

Determinants of Stunting among Children Aged 12-60 months in South Central Timor Regency of Indonesia: A Cross-Sectional Study

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Herliana Monika Azi Djogo¹ , Yasinta Betan¹ , Yohanes Dion¹

Abstract

Introduction: Stunting is currently one of the world's nutritional problems suffered by toddlers. This study aimed to determine the factors and incidence of stunting among children aged 12-60 months old in Indonesia.

Methods: The design was a cross-sectional approach. This research was conducted in the South Central Timor Regency from February to August 2020. The respondents of this study were as many as 286 mothers and children. The sampling technique used in this study was purposive sampling. The questionnaire was used to identify demographic factors, infectious diseases, maternal care practice factors and stunting was identified by using the anthropometric measurement by WHO age-based height index (Z score <-2 SD). Chi-square and logistic regression were used to determine the factors associated with the incidence and the dominant factors of stunting.

Results: The results showed a significant relationship between the number of children with $p=0.000$; mother's knowledge with $p=0.000$; and practice of complementary feeding with the incidence of stunting with $p=0.000$, while the main factor causing the incidence of stunting in toddlers is the number of children, which is more than two people in the family ($p=0.000$, Exp (B) = 0.137).

Conclusion: The number of children is the primary factor causing stunting in South Central Timor. Therefore, health workers should increase health promotion and education about stunting and raise family awareness in running family planning programs to meet children's needs, including nutrition and control of childbirth.

Keywords

child; growth disorders; nutritional status

INTRODUCTION

Stunting is one of the nutritional problems in the world suffered by toddlers. In 2019, 21.3% or around 144 million children under five in the world were stunted. Data show that from 144 million children under five in the world who are stunted, more than half of this

number comes from lower-middle-income countries (UNICEF/WHO/The World Bank Group Joint Child Malnutrition, 2020). Only a quarter comes from low-income countries. Indonesia is among the six countries with the highest prevalence in Southeast Asia with stunting greater than or equal 30% (UNICEF/WHO/The World Bank Group Joint

¹ Department of Nursing, Health Sciences Faculty, University Citra Bangsa, East Nusa Tenggara, Indonesia

Corresponding Author:

Herliana Monika Azi Djogo; Department of Nursing, Health Sciences Faculty, University Citra Bangsa, East Nusa Tenggara, Indonesia
Kayu Putih, Oebobo, Kupang East Nusa Tenggara, 85111, Indonesia
Email: djogoherliana@ucb.ac.id

Child Malnutrition, 2020). Based on data from Basic Health Research in 2018, the prevalence of stunting shows a decrease of 6.4% over the five years, namely 37.2% in 2013 to 30.8% in 2018 (Ministry of Health of Republic Indonesia, 2018b). However, according to the WHO, this number is still above the stunting limit, which is <20%. This case indicates that around 8.9 million Indonesian children experience non-optimal growth, or 1 out of 3 Indonesian children is stunted (Ministry of Health of Republic Indonesia, 2018a).

Stunting is influenced by multifactors, including maternal knowledge, the number of children in the family, complementary feeding and breastfeeding (WHO, 2013). A similar study found that mother's knowledge and number of children have a significant relationship with stunting in Rwanda (Nshimyiryo et al., 2019). Previous research stated that complementary feeding practices significantly correlate with stunting in Ethiopia (Wirth et al., 2016). Stunting impacts poor physical growth, risk of infection, child mortality, impaired cognitive and motor development, IQ, learning capacity and performance, and a person's productivity (Beal et al., 2019; UNICEF, 2020). Recent research results show that stunting was associated with lower cognitive development in children under five (Alam et al., 2020). Similar research was also carried out in rural Bangladesh, which shows that stunted children are more likely to have delayed puberty than children of the same age who are not stunted (Svefors et al., 2020).

The government has various efforts to handle and prevent stunting in the 2019-2024 national mid-term development plans (RPJM) involving cross-sectoral involvement. Nutrition-Specific and Nutrition-Sensitive Interventions are expected to reduce the incidence of stunting in Indonesia (Indonesian Ministry of Health, 2018).

East Nusa Tenggara province has several regencies still classified as rural areas. It also contributed to increasing the incidence of stunting by around 42.6% in 2018. Although the number decreased by 9.1% from 2013 to 2018, this number is still high (Ministry of Health of Republic Indonesia, 2018a). Based on the latest data by the East Nusa Tenggara Provincial Health Office, stunting still occurs in all regencies/cities in East Nusa Tenggara. South Central Timor is a regency with the highest

incidence of stunting at 56.0% (Ministry of Health of Republic Indonesia, 2018b). It is also a regency with the category of disadvantaged areas in Indonesia based on the criteria of the community's economy, human resources, facilities and infrastructure, regional financial capacity, accessibility, and characteristics based on Presidential Regulation number 63 of 2020 (Indonesian Ministry of Home Affairs, 2020). When linked to the WHO framework on stunting, the high incidence of stunting needs to be assessed and addressed from various factors, including household and family, insufficient feeding, exclusive breastfeeding, infections, handwashing practice, and social factors. Related studies have been carried out, but mainly outside East Nusa Tenggara, and research is still rare in South Central Timor, which is an underdeveloped regency in Indonesia and has the highest incidence of stunting both on a local and national scale (Beal et al., 2018; Sukardin et al., 2014;). This study aimed to determine the main stunting factor in the South Central Timor Regency.

MATERIALS AND METHODS

Study Design

A cross-sectional study was conducted from February to August 2020 in the South Central Timor Regency, East Nusa Tenggara Province of Indonesia.

Population, Samples, and Sampling

The study population consisted of mothers and children aged 12-60 months. The total population was 1,000 from five out of ten villages in the rural area in the South Central Timor Regency. The total number of respondents using Slovin's formula was 286 mothers and children who met the criteria with a significance level of 0.05 and a non-response rate of 10%. Cluster random sampling was applied to select the villages, while the sample was selected using the purposive sampling technique. This study took place in the Public Health Center. The inclusion criteria in this study were 1) mother with children aged 12-60 months, 2) children who have complete growth chart report. In comparison, the exclusion criterion was

children who had a congenital disease. Children with the congenital disease will experience growth problems, which will impact the result of anthropometric measurement.

Instruments

Data were collected by using a questionnaire and anthropometric measurements (height and weight) according to WHO standards. The questionnaire consists of demographic factors: 1) the age of the married mother was divided into less or equal to 20 years and more than 20 years (Beal et al., 2019). Mother's education was divided into basic, middle and higher education based on Indonesian Management of National Education (Indonesia Ministry of Education and Culture, 2016). The number of children was divided into less than or equal to two children and more than two children. The gender of children was categorized into male and female (National Population and Family Planning Board (BKKBN), Statistics Indonesia (BPS), Ministry of Health (Kemenkes), and ICF, 2018).

The questionnaire of mother's knowledge about stunting was developed by the researcher with the categories poor (< 60 %) and good knowledge (60-100%). The Cronbach's alpha score was 0.912. The practice complementary feeding questionnaire was adopted from the Department of Health of Indonesia (2018). The category was divided into complete provision if the child receives complementary foods according to time and frequency and partial complementary feeding if the child has lost at least one or more times and frequency of complementary feeding. The Cronbach's alpha score was 0.712. Children immunization status was divided into the categories complete, if the child has received all the proper immunizations according to the schedule, and incomplete, if the child has missed one or more immunization schedules (National Population and Family Planning Board (BKKBN), Statistics Indonesia (BPS), Ministry of Health (Kemenkes), and ICF, 2018).

Hand washing practice is an activity for mothers and children to clean their hands using soap and water at critical times such as before eating, before preparing food, after defecating and after children playing. The handwashing practice questionnaire was adopted and modified by the researcher with the categories

not appropriate and appropriate (Datta et al., 2011). The Cronbach's alpha score was 0.908

The infectious disease includes the presence of diarrhea, cough, malaria, and flu in the previous three weeks before the interview. The questionnaire of infectious diseases was adopted from Beal et al. (2019).

The incidence of stunting, which is the presence or absence of stunting among children under five in South Central Timor, was divided into Yes if the height according to the z-score age was below -2 SD, and No if the z score was between -2 SD and + 2 SD. The anthropometric data for height and weight are continuous data to count the children's Z score. The height and weight of children were assessed using WHO Anthro software version 3.2.2. (WHO, 2011).

Procedure

When the primary health centre head approved the study, the researcher visited the integrated healthcare center to collect data by directing interviewed mothers about demographic factors, maternal care practice, and infectious diseases. This procedure was followed by anthropometric measurement. Children's height was measured in a standing position without shoes to the nearest 0.1 cm using a portable stadiometer. The weight of children was measured to the nearest 0.1 kg using an electronic scale. The WHO AnthroPlus software version 3.2.2 was used to calculate height-for-age z scores. According to WHO criteria, a z score of less than -2 SD for height for the age indicates stunting. The result was collected and used for statistical correlation when each respondent had done the questionnaire and the anthropometric measure.

Data Analysis

Descriptive statistics were used to describe the characteristics of respondents. Chi-square test was used to determine the relationship of each factor with stunting, and logistic regression analysis was applied to examine the predictor factors affecting stunting using SPSS version 22.0.

Ethical Considerations

The approval was given by the Ethical Review Board of Citra Bangsa University (ERB No.005/2020). The mothers willing to participate in this study were given informed consent.

RESULTS

Table I shows that most of the mothers, 85.7%, were married at ≥ 20 years of age. Most mothers have a middle education background, namely 80.4%, while only 9.1% have a basic education background. Based on employment status, 81.5% of mothers are unemployed or just regular housewives. Most families (50.7%) have more than two children, and most of the children under five are female, namely 51%, and 49% were male. The majority of mothers (91.6%) have good knowledge regarding the nutritional needs of children under five. It also

indicates that 52.4% of mothers have incomplete complementary food to give. The majority of children under five (83.9%) immunization statuses are complete, although there are still 16.1% who have incomplete immunization. Most children under five (74.1%) suffer from malaria, diarrhea, and ARI (Acute Respiratory Infection). Meanwhile, 73.1% of mothers and toddlers' handwashing practices are appropriate. The nutritional status of children under five shows that 25.5% of children under five are stunted, and 74.5% of children under five are not stunted.

The chi-square test shows a significant relationship between a mother's knowledge and the incidence of stunting (p -value = 0.000). Mothers with poor knowledge are at risk of having a stunted child. There is a relationship between the number of children in the family and stunting incidence (p -value = 0.000).

Table I. Characteristics of respondents based on demographic data, knowledge, complementary feeding, immunization status, infectious diseases, hand washing practice, and incidence of stunting (n = 286)

Characteristic	N	%
The mother's age at marriage		
<20 years	41	14.3
≥ 20 years	245	85.7
Level of education		
Basic education	26	9.1
Middle education	230	80.4
Higher education	30	10.5
Employment		
Employed	53	18.5
Unemployed	233	81.5
Number of children		
≤ 2	141	49.3
> 2	145	50.7
The gender of the toddler		
Male	140	49.0
Female	146	51.0
Mother's knowledge		
Good	262	91.6
Poor	24	8.4
Complementary feeding (MPASI)		
Incomplete	150	52.4
Complete	136	47.6
Immunization status		
Incomplete	46	16.1
Complete	240	83.9
Infectious diseases		
Healthy	74	25.9
Sick	212	74.1
Hand washing practice		
Inappropriate	77	26.9
Appropriate	209	73.1
Stunting incidence		
No	213	74.5
Yes	73	25.5

Table 2. Bivariate analysis of determinants of stunting among children aged 12-60 months in South Central Timor Regency (n = 286)

Variable	Stunting				P
	Yes		No		
	n	%	n	%	
Mother's knowledge					
Good	24	100	0	0	0.000
Poor	49	18.7	213	81.3	
Mother's age at marriage					
<20 years	8	19.5	33	80.5	0.447
≥ 20 years	65	26.5	180	73.5	
Number of children					
≤2	55	39.0	86	61.0	0.000
> 2	18	12.4	127	87.6	
Complementary feeding					
Incomplete	18	12.0	132	88.0	0.000
Complete	55	40.4	81	59.6	
Immunization status					
Incomplete	66	27.5	174	72.5	0.117
Complete	7	15.2	39	84.8	
Infectious diseases					
Sick	49	23.1	163	76.9	0.153
Healthy	24	32.4	50	67.6	
Hand washing practice					
Poor	20	26.0	57	74.0	1.000
Good	53	25.4	156	74.6	

Table 3. Multivariate analysis of determinant of stunting among children aged 12-60 months in South Central Timor (n=286)

No	Variable	Nilai B	S.E	Wald	p	Exp (β)	95% CI
Method= Enter							
1.	Mother's knowledge	22.511	7.524	0.000	0.998	5.978	0.000-
2.	Mother's age at marriage	0.645	0.532	1.470	0.225	1.906	0.672-5.410
3.	Number of children	-1.985	0.411	23.357	0.000	0.137	0.061-0.307
4.	Complementary feeding	0.938	0.503	3.479	0.062	2.554	0.953-6.843
5.	Immunization status	-0.273	0.542	0.254	0.615	0.761	0.263-2.202
6.	Infectious diseases	0.385	0.404	0.906	0.341	1.469	0.665-3.244
7.	Hand washing practice	-0.063	0.435	0.021	0.885	0.939	0.401-2.201

Mothers who have more than two children are at risk of having stunted children. There is a significant relationship between complementary feeding and the incidence of stunting (p -value= 0.000), where mothers who provide incomplete complementary foods are at risk of their children stunting, as you can see at table 2.

The model has the value of Nagelkerke's R Square of 0.543. This means that the mother's age at marriage, the number of children, the mother's knowledge, complementary feeding, immunization status, infectious diseases, and handwashing practice affect the incidence of stunting among children under five in South Central Timor Regency (54%). The Hosmer and Lemeshow test

showed the chi-square value of 6.43 with a significance of 0.49,> 0.05. It can be concluded that the model is acceptable.

The dominant factor affecting the incidence of stunting in children under five in the South Central Timor Regency is the number of children with a p -value of 0.000 and an Exp value (B) of 0.137. This means that mothers with less or equal to two children have a lower chance of experiencing stunting by 0.137 times than families with more than two children.

DISCUSSIONS

Incidence of stunting in children in the South Central Timor Regency

Stunting in the first two years of life is critical; the duration between pregnancies to 24 months is vital for nutritional intervention to reduce the adverse effect on child survival, health, and development (Bégin, 2016; UNICEF, 2017). This study found that stunting in this area is still at an upward trend in children 12 to 60 months old, which is in line with the 2018 Basic Research & Human Health report. This situation remarked enormous challenges for both local and national government.

Stunting incidence in this study can be explained by the fact that the children almost have non-exclusive breastfeeding and local cultural practices that are too early to provide complementary foods (nDjogo, Betan, & Dio, 2020). A similar study in Bangladesh showed that children aged 12 to 24 months old were more stunted because they only had five months of breastfeeding (Chowdhury et al., 2020). Although the researcher can identify the incidence of stunting, the limitation of this study is the sample size, geographic location barrier, and Covid-19 pandemic which meant only a few mothers and children visited public health centers.

The relationship between the mothers' age and the incidence of stunting

In this study, the mother's age has significant stunting incidents. Previous research conducted in Ethiopia described that pregnant women in their adolescence were not related to the linear growth of their children (Workicho et al., 2019). On the contrary, the previous result showed a strong relationship between the age of mothers and the incidence of stunting in which women aged less than or equal to twenty years have more chances to have a stunted child than those aged over 30 years (Beal et al., 2018, 2019). This finding can be summarized as; firstly, the nutritional status of children is more influenced by the nutritional component consumed. Therefore, the more balanced the nutrition provided to children, the better the nutritional status. Secondly, most of the mothers in this study were in the age group of 20-35. Mothers in this age group are more experienced in caring for children and providing adequate nutrition to their children. The age of the mothers in this study is not directly related to the incidence of

stunting. Previous research found that inadequate nutritional intake during childhood is recognized as a contributing factor to growth failure. A similar study in Madura Island, Indonesia, showed that nutrition supplement consumption that contains macro and micronutrients during six months reduced stunting incidence (Muslihah, 2016).

The relationship between mother's knowledge and the incidence of stunting

This study found that mothers' knowledge influenced the incidence of stunting. Most mothers with stunted children had poor knowledge about nutrition and feeding practices, including breast milk for children under five. One of the causes of stunting is insufficient knowledge of mothers, while mothers are the primary caregivers for the children. This research is in line with the study conducted in Nigeria, where the limited knowledge of mothers about food choices, feeding, and healthcare practice contributes considerably to the consequences of under-nutrition in children under five in most developing countries (Fadare et al., 2019).

Mothers in Indonesia are generally the primary caregivers for their children. The behavior reflects mothers' knowledge that supports child growth and development are increased public health center visits to get an immunization, measurement of nutritional status, health education and provision of vitamin A (Hallet et al., 2018). Previous studies also show that mothers with poor nutritional knowledge tended to have children with poor nutritional status. Knowing good nutrition will help mothers provide better and nutritious food to their children (Sukardin et al., 2014).

However, the knowledge factor was not a predictor of stunting when combined with other factors in this study. The possible causes of this result are: 1) knowledge cannot directly influence changes in a mother's behavior in providing nutritious food to children to prevent stunting. 2) Health workers have often provided health education about stunting and how to prevent it to the respondents, but the incidence of stunting continues to occur in this area.

The relationship between the number of children in the family and the incidence of stunting

The dominant factor affecting the incidence of stunting in children under five in the South-Central Timor Regency is the number of children. In this study, most families with children under five are stunted in families with more than two children. This is influenced by the role and duty of caring for family members, which the mother mostly does. Mothers who have fewer than or equal to two children will pay more attention to the nutritional needs of children compared to mothers with more than two children. The increasing number of children is closely related to the proportion of food given in quality and quantity. This study is in line with research conducted in Nigeria. Families with more than three family members (consisting of a father, mother, and two children) are associated with stunting (Ajao et al., 2010).

The relationship between complementary feeding practice and the incidence of stunting

This study found complementary feeding practice influenced the incidence of stunting. This is in line with previous research, which shows that households that do not provide food according to age, including non-diverse foods, and inappropriate frequency were associated with an increased incidence of stunting at 6-23 months of age (Beal et al., 2018). A recent study also supports this study, which stated that households without age-appropriate feeding (minimum diet, not varied, and less frequency) are associated with an increased probability of stunting in children 0-23 months (Torlesse et al., 2016). This is consistent with the research conducted in Madura, Indonesia, which stated a significant relationship between maternal parenting attitude and the incidence of stunting. The attitude of the mothers who are lacking in good child feeding practices will have an impact on the child's growth in the long term. The mother's attitude toward childcare will affect the child's health status. A good mother's attitude will be followed by the incidence of stunting being decreased (Yunitasari et al., 2021). Giving additional food that is not

suitable for the child's needs and premature provision of complementary food can cause stunting. Local people have a habit of providing local food named "bose", a mixture of corn and beans consumed almost every day. Some people believe that fussy children are also caused by insufficient food intake, so children get an early introduction to this local food.

The relationship between immunization status, infectious diseases, and handwashing practice with the incidence of stunting

There is no significant relationship between immunity status and infectious diseases with the incidence of stunting. This is not in line with research conducted in Papua New Guinea, where there is a significant relationship between the incomplete immunization status of children and the incidence of stunting. This is also supported by research that shows an association between the incidence of fever and insufficient vaccines or not vaccinated associated with the incidence of stunting (Semba et al., 2011). Some of the diseases related to stunting are malaria, diarrhea, intestinal worms, and respiratory infections (Wirth et al., 2017). Hand washing practice was not associated with stunting. This study was inversely proportional to previous studies conducted in India, where there was a significant relationship between hand hygiene and the incidence of stunting (Saxton et al., 2016).

CONCLUSION

The finding provided helpful information for nurses to initiate the effective health promotion and prevention of children's nutritional status in the community. The causes of stunting are multidimensional. Nurses and health workers have to identify and prevent factors that can cause stunting in children under five by increasing education about stunting, home visit and raising family awareness in running family planning programs to meet children's needs, including nutrition and control of childbirth.

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Conflict of Interest

The authors declare that there is no conflict of interest in this study.

Suggestion

Researchers suggest that nurses improve their competence in meeting spiritual needs by increasing their knowledge and skills through programmed training and guidance by hospital management. This is expected to improve the quality of care given to patients to speed up the healing process.

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