfeeding is very important to provide adequate nutrition for babies to avoid stunting.

CONCLUSIONS

Based on the outcomes of this study, it can be inferred that the incidence of stunting among toddlers in East Nusa Tenggara province during 2021 is classified as moderate. This is in line with ANC visits in districts/cities which are in the low category, history of LBW in districts/cities which are also in the low category and exclusive breastfeeding in districts/cities which are also in the high category. To expedite the prevention of stunting in Indonesia, it is crucial to concentrate efforts on addressing the underlying causes of stunting. This entails comprehensive planning, effective implementation, and rigorous monitoring and evaluation at all government levels, including local villages. It is essential to maximize the involvement of all stakeholders in order to accelerate stunting prevention across the country.

REFERENCE

- Badan Kebijakan Pembangunan Kesehatan. Kementerian Kesehatan. (2022). *Status Gizi SSGI 2022*. Badan Kebijakan Pembangunan Kesehatan Kementerian Kesehatan RI.
- Black, R. E., Allen, L. H., Bhutta, Z. A., Caulfield, L. E., de Onis, M., Ezzati, M., Mathers, C., & Rivera, J. (2008). Maternal and child undernutrition: global and regional exposures and health consequences. *The Lancet*, 371(9608), 243–260. [https://doi.org/10.1016/S0140-6736\(07\)61690-0](https://doi.org/10.1016/S0140-6736(07)61690-0)
- Budiastutik, I., & Rahfiludin, M. Z. (2019). Faktor Risiko Stunting pada anak di Negara Berkembang. *Amerta Nutrition*, 3(3), 122. <https://doi.org/10.20473/amnt.v3i3.2019.122->

- Caulfield, L. E., Richard, S. A., Rivera, J. A., Musgrove, P., & Black, R. E. (2006). Stunting, Wasting, and Micronutrient Deficiency Disorders. In Jamison DT, Breman JG, Measham AR, Alleyne G, Claeson M, & Evans DB (Eds.), *Disease control priorities in developing countries* (2nd ed., Vol. 2, pp. 551–567). Oxford University Press.
- Dinas Kesehatan Provinsi Nusa Tenggara Timur. (2021). *Profil Kesehatan Provinsi Nusa Tenggara Timur Tahun 2021*. Dinas Kesehatan Provinsi Nusa Tenggara Timur.
- Fikadu, T., Assegid, S., & Dube, L. (2014). Factors associated with stunting among children of age 24 to 59 months in Meskan district, Gurage Zone, South Ethiopia: A case-control study. *BMC Public Health*, *14*(1). <https://doi.org/10.1186/1471-2458-14-800>
- Hadisuyitno, J., Riyadi, B. D., & Suprajitno. (2021). Determinant Factors of Stunting Events of Toddler in Batu City Indonesia. *Systematic Reviews in Pharmacy*, *12*(1), 231–234.
- Halim, F., Ermiami, & Sari, E. A. (2021). Factors of stunting in toddlers: A literature review. In *Journal of Nursing Care* (Vol. 4, Issue 1).
- Halli, S. S., Biradar, R. A., & Prasad, J. B. (2022). Low Birth Weight, the Differentiating Risk Factor for Stunting among Preschool Children in India. *International Journal of Environmental Research and Public Health*, *19*(7), 3751. <https://doi.org/10.3390/ijerph19073751>
- Kahssay, M., Mohamed, L., & Gebre, A. (2020). Nutritional Status of School Going Adolescent Girls in Awash Town, Afar Region, Ethiopia. *Journal of Environmental and Public Health*, 2020. <https://doi.org/10.1155/2020/7367139>
- Laksono, A. D., Sukoco, N. E. W., Rachmawati, T., & Wulandari, R. D. (2022). Factors Related to Stunting Incidence in Toddlers with Working Mothers in Indonesia. *International Journal of Environmental Research and Public Health*, *19*(17). <https://doi.org/10.3390/ijerph191710654>
- Millward, D. J. (2017). Nutrition, infection and stunting: the roles of deficiencies of individual nutrients and foods, and of inflammation, as determinants of reduced linear growth of children. *Nutrition Research Reviews*, *30*(1), 50–72. <https://doi.org/10.1017/S0954422416000238>
- Morgenstern, H. (1995). Ecologic studies in epidemiology: Concepts, principles, and methods. *Annual Review of Public Health*, *16*(1), 61–81. <https://doi.org/10.1146/annurev.pu.16.050195.000425>
- Oktaviani, I., Rahmawati, D., & Kana, Y. N. R. (2021). Prevalensi dan Faktor Risiko Anemia pada Anak di Negara Maju. *Jurnal Kesehatan Masyarakat Indonesia*, *16*(4), 218. <https://doi.org/10.26714/jkmi.16.4.2021.218-226>
- Pratiwi, S. R. (2019). Manajemen kampanye komunikasi kesehatan dalam upaya pengurangan prevalensi balita stunting. *Jurnal Manajemen Komunikasi*, *4*(1), 82. <https://doi.org/10.24198/jmk.v4i1.23435>
- Prendergast, A. J., & Humphrey, J. H. (2014). The stunting syndrome in developing countries. *Paediatrics and International Child Health*, *34*(4), 250–265. <https://doi.org/10.1179/2046905514Y.0000000158>
- Pusat Data dan Informasi Kementerian Kesehatan RI. (2018). *Situasi Balita Pendek (Stunting) di Indonesia*. Buletin Jendela Data dan Informasi Kesehatan.
- Putri, T. A., Salsabilla, D. A., & Saputra, R. K. (2022). The Effect of Low Birth Weight on Stunting in Children Under Five: A Meta Analysis. *Journal of Maternal and Child Health*, *6*(4), 496–506. <https://doi.org/10.26911/thejmch.2021.06.04.11>
- Semba, R. D., de Pee, S., Sun, K., Sari, M., Akhter, N., & Bloem, M. W. (2008). Effect of parental formal education on risk of child stunting in Indonesia and Bangladesh: a cross-sectional study. *The Lancet*, *371*(9609), 322–328. [https://doi.org/10.1016/S0140-6736\(08\)60169-5](https://doi.org/10.1016/S0140-6736(08)60169-5)

- Setyowati, E., Musfiroh, M., Arief, I., Leonardo Sari, A., Sayyid Ali Rahmatullah, U., & Agung, T. (2022). *Eny Setyowati et al / Exclusive Breastfeeding as an Effort to Prevent Stunting in Toddlers eISSN. 20, 1303–5150.* <https://doi.org/10.14704/nq.2022.20.5.NQ22664>
- Tim Percepatan Pencegahan Anak Kerdil (Stunting). (2020). *Percepatan Pencegahan Stunting*. Kementerian Kesehatan RI.
- Vilcins, D., Sly, P. D., & Jagals, P. (2018). Environmental Risk Factors Associated with Child Stunting: A Systematic Review of the Literature. *Annals of Global Health, 84(4)*, 551. <https://doi.org/10.29024/aogh.2361>
- Wahyuni, E., Erye Frety, E., & Atika. (2021). Relationship of Quality of Antenatal Care (Anc) To Stunting Events in Children Age 24-59 Months in Indonesia Using Literature Review Method. *MIKIA: Mimbar Ilmiah Kesehatan Ibu Dan Anak (Maternal and Neonatal Health Journal)*, 65–75. <https://doi.org/10.36696/mikia.v5i1.61>
- WHO, & UNICEF. (2018). *Levels and trends in child malnutrition*.
- Yenita, R. N., & Ruwaida, A. (2021). Risk factors for stunting in children under five years old in the working area of UPTD Health Center in Teluk Kuantan. In *Al Insyirah International Scientific Conference On Health (Vol. 2)*. <https://jurnal.stikes-alinsyirah.ac.id/index.php/aisch/article/view/1572>
- Young, M. F., Nguyen, P. H., Gonzalez Casanova, I., Addo, O. Y., Tran, L. M., Nguyen, S., Martorell, R., & Ramakrishnan, U. (2018). Role of maternal preconception nutrition on offspring growth and risk of stunting across the first 1000 days in Vietnam: A prospective cohort study. *PLOS ONE, 13(8)*, e0203201. <https://doi.org/10.1371/journal.pone.0203201>