

Original Research Article

The influential factors of stunting in toddlers of Cianjur regency

Nur Amaliah Ramadhani Nur, Ikeu Ekayanti*, Cesilia Meti Dwiriani, Ali Khomsan

Department of Community Nutrition, Faculty of Human Ecology, IPB University, Dramaga, Bogor, Indonesia

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*Correspondence:

Dr. Ikeu Ekayanti,

E-mail: Ikeu.ekayanti@gmail.com

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ABSTRACT

Background: Nutritional problems had become the major problem for many developing countries such as in Indonesia. One of nutritional problems that brought high concern to date is stunting problem. Result from 2021 Indonesian nutritional status study stated the stunting prevalence of toddlers in Indonesia was 24.4%, where Cianjur regency as one example of regencies in West Java has fairly high stunting rate (33.7%).

Methods: This study is applying a cross-sectional design. The research was conducted in May-July 2022 in Cianjur regency. As subjects of this study were 24-59 months toddlers who were selected by a method of clustered sampling. The research data was collected by questionnaires and a direct measurement method. Then, data analysis was conducted by Chi-square and logistic regression analysis.

Results: The result showed the prevalence number of stunting in Warungkondang district, Cianjur regency was 40.70%, with influential factors were the birth weight ($p=0.012$), history of: cough ($p=0.050$), fever ($p=0.037$), diarrhea ($p=0.040$) during the last 3 months, the mother's knowledge level ($p=0.050$), the food diversity ($p=0.048$) and the health care pattern ($p=0.004$).

Conclusions: There are several influential factors to stunting problem such as birth weight, history of infectious diseases, the level of mother's nutritional knowledge, the food diversity and health care patterns. For the most dominant factors that influence stunting are mother's nutritional knowledge and the birth weight of the baby. It indicates the causes of stunting are not only triggered by health factors. Therefore, collaboration with various stakeholders is needed to overcome the stunting problem.

Keywords: Food diversity, History of infectious diseases, Mother's nutritional knowledge, Stunted toddlers

INTRODUCTION

Stunting remains as a major problem to developing countries such as Indonesia. The result study of 2021 Indonesian nutritional status study (Studi status Gizi Indonesia/SSGI) reported the stunting prevalence of Indonesia's toddlers was 24.4%, and Cianjur regency was one of the regencies in West Java which has a high stunting rate (33%). This prevalence still a far from target of Indonesian government stated in the 2020-2024 medium of long-term development plan (Rencana Pembangunan Jangka Panjang Menengah/RPJMN) to press down the stunting rate to 14%.¹

Toddler period is an important period in human growth and development process because 90% of human brain development starts from fetus period to five years old children where 70% of the brain development occurs before the children reaches the age of five years. This golden period requires support of special nutritional intake, appropriate stimuli and interventions.¹⁻³ Stunting in toddlers brings short and long terms negative impact. The short-term impact of stunting can lead to increased morbidity and mortality rates as well as not optimum cognitive and motor development of the children. Whereas in the long term, it will have an impact on decreasing the level of intelligence or cognitive abilities and increasing the risk of non-communicable diseases

(Penyakit Tidak Menular/PTM) in the future time.^{4,5} There are two factors causing stunting, the direct factor and the indirect factor. Direct cause such as lack of food intake and the presence of infectious diseases, while indirect causes are the availability of household food supply, restricted access to health services, lack of health and nutrition knowledge, lack of parenting health and poor eating patterns also inadequate environmental hygiene and sanitation.

COVID-19 pandemic which has lasted for ± 2 years impacted on all sectors where one of them was the food security sector. Although Cianjur regency renown as the highest rice-producing region in West Java, this regency has a low composite food security index/IFI (0.80) compared to other districts/cities in West Java province.⁶ Families' food security status cannot be separated from their nutritional status. When a family is included in the category of food insecurity then this condition will affect the family's nutritional status, and low nutritional status makes immune system decrease so the body gets susceptible to various diseases which can reduce the level of family's health status.⁷

Many government programs have been implemented to overcome stunting; however, stunting incidence still has a fairly high prevalence so far. Since there have been many studies conducted on factors influencing stunting but each study carried out in different location tends to produce different determinants, the authors decide to put these matters into a study problem. Therefore, this study aims to analyse characteristics of toddlers and his/her family, the history of infectious diseases, the food consumption diversity, the food security level and the health care patterns in toddlers who live in Cianjur regency also analyse the factors that influence stunting in toddlers of Cianjur regency.

METHODS

A cross-sectional design was applied for this study. This research took place in Cianjur regency in May-June 2022 to 24-59 months toddlers as the subject of the study with respondents of the study were their mothers who live in Cianjur regency. Amount of study samples were 91 toddlers. The sampling was carried out using the clustered sampling method with the inclusion criteria that the respondents were mothers of toddlers aged 24-59 months in Cianjur regency and were willing to take part in this study, while the exclusion criteria in this study were that the respondents were not at the research site at the time of the study, toddlers who were sick and toddlers who had abnormalities or birth defects.

The qualitative data was used as data type of this research, where the food diversity data collected by questionnaire of individual dietary diversity score (IDDS) and by food security indicators in term of food insecurity level that measured by questionnaire of food insecurity experience scale (FIES).^{8,9} For the anthropometric data

were obtained by direct measure to subject's weight and height by a digital scale and a microtoise. Data process for this study aided by Indonesian food ingredients composition Table (Tabel Komposisi Bahan Pangan Indonesia/TKPI), WHO Anthro Plus, Microsoft excel 2019 and SPSS version 23.0. The research data then put into data analysis process by employing descriptive test (crosstab), Spearman's Rank, Chi-square, and multiple logistic regression. The correlation result (bivariate) with $p < 0.25$ were further analysed through multiple logistic regression test. The study was approved by the institutional ethics committee of IPB university with registration number 78680/IT3.KEPMSM-IPB/SK/2022.

RESULTS

The characteristics of toddlers and his/her families

The subject of this research was toddlers who live in Warungkondang district of Cianjur regency. Characteristics of toddlers with his/her families are presented in Table 1.

Table 1: Subject distribution based on toddlers and his/her families characteristics.

Characteristics	N	Percentages (%)
Toddler characteristics		
Age of toddlers (In months)		
24-36	33	36.3
37-48	31	34.1
49-60	27	29.7
Average value $\pm$ SD	41.03 $\pm$ 9.94	
Gender		
Male	39	42.9
Female	52	57.1
Birth weight (kg)		
Low birth weight (BBLR)	50	54.9
Normal	41	45.1
Average value $\pm$ SD (kg)	2.61 $\pm$ 0.63	
Nutritional status (TB/U)		
Short	37	40.7
Normal	54	59.3
Average value $\pm$ SD (value of z TB/U)	1.76 $\pm$ -1.34	
Family characteristics		
Mother education level		
Elementary school	36	39.6
Junior high school	24	26.4
Senior high school	31	34.1
Mother's nutrition knowledge		
Poor	32	35.2
Moderate	38	41.8
Good	21	23.1

Table 1 displayed data of around one third of 24-36 months toddlers (36.3%) and about a half of study samples (57.1%) were female toddlers. This study also

found that about half of the subjects (54.9%) were born with low-birth-weight condition and more than a third of subjects (40.7%) had short nutritional status (stunting). The research also showed for mothers of toddlers, more than a third of mothers (36.6%) have education level limited only to elementary level, and almost three quarters of mothers (74.7%) do not work and almost half of them (41.8%) have moderate nutritional knowledge. Whereas for fathers of toddlers, almost half of them (40.7%) work as laborers/drivers.

The household food security

Household food security can be measured by questionnaire of FIES with the result of subject distribution data based on food security level presented in Table 2 below.

Table 2 displayed data of almost half households (48.4%) were include into no indication of food insecurity category with a food security score of 0. Result data showed the household percentage in category of no indication of food insecurity in toddler group with normal nutritional status is higher (59.3%) when compared to the stunting toddler group, meanwhile the household percentage in category of light food insecurity has a higher number (43.2%) in the stunting toddler group when compared to the normal nutritional status toddler group (33.3%). The same result was found in household of moderate food insecurity category which have a three times higher percentage of more stunting toddlers (24.3%) when compared to toddlers with normal nutritional status. As the result of Chi-square test showed there was a relationship found between the food security level as well as the stunting incidence in the toddlers ($p < 0.05$).

The healthcare pattern

The healthcare pattern is a habitual activity or way for the parents or closest member of family in taking care of the health of toddlers. Data related to health care pattern is presented in Table 3, whereas type of healthcare patterns studied in this study were related to children immunization, Posyandu/mother healthcare facility's visit, vitamin A administration to toddlers and the personal hygiene of the toddlers.

The result of this study showed almost all mothers who have toddlers immunize their children every month, however, the percentage of the mothers who took their children to fully immunized and received vitamin A capsules was higher for mothers with stunting children when compared to mother with normal nutritional status children. Yet, the differences in the result analysis were only five percents. In addition, it also can be seen the percentage related to visits to healthcare facilities (Posyandu) and the personal hygiene status for stunting children is lower when compared to toddlers who have normal nutritional status.

The history of infectious diseases

Table 4 is presented the history of infectious diseases experienced by subjects of study, such as fever, cough and diarrhea in the last three months. Apparently almost half of subjects' study suffered from fever and cough or runny nose, but the percentage of stunting subjects suffered from fever and cough was almost twice higher the percentage of normal subjects. Table 2 also showed only one-fifth of toddlers (19.8%) experienced diarrhea in the last three months, but the percentage of sufferers in stunting subjects was about five times higher than the percentage of diarrhea sufferers in normal subjects. From the Chi-square test results showed there was a relationship found between the history of infectious diseases (fever, cough and diarrhea) and the stunting incidence in toddlers ($p < 0.05$), meaning that stunted toddlers tend to experience fever, cough and diarrhea in the last 3 months compared to toddlers with normal nutritional status.

The diversity of food consumption

Research data related to diversity of toddlers' food consumption is presented in Figure 1. The results showed more than two-thirds of toddlers had consumed a variety of foods.

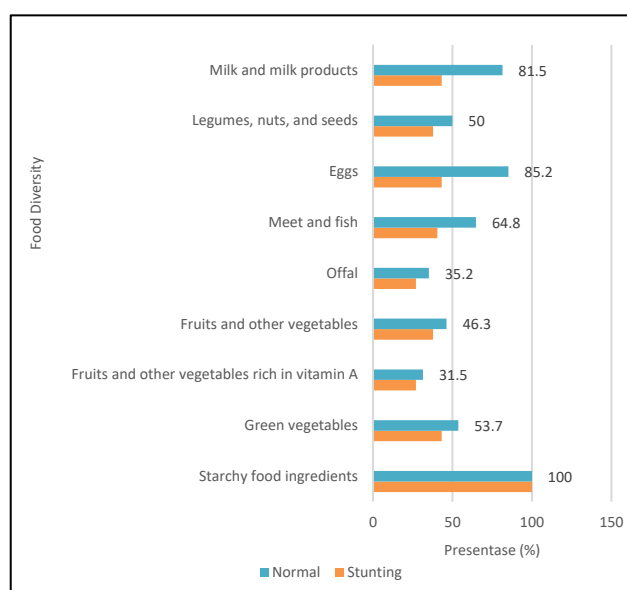


Figure 1: Food diversity of toddlers.

The result of the analysis showed toddlers with normal nutritional status consume more varieties of food often when compared to stunting toddlers. In this study, type of least consumed food was offal. The stunting toddlers have an intake of green vegetables (43.2%), fruits and vegetables sources of vitamin A (27%), other vegetables and fruits (37.8%), meat and fish (40.5%), eggs (43.2%), nuts (37.8%), and milk (43.2%) which considered as low intake when compared to toddlers with normal nutritional status. Chi-square test results showed there was a

relationship found between food consumption diversity and the stunting incidence in toddlers ($p < 0.05$).

The influential factors to stunting in toddlers

Bivariate results showed a significant relationship found between birth weight, mother's nutritional knowledge, a history of infectious diseases, food diversity, food

security and health care patterns to stunting problem. Then, the related variables were treated into further analysis by the logistics regression test. Logistic regression results (Table 5) presented the birth weight, history of infectious diseases (cough, fever, diarrhea), mother's knowledge level, the diversity of food consumption and health care patterns were factors that influencing stunting.

Table 2: Subject distribution based on household food security level.

Food security level	Nutritional status				Total		P value
	Normal		Stunting				
	N	%	N	%	N	%	
No indication of food insecurity: 0	32	59.3	12	32.4	44	48.4	0.016*
Light level of food insecurity: 1-3	18	33.3	16	43.2	34	37.4	
Moderate level of food insecurity: 4-6	4	7.4	9	24.3	13	14.3	

*Test of Chi-square, significantly correlated.

Table 3: The healthcare pattern.

Questions	Data distribution of health care pattern			
	Stunting		Normal	
	N	%	N	%
Did the mother give immunization to her children	37	100	52	96.3
A complete immunization administration	22	59.5	35	64.8
Toddler always be weighed in healthcare facility (Posyandu) every month	3	8.1	49	90.7
Did your children receive vitamin A capsule?	37	100	52	96.3
Mother has a habit to change the children's clothes with clean clothes after he/she plays outside the house	20	54.1	31	57.4
Mother has habit to wash her children's hand with soap before and after children eat	27	73.0	37	78.5
Mother checks and cuts her children nails once in a week	21	56.8	41	75.9
Mother will not allow her children to play in dirty places	18	48.6	35	64.8
Mother reminds/tells her children to wash her/his foot and brushing teeth before goes to bed	25	67.6	40	74.1
Mother brings habit to take a shower twice a day for her children	20	54.1	41	75.9
Has the mother ever given her children worm pills	19	51.4	35	64.8

Table 4: Subject distribution based on history of infectious diseases in the last three months.

Infectious diseases	Nutritional status				Total		P value
	Normal		Stunting				
	N	%	N	%	N	%	
Fever	20	37.0	24	64.9	44	48.4	0.017*
Cough	19	35.2	23	62.2	42	46.2	0.011*
Diarrhoea	4	7.4	14	37.8	18	19.8	<0.001*

*Test of Chi-square, significantly correlated.

Table 5: Influential factors to stunting in toddlers.

Variables	Category	P value	Exp (B)	OR (95% CI)	
				Lower	Upper
Birth weight	Normal	Reference			
	LBW	0.012*	8.042	1.583	40.862
Cough (Last three months)	No	Reference			
	Yes	0.050*	4.741	1.988	22.756
Fever (Last three months)	No	Reference			
	Yes	0.037*	5.820	1.116	30.337

Continued.

Variables	Category	P value	Exp (B)	OR (95% CI)	
				Lower	Upper
Diarrhoea (Last three months)	No	Reference			
	Yes	0.040*	5.136	1.821	32.109
Mother's knowledge	Good	Reference			
	Moderate	0.366	2.616	0.326	21.016
	Poor	0.050*	8.746	1.002	77.100
IDDS	Vary	Reference			
	Not vary	0.048*	4.626	1.015	21.083
Healthcare pattern	Good	Reference			
	Less	0.004*	7.619	2.094	46.040

*a significance of $p < 0.05$.

DISCUSSION

The result data showed more than half samples were female toddlers and had a history of low birth weight with percentage of stunting toddlers was 40.7%. WHO states an area is said to be experiencing serious problems when the stunting prevalence is more than 20%, moreover, this figure is still far from the government target (14%) as stated in 2020-2024 medium of long term development plan (RPJMN).¹⁰

Result of the study showed there was a relationship existed between household food security to stunting incidence in toddlers, however this result tends not to have a significant effect because Cianjur district is one of the local food producers in West Java which has support from government program to utilize vacant land, so any useful food production for meeting food necessities at local level and also can supply other cities/regencies can be increased. Previous studies have reported the level of food security were correlated with stunting incidence. These researches also align with research in Surabaya which stated there is a relationship between food security and stunting incidence. Low nutritional status causes a decrease in the immune system so the body will be susceptible to various diseases that able to reduce the health status of an individual.⁷

The influential factors of stunting

The result data showed the birth weight had a significant effect to the stunting incidence to toddlers at the age of 24-59 months ($p < 0.05$). Children with low birth weight have 8.042 higher risk of experiencing stunting compared to children with normal birth weight (OR=8,042 CI=95% 21,583-40,862). A previous research conducted in Semarang also stated that children born with low birth weight have higher risk of 11.5 times to experience stunting when compared to toddlers with normal birth weight, due to poor health of the mother during pregnancy such as having mother who has anaemia or chronic energy deficiency (CED).^{11,12} This research is also in line with research conducted in Padang Timur district of Padang city which stated that birth weight has a significant relationship to the stunting incidence in toddlers ($p < 0.05$) and children born with less weight than normal limit will experience digestive disorders as a

result of unwell functioning digestive tracts.¹³ One frequent digestive disorder experienced was the inability or lack of absorbing fat and digestive protein which causes fewer nutrient reserves inside the children's body. Eventually, it will result in stunted growth in low birth weight (LBW) toddlers. When these incidents continue, accompanied by insufficient food intake, children often experience infectious diseases, also with poor parenting will cause children to experience nutritional problems, one of which is the stunting problem. These explanations are supported by research from Vietnam that also showed a history of LBW that became a major risk factor of stunting for toddlers at the age of 24-36 months (OR=4.4, 95% CI=95% 2.08-9.10).^{14,15}

A history of infectious disease became one of the direct causes of stunting problem in toddlers. In this study, there was a history of ARI infection seen from the symptoms experienced by toddlers such as cough and fever which happened last month. According to the ministry of health (2018), toddlers declared to have ARI are toddlers who experience symptoms such as fever and cough for less than 2 weeks and runny nose or sore throat. Infectious diseases are loosely related to toddlers' growth. Growth period and infectious diseases often occur together and able to influence each other.¹⁶ Infectious diseases can and will occur due to lack of nutritional intake. Less nutritional intake will reduce the body's resistance and make the human body susceptible to any diseases. If the children is sick, then, it will cause a decrease in his/her appetite, so when it happen continuously, these will have impact on toddlers' nutritional status.^{17,18} The result of this study showed there was a significant relationship between a history of cough and fever within the last three months to stunting problem. Children who have a history of cough, fever, diarrhea in the last three months have a risk of 4,741- and 5,820-times higher risk of experiencing stunting when compared to children who do not have a history of illness (OR=4.741, 95% CI=1.988-22.756, OR=5.820, CI=1.116-30.337, OR=5.136, 95%, CI=1.821-32.109). These findings were in line with research conducted in Mulyaharja Village, South Bogor district, Bogor city that showed the toddlers who have a history of illness (fever) with a duration of more than 3 days within 3 months period have a 5.31 times higher chance to experience stunting problem when compared to toddlers who do not experience illness (fever) within the last 3

months.¹⁹ These were also supported by report from other research that reported children who have symptoms of a history of infectious diseases such as fever and cough have a greater chance of being stunted when compared to children who do not have a history of illness, which means if the children has a history of infectious diseases and he/she experience lack of appetite then, it will be followed by an increase of chance in having toddlers' stunting incidence.²⁰

Diarrhea is a condition where a child has bowel movements (BAB) more than 3 times in a day with a liquid consistency. In this study, the result related to diarrhea showed that toddlers who had diarrhea within the last 3 months had a chance of experiencing stunting problem when compared to toddlers who did not have diarrhea (OR=5.136, 95%, CI=1.821-32.109). This finding is supported by result of a study conducted in Southeast Aceh Regency that stated diarrhea was the most dominant risk factor for stunting in toddlers (OR=6.56, 95%, CI 3.33-13.01). From several result studies from United States, Brazil and Somalia have shown the same thing that reported diarrhea is a significant risk factor for stunting.²¹⁻²⁴ In addition, poor hygiene and poor sanitation practices in children will trigger bacteria growth, where usually the bacteria enter children body through food and will bring impact to the children's health, one of which become diarrhea. The children who has diarrhea will experience loss of massive body fluids and nutrient intake, and when this process lasts for a long time and not immediately treated with adequate food intake, then it can lead to failure of growth.^{25,26}

The mother's nutritional knowledge is a factor in the stunting occurrences. The result of this study indicated there was a significant relationship between the mother's nutritional knowledge to stunting occurrence ($p < 0.005$). Mothers with low nutritional knowledge score (score < 60%) have chances 8.746 times higher of having stunted children compared to mothers with good nutritional knowledge (OR=8.746, 95%, CI=1.002-77.100). The result of this study is in line with research conducted in Jambi where mothers with poor nutritional knowledge were having chances of 12.67 higher more likely to have children that about to experience stunting compared to mothers who have adequate nutritional knowledge (OR=12.67, 95%, CI=3.68-43.61). It was also supported by research in Semarang that reported the same result of a significant correlation found between the mother's knowledge and stunting occurrence ($p < 0.001$). Mothers with poor knowledge are at risk of having children experiencing stunting 5.2 times higher when compared to mothers with good nutritional knowledge.^{27,28} A good nutritional knowledge from mothers can reduce the stunting possibility in toddlers, since knowledge is the initial foundation for changing an individual's behaviour, thus, when the nutritional knowledge from the mother is included in the poor category, it brings impact on the attitude and behaviour of

the mother in meeting her children's nutritional needs. Whereas for mothers with high knowledge, she will apply positive attitudes and behaviors also provide appropriate food intake for her children. Mothers of toddlers who have good nutritional knowledge will try their best to fulfil their children's necessities. Furthermore, mothers' knowledge also related to mothers' education level. The result of studies in Myanmar and Nepal also state that mother's education level is a risk factor for stunting occurrence in toddlers.^{29,30} As in this study, the average education level of mothers was only limited to elementary school meanwhile mothers who have higher education tend to have more knowledge related to nutrition.³¹⁻³³

The individual dietary diversity score (IDDS) is a way to measure food consumption quality which calculated based on types or number of food groups consumed by toddlers on a certain day. The result of this study showed there was a significant relationship found between dietary diversity scores and stunting incidence ($p = 0.048$), and toddlers who have dietary diversity scores ≤ 4 have chance to experience stunting 4.62 times higher than the children with dietary diversity scores of more than < 4 (OR=4.626, 95%, CI=1.015-21.083). This finding is supported by similar research results from Myanmar and India which stated that children who consumed less variety of foods had a greater chance of experiencing stunting when compared to children that consumed variety of foods (OR=4.2, 95%, CI=1.94-9, 16 OR=0.17, 95% CI=0.10-0.29).^{34,35} A research conducted in Banten also reported toddlers who have low food diversity score (< 4) have bigger chance to experience stunting (OR=3.61).³⁶ In this study, toddlers were consumed less variety of foods in their daily basis, the mothers of toddlers only gave ≤ 4 types of foods in their everyday menu. The mothers only gave rice, animal or vegetable protein, and rarely given vegetables, so that the vitamin and mineral intake of toddlers was not fulfilled. This has an impact on the toddlers' nutritional status.

The health care pattern is a habitual activity or a way for parents/closest people to care for the health of toddlers. In this study, there was a relationship found between health care style and stunting incidence, toddlers with poor healthcare from the mothers had a greater chance of having stunted compared to toddlers with good healthcare style (OR=7.619, 95%, CI=1.007-54.053). Similar researches in Padang Lawas district of North Sumatra and the city of Banda Aceh also reported there was a significant relationship between health care style to children of 1-5 years old. The research in the city of Banda Aceh also stated toddlers with poor health care parenting style were 3.37 times more likely to experience stunting when compare to toddlers with good health care parenting style.^{37,38} The health care pattern presented in this study were health center (Posyandu) visit, the completeness of immunization, and toddler hygiene issues. The limitation of this study is the food consumption quality questionnaire used does not describe the quantity of food because it only based on food

grouping as seen from 1×24-hour recall, so it cannot portray the actual consumption of the subjects.

CONCLUSION

Result of this study showed the stunting prevalence in Warungkondang District, Cianjur Regency was 40.70% and factors that influencing the stunting incidence in toddlers in Cianjur Regency are the birth weight, history of infectious diseases, mothers' nutritional knowledge, food diversity and health care patterns. The most dominant factor that influencing stunting incidence is the mothers' knowledge regarding nutrition and birth weight. These factors indicate the causes of stunting not only came from health factors. Therefore, collaboration with various stakeholders is needed to overcome the stunting problem.

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