

## Factors Affecting Nutritional Status (Height for Age) of Children Under Five in Rote Ndao District, Kupang, Nusa Tenggara Timur, Indonesia

Intje Picauly, Daniela Boeky, Grouse Oematan

Study Program Public of Health, Faculty of Public Health, Universitas Nusa Cendana, Kupang, Nusa Tenggara Timur, Indonesia

Received: 05 December 2023; Accepted: 31 December 2023; Available online: 16 January 2024

### ABSTRACT

**Background:** Nusa Tenggara Timur (NTT) Province has many problems related to nutritional intake and public health. Pregnant women and children under five are groups of people who are very vulnerable to this problem. Many government programs have been implemented but to date there are still high maternal and infant mortality rates as well as high problems of malnutrition and stunting. This study aimed to determine what factors influence the nutritional status of toddlers in Rote Ndao Regency.

**Subjects and Method:** This was a cross-sectional study conducted in Rote Ndao Regency, Kupang, NTT, Indonesia, from August to November 2023. A total of 43 mothers who had children aged 12-59 months were selected for this study. The dependent variable was nutritional status (height for age/ HAZ). The independent variables were maternal knowledge on nutrition and stunting, history of infectious diseases, and local-food-based supplementary feeding. Supplementary feeding was measured using food frequency questionnaire (FFQ). Nutritional status was measured by height for age. The data were analyzed using a multiple linear regression.

**Results:** Maternal nutritional knowledge ( $b = 0.37$ ; 95% CI = 0.23 to 0.50;  $p = 0.001$ ), no history of infection ( $b = 0.98$ ; 95% CI = 0.72 to 1.24;  $p = 0.001$ ), and local-food-based supplementary feeding ( $b = 1.33$ ; 95% CI = 0.71 to 1.96;  $p = 0.001$ ) positively and significantly increased nutritional status (height for age) in children under five.

**Conclusion:** Maternal nutritional knowledge, no history of infection, and local-food-based supplementary feeding positively and significantly increase nutritional status (height for age) in children under five.

**Keywords:** supplementary feeding, nutritional status, maternal knowledge, stunting

### Correspondence:

Intje Picauly. Study Program of Public Health, Faculty of Public Health, Universitas Nusa Cendana, Kupang 85111, Nusa Tenggara Timur, Indonesia. Email: intjepicauly@staf.undana.ac.id. Mobile: +6282237145517.

### Cite this as:

Picauly I, Boeky D, Oematan G (2024). Factors Affecting Nutritional Status (Height for Age) of Children Under Five in Rote Ndao District, Kupang, Nusa Tenggara Timur, Indonesia. *J Matern Child Health*. 09(01): 38-46. <https://doi.org/10.26911/thejmch.2024.09.01.04>.



© Intje Picauly. Published by Master's Program of Public Health, Universitas Sebelas Maret, Surakarta. This open-access article is distributed under the terms of the [Creative Commons Attribution 4.0 International \(CC BY 4.0\)](https://creativecommons.org/licenses/by/4.0/). Re-use is permitted for any purpose, provided attribution is given to the author and the source is cited.

### BACKGROUND

Stunting is still a public health problem in Nusa Tenggara Timur (NTT) Province with a

percentage of 15.7% or 67.54 children in 2023. This number has decreased compared

to 2022, namely 17.7 percent or 77.34 children. In particular, it is known that Rote Ndao Regency is one of the districts that has the highest prevalence of Stunting in the NTT Region, namely 22.3% in 2022 then decreasing in 2023 to 20.5% (Electric Application-Community Based Nutrition Recording and Reporting/e-PPGBM period 2022-2023). The high prevalence of stunting in NTT Province is the impact of various factors. The dry climate with long hot or dry seasons has an impact on the problem of lack of clean water and it is very easy to experience food shortages which have an impact on the emergence of various problems of malnutrition and infectious diseases in children under five (BPS Provinsi Nusa Tenggara Timur, 2022, 2023b, 2023a).

The results of research conducted by the Habibie Center Research Institute in East Java Province, Jember Regency and NTT, Rote Ndao Regency show that the high prevalence of Stunting in Rote Ndao Regency is influenced by three main factors, namely: (1) Poor quality and quantity of food consumption as a result of low family food security; 2). Bad parenting patterns and 3). Low access to health facilities (Arini et al., 2021). It was further explained that the low level of consumption of energy, protein, iron, calcium was due to food consumption that was not diverse and unbalanced. The research results found that toddlers generally consume rice porridge or corn porridge without empty porridge side dishes. Food sources of vegetable protein are rarely or almost never consumed (Adu et al., 2021).

Vegetables are given to toddlers but they are not varied and in small quantities so that children not only have a deficit of macronutrients but also micronutrients (vitamins and minerals) (BPS Provinsi Nusa Tenggara Timur, 2023a) (BPS Provinsi Nusa Tenggara Timur, 2023b). Apart from that, there are

many other factors that also influence, including: low level of maternal nutritional knowledge, health care practices and breastfeeding practices, healthy living behavior of children under five, mother's parenting patterns, and physical environmental conditions (sanitation and limited clean water), education. fathers and mothers, physical and economic accessibility is hampered by a lack of sources of income from the agricultural sector and other sectors (Beal et al., 2018).

Data from measurements and weighing operations from the Rote Ndao Regency Government shows that there are several sub-districts that still have a high prevalence of stunting, including: Rote Selatan Sub-district 19.6%, with Nggelodae Village having a prevalence of 38.0%; and Lobalain District 19.7%, with Loleoen Village having a prevalence of 46.6%; Kolobolon Village which has a prevalence of 45.9%; Bebelain Village which has a prevalence of 37.8% (Electric Application-Community Based Nutrition Recording and Reporting/e-PPGBM for the period 2022-2023). Based on the existing background, an important question arises as to what effect the provision of village supplementary food has on the nutritional status of stunted children under five in Rote Ndao Regency.

In order to answer this question, research was conducted with the aim of examining the influence of the level of knowledge of mothers of toddlers about nutrition and stunting, history of infectious diseases and providing additional food (PMT) in villages on the nutritional status of stunted toddlers in Rote Ndao Regency.

## SUBJECTS AND METHOD

### 1. Study Design

This was a cross-sectional study conducted at 4 village with high prevalence of stunting in Rote Ndao, Kupang, Nsa Tenggara Timur, Indonesia, from August to November 2023.

**2. Population and Sample**

The study population was children under five. Total of 43 children aged 12 – 59 months and their mothers were selected for this study.

**3. Study Variables**

The dependent variable was the nutritional status (height for age). The independent variables were maternal knowledge, history of infectious diseases, and local-food-based supplementar feeding.

**4. Operational Definition of Variables**

**Maternal knowledge:** Opinions given by mothers of toddlers regarding nutrition and stunting.

**History of infectious diseases:** the occurrence of infectious diseases (i.e. acure respiratory infection/ARI, malaria, worm infection, or diarrhea) in the last past month.

**Local-food-based supplementary feed-ing:** Malnourished and stunted children under five who receive additional food through village budget support for 90 days.

**Nutritional status of toddlers:** Child's nutritional condition that measured by body height for age (HAZ).

**5. Study Instruments**

Data on history of infection was collected from medical record. Local-food-based supplementary feeding was measured using Food frequency questionnaire (FFQ).

**5. Data analysis**

Factor related to child's nutritional status (HAZ) were analyzed usin a multiple linear

regression. Significance level of statistical analysis uses  $p < 0.050$  with Confidence Interval (CI) 95%.

**6. Research Ethics**

Research ethical issues including informed consent, anonymity, and confidentiality, were handled carefully throughout the research process. The research permit approval letter was obtained from the Rote Ndao Regency Research and Development Planning Agency No: 050/126.1/Bapeltbang 5.1/2023 on 02 October 2023.

**RESULTS**

**1. Sample Characteristics**

Table 1 showed that the majority of children under five (79.07%) were not stunted after receiving Village PMT according to standards (Number and diversity of types according to PMT Health technical guidelines) as much as 86.06%. Several characteristics of the subject's family can be seen in Table 3.1. among others, the majority (86.06%) of children under five each have mothers who work as farmers with an income below the minimum wage for Rote Ndao Regency, namely IDR. 2,123,994, - and live in a large family with more than four family members. Apart from that, the majority (55.81%) of children under five have mothers who have little education and knowledge about nutrition and stunting (81.39%) however, in the last month the majority of these children (60.46%) have no history of infection.

**Table 1. Distribution of children under five according to research variable characteristics**

Indicator	Frequency (N)	Percentage (%)
<b>Child'd nutritional status</b>		
Stunting	9	20.93
Normal	34	79.07
<b>Local-food-based supplementary feeding</b>		
Not compliance	6	13.94
Compliance	37	86.06
<b>History of infectious diseases</b>		
Yes	17	39.54
None	26	60.46
<b>Maternal knowledge</b>		

Indicator	Frequency (N)	Percentage (%)
Poor	35	81.39
Good	8	18.61
<b>Family Income</b>		
Low (<minimum regional wage*)	41	95.35
High (≥minimum regional wage)	2	4.65
<b>Level of education</b>		
Lower	24	55.81
High	19	44.19
<b>Types of Work for Mothers of Toddlers</b>		
Farmer	37	86.06
Self-employed	3	6.97
Civil servants/state civil servants	3	6.97
<b>Number of Family Members</b>		
Small (≤4 persons)	15	34.88
Great (>4 persons)	28	65.12

\*Rote Ndao minimum regional wage in 2023 Rp 2,123,994

**2. Multivariate Analysis**

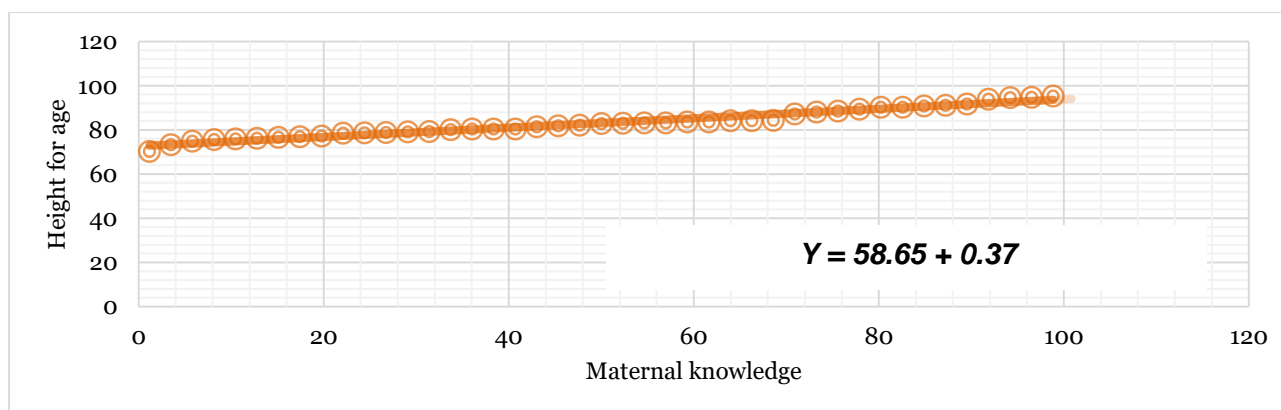
Table 2 shows the results of multiple linear regression of factors related with child’s nutritional status (height for age). Table 2 found that maternal nutritional knowledge (b= 0.37; 95% CI = 0.23 to 0.50; p = 0.001),

no history of infection (b= 0.98; 95% CI= 0.72 to 1.24; p= 0.001), and local-food-based supplementary feeding (b= 1.33; 95% CI= 0.71 to 1.96; p= 0.001) positively and significantly increased nutritional status (height for age) in children under five.

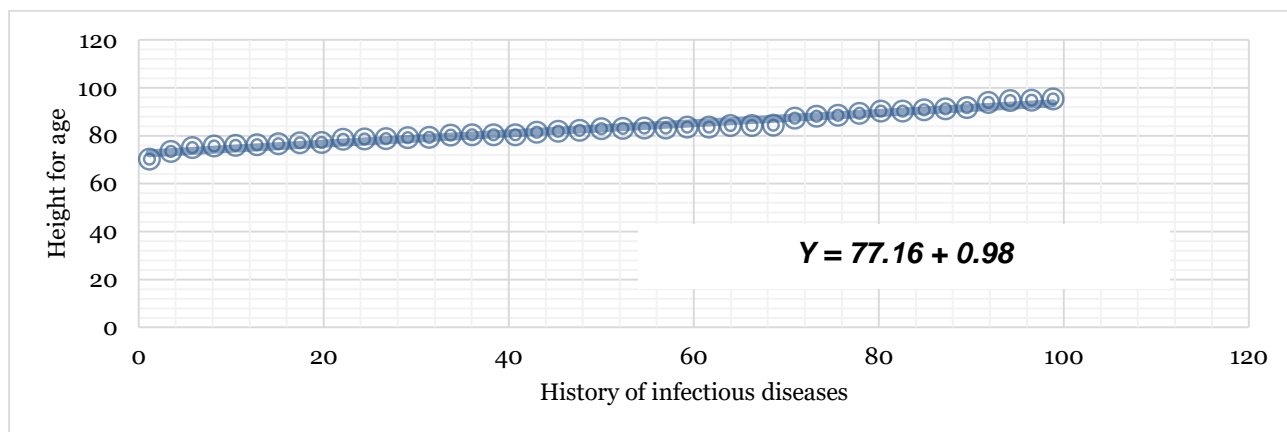
**Table 2. Results of multiple linear regression analysis of factors related with child’s nutritional status (height for age/ HAZ)**

Independent variable	b	95% CI		p
		Lower limit	Upper limit	
Maternal knowledge (good)	0.37	0.23	0.50	0.001
Infection history (no)	0.98	0.72	1.24	0.001
Local-fod-based Supplementary feeding (good)	1.33	0.71	1.96	0.001

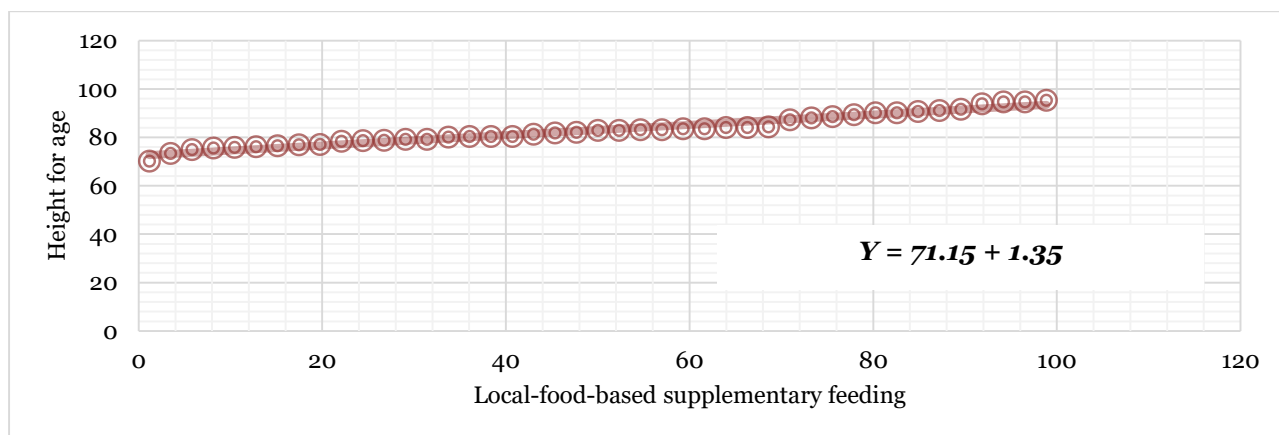
N observation= 43  
 Adj R-Squared= 57%  
 p= 0.970



**Figure 1. Liniar regression of maternal knowledge on child nutritional status (HAZ)**



**Figure 2. Liniar regression of histiry of infectious disease on child nutritional status (HAZ)**



**Figure 3. Liniar regression of local-food-based supplementary feeding on child nutritional status (HAZ)**

### DISCUSSION

The family is part of a social system which consists of a series that is interdependent and influenced by internal and external structures. The number of family members in one house greatly determines the amount of family food needs. The greater the number of family members, the greater the amount of income used to spend on family needs, including food consumption needs. Limited income will result in insufficient nutritional intake resulting in the emergence of malnutrition problems (Akanda, 2020; Akseer et al., 2020; Vaivada et al., 2020).

The level of knowledge of mothers of

toddlers about nutrition and stunting influences changes in attitudes and behavior in healthy living (Stewart et al., 2013; Arifin, 2021). A higher level of knowledge among mothers of toddlers about nutrition and stunting will make it easier to fulfill daily food needs. The results of the research found that mothers of toddlers who have a low level of income and knowledge will influence the fulfillment of nutritional intake for toddlers. This is in accordance with the results of the analysis which shows that if every increase in the knowledge of mothers of toddlers about nutrition and stunting by 1 unit will increase the number of toddlers who experience a decrease in the incidence

of stunting in Rote Ndao Regency. This means that the level of knowledge of mothers of toddlers about nutrition and stunting is one of the factors causing nutritional problems due to inappropriate feeding practices for toddlers (Arini and Peranto, no date; Shela, 2010; Rohayati and Aprina, 2021; Picauly et al., 2023).

The knowledge of mothers of toddlers about good nutrition and stunting has a role for the family in terms of preparing menus, choosing food and processing food consumed by all family members (Munawaroh, 2015; Rohayati and Aprina, 2021). The higher the knowledge of mothers of toddlers about nutrition and stunting, the better it will be compared to parents with low levels of knowledge about nutrition and stunting.

The results of the study showed that in the past month the majority of children under five had no history of infection. A small number of children under five experience acute respiratory infections. ISPA is defined as an infectious disease of the nose, ears, throat and lungs which in a period of less than 14 days has signs and symptoms in the form of a cough, cold and shortness of breath due to a blocked nose with or without fever (Arini and Peranto, no date; Intje Picauly, 2023; Picauly et al., 2023). Children who have an infection will have an effect on their appetite so that the child's weight tends to decrease. This means that preventing the incidence of infectious diseases has an impact on positive changes in the nutritional status of children under five (Assessment and Study, no date; Adekanye, RN and Odetola, RN, 2014; World Health Organization, 2014; Perrar, Alexy and Jankovic, 2022). This condition is in accordance with the results of the analysis which explains that if every increase in the number of toddlers who do not have a history of infectious disease by 1 unit will increase the number of toddlers who experience a decrease in the

incidence of stunting.

Nutritional status is an expression of the balance of nutrients with the body's needs which is manifested in the form of certain variables. An imbalance of nutrients with the body's needs will cause pathological disorders, therefore, to prevent undesirable impacts, fulfilling proper nutritional needs is important to pay attention to. (Hina and Picauly, 2021).

Adequate nutrition is very important, especially in the early days of life, to ensure that children can grow healthily. The first 1000 days of life are the most critical period for children to improve their physical and cognitive development (P2PTM Kemenkes RI, 2018; Putri and Rahardjo, 2021). Good nutritional status and health are important factors for children's physical growth and cognitive development. Aware of the importance of providing adequate and varied nutrition in the early years of life, nutritional interventions such as providing additional food are an appropriate form of nutritional intervention to improve children's nutritional status. This is in accordance with the results of the analysis which show that providing Village PMT has a very real effect on the nutritional status of children under five.

Therefore, Village PMT is an appropriate strategy for overcoming nutritional problems. The results of this research show that the Village PMT carried out has proven to be able to improve the nutritional status of children. Village PMT carried out in 4 villages as stunting loci, namely Ngelodae Village, Kolobolon Village, Loleoen Village and Bebelain Village, showed that there was an influence on changes in the weight and height of children under five. This means that increasing the number of toddlers who receive the Village PMT program by 1 unit will increase the number of toddlers who experience a reduction in the incidence of

stunting. This study found a significant change in children's body weight before and after giving PMT. This difference can be caused because body weight is quite sensitive to small changes that occur in children, while height has a lower level of sensitivity to nutritional deficiency conditions in the short term.

This research is in line with research by Iskandar (2017) which states that there is a significant influence of PMT activities on changes in body weight. Weight gain in children is caused by the additional nutritional intake provided that meets the requirements in terms of type, quantity and nutritional value of each food. Apart from that, another finding in the research was the change in children's height after PMT was carried out. This is in accordance with research conducted in Semarang which stated that after providing additional food for 60 days, differences were found in nutritional status based on BW/TB, this was due to the energy and protein intake that was routinely given to toddlers (Fitriyanti and Mulyati, 2012).

Changes in nutritional status in children can be caused by fairly high levels of energy and protein consumption in the PMT diet. Based on observations and follow-up interviews conducted by researchers, it was found that the nutritional composition of PMT food was good in terms of quantity and quality. The menu served consists of rice as a source of carbohydrates, chicken, eggs and fish as a source of protein and fat and vegetables and fruit as a source of vitamins and minerals. In practice, there are several food ingredients that are difficult to obtain, such as fish, which can be replaced with other sources of protein, namely eggs or chicken. This is done so that the nutritional quality of PMT is not reduced.

Providing additional food that contains quality nutrients can help increase

daily intake so that children's daily nutritional needs can be met. Apart from the quantity and quality of the existing PMT menu, researchers also saw the level of compliance in consuming PMT food. The role of parents is very necessary in bringing about changes in the nutritional status of their children. This research shows that the majority of parents are obedient in taking their children to the location or place where PMT is carried out and this is done routinely every day for 90 days. Obedient consumption of PMT helps meet the energy and protein needs of children under five, so that if done correctly it will have an impact on changing the nutritional status of children for the better (Adelasanti and Rakhma, 2018).

In general, it was found that the characteristics of the respondents' families included that the majority (86.06%) of children under five each had mothers who worked as farmers with incomes below the minimum wage in Rote Ndao Regency and lived in large families with more than four family members person. Apart from that, the majority of children under five have mothers who have low education and knowledge about nutrition and stunting, but in the last month most of these children have no history of infection. Most children under five do not experience stunting after receiving village PMT according to standards (the number and variety of types are in accordance with the technical guidelines for PMT Health). The factors of the mother's level of knowledge about nutrition and stunting, history of infectious diseases and provision of PMT have a significant and correlated influence and have the same causal relationship and show a very strong influence on the nutritional status of stunted toddlers in Rote Ndao district.

#### **AUTHOR CONTRIBUTION**

Intje Picauly, Daniela Boeky, and Grouse

Oematan were both responsible for designing and collecting research data. Next, Intje Picauly analyzed the data, interpreted and wrote the manuscript, Daniela Boeky and Grouse Oematan checked and edited the article.

#### ACKNOWLEDGMENT

The research team would like to express its deepest thanks to all parties who have supported this research: (1) Rote Ndao Regency Regional Government; (2) Research and Development Planning Agency of Rote Ndao Regency; (3) Institute for research and community service, (4) Undana Faculty of Public Health, Undana; (5) Department: Health, Education, Culture and Sports, Women's Empowerment and Child Protection and Family Planning, Public Works and Public Housing, Social, Agriculture and Food Security, Rote Ndao Regency, and (6) Religious Figures in Lobalain District, Rote Ndao Regency.

#### FUNDING AND SPONSORSHIP

This research activity is a collaborative research study between the Rote Ndao Regency Government and FKM Undana and is supported by DAK funds from the Rote Ndao Regency Government.

#### CONFLICT OF INTEREST

The research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

#### REFERENCE

Adekanye OE, Odetola TD (2014). Awareness and implementation of integrated management of childhood illness (IMCI) Among nurses in paediatric settings of selected hospitals in Ibadan, Nigeria. *IOSR Journal of Nursing and Health Science*. 3(5): 29–34.

[doi.org/10.9790/1959-03532934](https://doi.org/10.9790/1959-03532934).

Adu IK, Weraman P and Tira DS (2021). Faktor yang berhubungan dengan kejadian stunting pada balita usia 24-59 bulan di Wilayah Kerja Puskesmas Baa Kabupaten Rote Ndao. *Media Kesehatan Masyarakat*. 3(3): 226–235. <https://doi.org/10.35508/mkm.-v3i3.3726>.

Akanda MAS (2020). Understanding stunting and the common characteristics of households with a stunted child. *SSRN Electronic Journal [Preprint]*, 14(3): 125-132. [doi.org/10.2139/ssrn.3602558](https://doi.org/10.2139/ssrn.3602558).

Akseer N, Vaivada T, Rothschild O, Ho K, Bhutta Z (2020). Understanding multifactorial drivers of child stunting reduction in exemplar countries: A mixed-methods approach. *Am J. Clin Nutr*. 112(2): 792S-805S. [doi.org/10.1093/ajcn/nqaa152](https://doi.org/10.1093/ajcn/nqaa152).

Arifin J (2021). Pencegahan stunting terintegrasi melalui bantuan sosial program sembako dan pendampingan sosial program keluarga harapan ( PKH): pembelajaran dari enam kabupaten prioritas. *Puslitbangkesos Kementerian Sosial*.

Arini HRB, Peranto S (2021). Ringkasan kebijakan pencegahan stunting di era pandemi COVID-19 (Summary of stunting prevention policies in the COVID-19 pandemic era).

Assessment Q, Study C (2020). assurance project quality assessment case study assessing the quality of healthcare at the district level in Rwanda.

Beal T, Tumilowicz A, Sutrisna A, Izwardy D, Neufeld LM (2018). A review of child stunting determinants in Indonesia. *Matern Child Nutr*. 14(4):e12617. [doi: 10.1111/mcn.12617](https://doi.org/10.1111/mcn.12617).

BPS Provinsi Nusa Tenggara Timur (2022). NTT dalam Angka tahun 2022 (NTT in



- Numbers 2022).
- BPS Provinsi Nusa Tenggara Timur (2023a). BPS Nusa Tenggara Timur 2023 (BPS East Nusa Tenggara 2023).
- BPS Provinsi Nusa Tenggara Timur (2023b). Statistik Daerah Provinsi Nusa Tenggara Timur (Regional statistics for East Nusa Tenggara Province).
- Hina SBGJ, Picauly I (2021). Hubungan faktor asupan gizi, riwayat penyakit infeksi dan riwayat ASI eksklusif dengan kejadian stunting di kabupaten Kupang. *Jurnal Pangan Gizi dan Kesehatan*. 10(2): 61–70. doi.org/10.51556/ejpazih.v10i2.155.
- Munawaroh S (2015). Asuh mempengaruhi status gizi balita relationship of parenting pattern and toddlers' nutritional status. *Jurnal Keperawatan*. 6(1): 44–50.
- P2PTM Kemenkes RI (2018). Cegah stunting dengan perbaikan pola makan, pola asuh dan sanitasi - Direktorat P2PTM (Prevent stunting by improving diet, parenting and sanitation - P2PTM Directorate). Kemkes.Go.Id [Preprint]. <http://p2ptm.kemkes.go.id/kegiatan-p2ptm/subdit-penyakit-diabetes-melitus-dan-gangguan-metabolik/cegah-stunting-dengan-perbaikan-pola-makan-pola-asuh-dan-sanitasi>.
- Perrar I, Alexy U, Jankovic N (2022). Changes in total energy, nutrients and food group intake among children and adolescents during the COVID-19 Pandemic—Results of the DONALD Study. *Nutrients*. 14(2). doi.org/10.3390/nu14020297.
- Picauly I (2023). Stunting dalam bingkai kesehatan ibu dan anak (edisi revisi ke 2) (Stunting in the framework of maternal and child health (2nd revised edition). *Angewandte Chemie International Edition*, 6(11):951–952. Jawa Tengah: Penerbit Amerta Media.
- Picauly I, Adi AAAM, Meiyetriani E, Mading M, Weraman P, Nashriyah SF, Hidayat AT, et al. (2023). Path analysis model for preventing stunting in dryland area island East Nusa Tenggara Province, Indonesia. *PLoS One*. 18(11):e02937-97. doi: 10.1371/journal.pone.02937-97.
- Putri EMS, Rahardjo BB (2021). Program pemberian makanan tambahan pemulihan pada balita gizi kurang (Program for providing additional recovery food to malnourished toddlers). *Indones J Public Health Nutr*. 1(3):337–345.
- Rohayati R, Aprina A (2021). Pengaruh penyuluhan partisipatif untuk meningkatkan pengetahuan ibu tentang penerapan gizi seimbang dalam penanggulangan stunting. *Jurnal Kesehatan*, 12(2): 287. doi.org/10.26630/jk.v12i2.2830.
- Stewart CP, Iannotti L, Dewey KG, Michaelsen KF, Onyango AW (2013). Contextualising complementary feeding in a broader framework for stunting prevention. *Matern Child Nutr*. 9(2):27-45. doi: 10.1111/mcn.12088.
- Vaivada T, Akseer N, Akseer S, Somaskandan A, Stefopoulos M, Bhutta ZA (2020). Stunting in childhood: an overview of global burden, trends, determinants, and drivers of decline. *Am J Clin Nutr*. 112(2):777S-791S. doi: 10.1093/ajcn/nqaa159.
- World Health Organization (2014). Integrated management of childhood illness (IMCI): Chart Booklet. Geneva, Switzerland.