Stunting Determinant Analysis in the East Mainland Province of East Nusa Tenggara for the Period of 2017-2021

Intje Picauly[1], Stefanus P Manongga[2], Damianus Adar[3], Franchy CH Liufeto[4]

[1,2]Department of Nutrition, Faculty of Public Health, Universitas Nusa Cendana,
Kupang, Nusa Tenggara Timur, Indonesia
[3]Agricultural Socio-Economic Department, Faculty of Agriculture,
Universitas Nusa Cendana, Kupang, Nusa Tenggara Timur, Indonesia
[4]Department of fisheries resource management, Faculty of fisheries and marine science,
Universitas Nusa Cendana, Kupang, Nusa Tenggara Timur, Indonesia

ABSTRACT

Background: The Mainland of Timor, East Nusa Tenggara Province (NTT) has a diverse regional topography with a high prevalence of stunting (>20%). The local government has taken preventive measures. However, the results show a very small reduction in the prevalence of stunting (±2-3%/year). This study aimed to determine the factors that influence the incidence of stunting in the Eastern Mainland Region, NTT

Subjects and Method: This data was a cross-sectional study conducted in NTT, from in June to August 2022. A sample of 28 informants who were selected with the following considerations: officials from the Health Office, PUPR Service, Agriculture Service, and Regency/ City BPS data managers for the Eastern mainland region of NTT. The dependent variable was stunting. The independent variables were Availability of Public Health Workers, Infectious infectious diseases, Open defecation behavior, Family income level, Availability of clean water and proper sanitation, Exclusive breastfeeding, Posyandu visits, Program for giving iron tablets to young women, and Administration of Vitamin A. The data were analyzed by linear regression analysis.

Results: Factors that influence the incidence of stunting were sanitation factors (b= -2.22; 95% CI= -3.52 to -0.91; p= 0.012), factor of pneumonia infection (b= 0.07; 95% CI= 0.01 to 0.13; p= 0.038), open defecation behavior factor (b= 2.60; 95% CI= 0.99 to 4.21; p= 0.014), and family income level factor (p= -1.21; 95% CI= -1.80 to -5.70; p= 0.009).

Conclusion: The incidence of stunting in the East Mainland Region, NTT is influenced by factors: sanitation, pneumonia infection, open defecation behavior; and family income level.

Keywords: stunting incidence, eastern mainland, sanitation factors, infectious diseases, pneumonia, open defecation.

Correspondence:
Intje Picauly, Department of Nutrition, Faculty of Public Health, Universitas Nusa Cendana, Kupang, Nusa Tenggara Timur, Indonesia, Jl. Adi Sucipto Penfui, Penfui, Maulafa, Kupang, Nusa Tenggara Timur. Mobile: +62822-3714-5517. Email: intjepicauly@staf.undana.ac.id.

BACKGROUND

The province of East Nusa Tenggara (NTT) is known as the dry land area of the archipelago. This is because the province of NTT has many islands called Flobamorata (Flores, Sumba, Timor, Alor, Rote, and Lembata). The East Mainland is one of the big islands which has six regencies/ cities, inclu-

ding: Kupang City, Kupang Regency, South Central Timor Regency, North Central Timor Regency, Belu Regency, and Malacca Regency. These 6 regions have a long summer (eight months) with an average temperature of 27-28 0C and a very limited rainy season (4 months) with an average rainfall of 600-4800 mm3 (NTT in Figures, 2021).

The background of the archipelagic region causes many limitations and weaknesses for the community to gain access to health services and important and up-to-date information related to nutrition and health aspects in a good and maximum manner as well as a fairly high cultural diversity with a philosophy that is contrary to the view of nutrition and health. Therefore, an increase in the prevalence and probability of the occurrence of Extraordinary Cases for infectious infectious diseases, including in the aspect of malnutrition, is greater.

NTT data in Figures (2021) states that the incidence of worms, diarrheal diseases, pneumonia, and dengue fever is still high (up to 90%). On the other hand, the 2018 Basic Health Research (Riskesdas) showed that NTT Province had a stunting prevalence of 35.9%. The prevalence is still higher than the national prevalence and higher than the WHO limit of 20%. Considering that nutritional problems in general can be influenced by many factors, this study was conducted with the aim of knowing the factors that influence the incidence of stunting in East Nusa Tenggara Province, especially in the East Land Region.

SUBJECTS AND METHOD

1. Study Design
This research is a quantitative descriptive study with a cross-sectional study design for 4 (four) months, namely May – August 2022 in 6 districts/ cities in the East Mainland Region, NTT Province. The types of primary data (independent variables) that were collected were: the program of giving Blood Add Tablets to pregnant women and adolescent girls; Vitamin A Tablet administration program; Implementation of Ante Natal Care (ANC); Immunization History; History of Posyandu visits; availability of Clean Water; ownership of Sanitation facilities or facilities; history of exclusive breastfeeding; habit of open defecation; incidence of pulmonary TB in children; incidence of diarrhea; incidence of pneumonia; availability of Health workers (Nurses, Midwives, TPG, and Public Health); availability of Pustu/ Posyandu; and family income level.

2. Population and Samples
The population and sample of this study were all children under five in 6 (six) regencies/ cities in the mainland of Timor, NTT Province. While the informants used were 28 people who came from secondary data supporting agencies such as: officials from the Health Service, PUPR Service, Agriculture Service, and BPS Regency/ City data managers in the East Mainland and NTT province. The process of collecting qualitative data used the FGD (Focus Group Discussion) method and continued with secondary data collection according to the details of the data that had been prepared by the research team.

The inclusion criteria were responsible for the data management system in each relevant agency in six regencies/ cities in the mainland region of East Nusa Tenggara; In good health and condition; Have been exposed to information related to stunting; and willing to be an informant.

The exclusion criteria were not responsible for the data management system in each of the relevant agencies in six regencies/ cities in the mainland area of NTT; In good health and condition; Not exposed to information related to stunting; but willing to be an informant.

3. Study Variable

The dependent variable was stunting. The independent variables were exclusive breast-feeding, number of health workers, family income level, adequate drinking water, proper sanitation, program coverage for pregnant women receiving blood-adding tablets, scope of the program for young women who receive blood-boosting tablet, coverage of the infant program receiving vitamin a, program coverage pregnant women who perform ANC, basic immunization, number of paysandu visits, pneumonia (upper respiratory tract infection), pulmonary Tb, and open defecation behavior.

4. Operational Definition of Variables

Exclusive breastfeeding was infants who have a history of or who have received exclusive breastfeeding for six months.

Number of health workers (midwives, TPG, public health, Nurses) were number of health workers who are officially registered at a health service center in districts and cities.

Family income level was the level of family income of children under five proxied by monthly food and non-food expenditure.

Adequate drinking water was households that use drinking water sources (bottled water, tap water, public faucets, hydrants, public hydrants, protected dug wells, protected springs, drilled wells or pumps) with a distance of more than 10 meters from the pollution source.

Proper sanitation was households using latrines with goose-neck toilets and WWTP or septic tanks.

Program coverage for pregnant women receiving blood-adding tablets were pregnant women who receive blood-boosting tablets supplementation during pregnancy are at least 90 tablets.

Scope of the program for young women who receive blood-boosting tablets were young women who receive supplements of blood-boosting tablets.

Coverage of the infant program receiving vitamin A was Infants receiving vitamin A tablets.

Program coverage pregnant women who perform ANC was pregnant women who visit health care centers for pregnancy check-ups in the 4th – 6th month.

Basic Immunization was infants 12-23 months who received complete immunization (HB0 1 time, BCG 1 time, DPT-HIB 3 times, OPV 4 times + 1 IPV or IPV 3 times and measles 1 time).

Number of posyandu visits was pregnant women and/ or mothers under five who visit the posyandu to monitor the health of mothers and children.

Pneumonia (upper respiratory tract infection) was infants who have experienced ARI events or symptoms (fever, cough, runny nose and or illness) in the past week.

Pulmonary TB was infants who have experienced pulmonary TB events or symptoms (cough, weight loss, high fever, night sweats) in the last 6 months.

Open defecation behavior was children under five who have a habit of defecating carelessly for the last 24 hours.

5. Study Instrument

The data of this study consisted of primary data and secondary data. Primary data was obtained from the results of discussions through the FGD method using FGD guidelines and keynote talk with informants.

6. Data Analysis

Univariate analysis was carried out to see the frequency distribution and characteristics of the research subjects, while bivariate and multivariate analysis was carried out using chi square test and multiple logistic regression with odds ratio (OR) calculation with 95% confidence level (CI) to study the relationship between the independent variable and the dependent variable.

7. Research Ethics

This research has gone through a due diligence process by the Health Research Ethics Commission at the Faculty of Public Health, University of Nusa Cendana with SK: 15/-UN15.16/KEPK/2022 and was declared eligible on 28 May 2022. Ethics Review Registration Number: UN02220343.

RESULTS

East Nusa Tenggara Province generally has a dry season and a rainy season. In June to September the wind current comes from Australia and does not contain much moisture, resulting in a dry season. On the other hand, in December – March, the wind currents contain a lot of water vapor from Asia and the Pacific Ocean, resulting in the rainy season. This makes NTT a relatively dry area where only 4 months (January to March and December) are relatively wet and the remaining 8 months are relatively dry with the highest average temperature in 2020 being 32.9°C.

Table. 1. Results of Analysis of Determinants of Stunting in the East Mainland Region of NTT

Indicator	b	95% CI		p
		Lower limit	Upper limit	
Pregnant women's blood increase tablets	-0.26	-1.47	0.95	0.548
Teenage girls blood enhancement tablets	-0.39	-1.16	0.38	0.207
Vitamin A	-0.38	-1.41	0.64	0.323
Ante Natal Care (ANC)	-0.17	-2.08	1.73	0.794
Complete immunization	-0.17	-2.33	1.99	0.823
Posyandu visit	-0.77	-2.09	0.57	0.165
Clean water	-0.42	-3.05	2.19	0.642
Sanitation	-2.22	-3.53	-0.91	0.012
Exclusive breastfeeding	-0.46	-1.14	0.22	0.122
Defecation carelessly	2.60	0.99	4.21	0.014
Pulmonary TB	0.13	-1.00	1.26	0.735
Diare	0.00	-0.00	0.01	0.121
Pneumonia	0.07	0.00	0.14	0.038
Nurse	0.03	-0.09	0.14	0.515
Midwife	0.02	-0.09	0.13	0.586
Nutritional assistant	-0.03	-0.09	0.03	0.216
Public health worker	-0.30	-0.64	0.04	0.070
Auxiliary health center/ integrated healthcare center	2.83	-19.71	25.37	0.716
Income level	-1.21	-1.80	-5.70	0.009
N observation= 28				
Adj R-Squared= 90%				
P= 0.002				

Agricultural productivity studies show that natural conditions can affect the amount of food crop production. The low amount of agricultural production will affect the food availability factor both at the community and family level and in the end will have an impact on the problem of malnutrition, including the incidence of stunting. In addi-

tion, high temperatures with prolonged heat also have an impact on the emergence of endemic infectious diseases which also have an impact on increasing the prevalence of stunting.

Research studies so far have concluded that the factors causing stunting in the Timor Mainland Region, NTT Province are very diverse. The results of the study are in line with the results of this study (Table 1). Based on secondary data collected from 4 related agencies, it is known that the high prevalence of stunting during the last 5 years (2017-2021) in the eastern mainland of NTT Province is largely influenced by 20 factors and tends to fluctuate or fluctuate (Table 1). This means that every year, the number of stunting under-five cases has the opportunity to increase or decrease.

The results of the analysis at the 95% confidence level show that in the mainland region of NTT, there were 4 factors that have a very significant effect on the incidence of stunting. Where, every increase in income level and the addition of proper sanitation facilities can reduce stunting prevalence by 1.2 – 2.2%. Meanwhile, each additional incidence of pneumonia and open defecation can increase the prevalence of stunting by 0.07 – 2.6%. Furthermore, the results of the analysis at the 90% confidence level are known that the factor.

DISCUSSION

UNICEF (1990) states that the incidence of nutritional problems can be influenced by various factors. Furthermore, Stewart et all (2013) and Beal et all (2018) explained that the growth and development of stunted children is strongly influenced by family and household factors, insufficient nutritious food, exclusive breastfeeding and the incidence of infectious diseases. The four factors were part of the social factors of the community. Among other things: political

economic factors, health and health services, education, socio-culture, agriculture and food systems, as well as the availability of water, sanitation, and a good and clean environment. This opinion is in line with the results of the research conducted.

The stunting problem for the last five (5) years (2017 - 2021) in six (6) districts in the eastern mainland is influenced by the availability of health workers, infectious infectious disease factors, environmental factors, health service factors and the availability of health service centers and their utilization. and factors history of exclusive breastfeeding. Until 2021, it is known that all indicators have a distribution pattern following the changing trend of stunting prevalence. Where, the process of recruiting health workers every year is always increasing; increasing the number of coverage programs for exclusive breastfeeding, vitamin A, giving blood supplement tablets for pregnant women and young women; positive changes in open defecation behavior; availability of clean water and proper sanitation facilities. However, on the other hand, there has been no significant change in the incidence of infectious diseases such as diarrhea, ISPA and pneumonia. The high prevalence and number of cases of this infectious disease is one of the strong allegations of a slow decline in the prevalence of stunting.

Table 1 showed that infectious disease factors and open defecation have a very significant effect on the incidence of stunting. Each additional case of diarrhea and pneumonia as well as an increase in open defecation will have an effect on increasing the prevalence of stunting by around 0.07 – 2.6%. The results of this study were in line with the results of research by Yulnefia and Sutia, 2022; UNICEF, 2020; Subroto et al., 2021; Namangboling et al., 2017 and Handayani, 2020 which prove that infants

with a history of infectious diseases have a 3 times greater chance of experiencing stunting. The infectious diseases that often attack children under five are upper respiratory tract infection, diarrhea, and pneumonia. Thus, stunting is not limited to being shorter than friends of his age, but more prone to disease. Handayani (2020) also emphasized that a history of infectious diseases related to stunting, i.e diarrhea, upper respiratory tract infection, helminthiasis, and tuberculosis were associated with stunting. In addition, stunted children are at a higher risk of developing degenerative diseases, such as cancer, diabetes, and obesity. This is because the needs of micro and macro nutrients in the body are not fulfilled optimally so that the formation of body and other cell functions is not perfect.

The factors that most influence the incidence of stunting were: family income, exclusive breastfeeding, family size, education of infant father, infant father's occupation, nutrition knowledge of infant mother, family food security, education of infant mother, level of infant carbohydrate consumption, accuracy of complementary feeding, infant fat consumption level, infant history of infectious diseases, socio-culture, infant protein consumption level, infant mother's occupation, levels of behavior, infant energy consumption level, and completeness of infant immunization (Supariasa and Purwaningsih, 2019). The results of this review are in line with the findings in this study that the family income level factor, the factor of exclusive breastfeeding, the history of infectious disease factors in infants, and the completeness factor for infant immunization.

Table 1 showed that all the determinant variables can explain the variation in stunting prevalence of more than 70-80%. The results of the analysis at the 95% confidence level show that in the mainland

region of NTT, there are four factors that have a very significant effect on the incidence of stunting. Where, every increase in income level, and the addition of proper sanitation facilities can reduce stunting prevalence by 1.2 − 2.2%. this means that family incomes that are less than the Regional Minimum Wage are 6 times more likely to experience stunting. Low income will have an impact on the adequacy of nutritional intake in children.

The results of this study were in line with the results of research in the Kupang District of NTT which found that there was a significant relationship between the amount of nutritional intake and the incidence of stunting (Hina et al, 2020). Where, based on the odds ratio value, it is known that infants who have low nutritional intake are 2.56 times more likely to experience stunting than infants who have good nutritional intake. Malnutrition problems can be caused by direct causes such as food and disease can directly cause malnutrition. The emergence of malnutrition is not only due to lack of food intake, but also disease. Children who get enough food but often get sick can suffer from malnutrition. Likewise, in children who do not get enough food, their immune system will weaken and they will be susceptible to disease. Stunting is a public health problem that is associated with an increased risk of illness, death, and inhibition of a child's physical and mental growth. Malnutrition at an early age increases infant and child mortality, causes sufferers to get sick easily and have poor posture as adults (Kemenkes RI, 2020).

The pattern of food consumption serves to direct that the pattern of food utilization nationally can meet the rules of quality, diversity, nutritional content, safety and halalness, in addition to eating efficiency in preventing waste. Food consumption patterns also direct the utilization of food in

the body (utility food) to be optimal, by increasing awareness of the importance of diverse consumption patterns, with balanced nutrition including energy, protein, vitamins and minerals and is safe (Nurbia et al., 2019).

The results of Wantina's research (2017) found that stunted infants aged 6-24 months had a low diversity of food consumption patterns compared to infants who were not stunted. While the results of the study also showed that the proportion of infants who had a low energy adequacy level was more in the stunting group (54.5%) and infants who had a low energy adequacy level had a 9.5 times greater risk of stunting compared to infants who had an energy adequacy level. adequate (Lift, 2018).

The pattern of breastfeeding refers to the practice of breastfeeding in the first 6 months, the pattern of breastfeeding is divided into exclusive breastfeeding, predominant breastfeeding and partial breastfeeding (Riskesdas, 2018). The proportion of breastfeeding alone in the last 24 hours for infants 0-5 months in NTT province is still low (75%) or below the national target of 93%. This is thought to be one of the risk factors for stunting. This confirms the results of a study in Kupang Regency which found that there was a relationship between exclusive breastfeeding and the incidence of stunting (Hina et al, 2020). In this study, it was found that a large number of children under five (66.1%) received exclusive breastfeeding well at the age of less than six (6) months or had a history of exclusive breastfeeding.

AUTHOR CONTRIBUTION

Intje Picauly was written articles. Stefanus P Manongga, Damianus Adar, and Franchy CH Liufeto were analyzed data and reviewed articles.

CONFLICT OF INTERESTS

There is no conflict of interest in this study.

REFERENCES

Beal T, Tumilowicz A, Sutrisna A, Izwardy D, Neufeld LM (2018). A review of child stunting determinants in Indonesia. Maternal and Child Nutrition Journal. 1(3): 14-24. doi: 10.1111/-mcn.12617.

BPS Provinsi Nusa Tenggara Timur/ BPS-Statistics of Nusa Tenggara Timur Province (2022). East Nusa Tenggara Province in Figures 2021. Accessed February 2, 2022. Retrieved from: https://ntt.bps.go.id/publication/2021/02/26/28a3d01a29a82489c3f95190/provinsi-nusa-tenggara-timur-dalam-angka-2021.html

Gaspersz E, Picauly I, Sinaga M (2020). The relationship of consumption patterns, history of infectious diseases, and personal hygiene with nutritional status of pregnant women in Indonesia north middle east district stunting locus area. Jurnal Pangan Gizi Dan Kesehatan (PAZIH). ISSN (e): 2085-2371. 9(2) 80-90 Oktober 2020. DOI: https://doi.org/10.51556/ejpazih.v9i2

.77.

Hairuddin AA (2018). Infectious diseases and practice of complementary feeding on the incidence of stunting in children aged 12-36 months in Simpang Kiri District, Subulussalam City. Jurnal Dunia Gizi (JDG). 1(1) 33-37 Retrieved from: http://ejournal.helvetia.ac.id/index.php/jdg/article/view/2919

Hidayani WR (2020). History of infectious diseases associated with stunting in Indonesia: literatur review. Home/ Archives/ 2(1): Proceedings of the National Health Seminar "The Role of Health Workers in Reducing Stunting Incidence" Jurnal Stikes Respati. Retrieved from: http://ejurnal.stikes-respati-tsm.ac.id/index.php/semnas/article/view/264

Hina BGJ, Picauly Intje (2021). Relationship of nutritional intake factors, history of infections and exclusive breast milk with incidence of stunting in Kupang District. Jurnal Pangan Gizi Dan Kesehatan (PAZIH). ISSN (e): 2085 - 2371. 10(2). 61-70 Oktober 2021. DOI: https://doi.org/10.51556/ejpazih.v10i2.155. s

Ministry of Health (2013). National basic health survey of Indonesia (Riset Kesehatan Dasar).

Ministry of Health (2018). National basic health survey of Indonesia (Riset Kesehatan Dasar).

Ministry of Health (2021). Regulation of the Minister of Health of the Republic of Indonesia 2 of 2020 concerning Anthropometry of Indonesian Children.

Namangboling AD, Bhisma M, Sulaeman ES (2017). Relationship of history of infectious diseases and exclusive breastfeeding with nutritional status children age 7-12 months in Kelapa Lima District, Kupang City. Jurnal Sari Pediatri. p-ISSN: 0854-7823; e-ISSN 2338-5030, 19(2). 12-17. Retrieved from: https://saripediatri.org/index.php/sari-pediatri/article/view/1208

Nurbiah Nurbiah, Kinasih LS (2019). Potential of responsive feeding and macronutrient intake on stunting incidence in muna ethnics in Batalaiworu, Southeast Sulawesi. proceedings of the national seminar on applied technology based on local wisdom. ISBN: 978-602-51407-1-6. 2(1) 497-505. Retrieved from: http://ojs.uho.ac.id/index.php/snt2bkl/article/view/9722

Stewart CP, Iannotti L, Dewey KG, Michaelsen KF, Onyango AW (2013). Contextualising complementary feeding in a broader framework for stunting prevention. Maternal and Child Nutrition journal.2(4): 27-45. doi:10.1111/mcn.12088

Subroto Trio, Novikasari Linawati, Setiawati Setiawati (2021). The Relationship of history of infectious diseases with stunting incidence in children aged 12-59 months. Jurnal Kebidanan Malahayati. 7(2) 132-137. DOI: 10.33024/jkm.v7i2.4140.

UNICEF (2020). Conceptual framework on the determinants of maternal and child nutrition. a framework for the prevention of malnutrition in all its forms. Retrieved from: https://www.unicef.org/media/113291/file/UNICEF%20 Conceptual%20 Framework.pdf

UNICEF (1998). The State of the World's Children 1998. New York: Oxford. University Press for UNICEF.

Wantina M, Sri Rahayu L, Yuliana I (2022). Diversity of food consumption as a stunting risk factor in infants age 6-24 months. Jurnal Ilmiah Mahasiswa

Keperawatan. ISSN (e): 2716-3555. 6(1). 86-96. Retrieved from: https://jim.unsyiah.ac.id/FKep/article/view/20738

Yulnefia, Sutia M (2022). The Relationship between history of infectious diseases and incidence of stunting in infants age 24-36 months in the working area of the Mining Health Center, Kampar Regency. Jambi Medical Journal Jurnal Kedokteran dan Kesehatan. 10(1) DOI: https://doi.org/10.22437/jmj.v-10i1.10410