



The Relationship of Body Weight, Exclusive Breastfeeding, MP-ASI and Energy Intake with Stunting in Toddlers

Verawaty Fitrinelda Silaban^{1*}, Lily Ratna Dewi¹, Lena Murniati Sinaga¹,
Linda Asmita¹, Lina Juwanti Ginting¹, Linawati Simanjuntak¹

¹ Faculty of Nursing and Midwifery, University of Prima Indonesia


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ABSTRACT

The incidence of stunting in toddlers is a global nutritional problem. Stunting causes delays in fine motor and gross motor development, increases morbidity and mortality rates, and increases the risk of metabolic disorders in adulthood. The aim of this study was to determine the relationship between body weight, exclusive breastfeeding, MP-ASI (weaning foods) and energy intake with stunting in toddlers aged 24-59 months. This research is descriptive analytical with a cross sectional design. The sample consisted of 92 participants selected using simple random sampling technique. Data collected with body weight measurements for birth weight, exclusive breastfeeding and MP-ASI questionnaires, energy intake calculate using daily energy requirements calculator, and stunting incidence questionnaire. Data analysis was carried out using the Chi-square test ($P < 0.05$). The results of the study explain that there is a relationship between body weight ($p = 0.000$), exclusive breastfeeding ($p = 0.003$), MP-ASI ($p = 0.004$) and energy intake ($p = 0.000$) with the incidence of stunting in toddlers aged 24–59 months. The research conclusion is that there is a relationship between body weight, exclusive breastfeeding, complementary foods and energy intake with the incidence of stunting in toddlers aged 24-59 months.

Keywords: Body weight, Exclusive breastfeeding, MP-ASI, Energy intake, Stunting, Toddlers

Corresponding Author:

Verawaty Fitrinelda Silaban

Faculty of Nursing and Midwifery, Prima University of Indonesia

Sei Agul, Medan, North Sumatera 20117, Indonesia

Email: verawatyfitrineldasilaban@unprimdn.ac.id

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I. INTRODUCTION

Stunting is one of the targets of the Sustainable Development Goals (SDGs), which is included in the second sustainable development goal, namely eliminating hunger and all forms of malnutrition by

2030. The targets set are to reduce stunting rates by 40% by 2025. According to WHO data, in 2020, the prevalence of stunting in toddlers was 22%. It proves that the WHO target of below 20% has yet to be achieved (Rianti, 2020). According to Survey results

from Indonesian Nutrition Status (SSGI) at the BKKBN National Working Meeting, the prevalence of stunting in Indonesia fell from 24.4% in 2021 to 21.6% in 2022 (Rokom, 2023).

According to the current growth reference, UNICEF states that a child experiences stunting if the height-for-age is Z score (HAZ) < -2 SD. WHO defines stunting as a growth disorder that describes not achieving growth potential due to health and nutritional status not being optimal. Because the cause of stunting is nutrition or health problems, i.e., infectious and non-infectious diseases that cause energy and nutrient requirements essential for insufficient growth, measurable linear growth with body length (PB) or height (TB) will be less than normal (Prawirahartono, 2021).

Stunting causes delays in fine motor development and gross motor skills, increased morbidity and mortality, and increased risk of metabolic disorders in adulthood. At a global level, WHO estimates that as many as 22.0% or 149.2 million children under five experienced stunting in 2020. More than half of the total are in Asia (53%). In Indonesia, the stunting rate is already showing improvement. In 2021, the Indonesian Nutrition Status Survey (SSGI) reported that the stunting rate fell to 24.4%.

However, Indonesia still requires substantial efforts to accelerate the reduction in the prevalence of stunting to 14% in 2024 (Putri, 2023). 2020 UN statistics record that there are more than 149 million (22%) children under five worldwide experiencing stunting of which 6.3 million are stunted young children or toddlers Indonesian toddlers. According to UNICEF, stunting is caused by malnutrition in two children years old, the mother lacking nutrition during pregnancy, and poor sanitation (PAUDPEDIA, 2023). In 2017, more than half of the children under five who were stunted in the world came from Asia (55%), while more than a third (39%) lived in Africa. Of 83.6 million children under five are stunted in Asia, the most significant proportion from South Asia (58.7%), and the lowest proportion is in Central Asia (0.9%) (Helmyati et al., 2020).

Stunting is a major threat to Indonesia's human quality and the nation's competitive ability due to being stunted. It only impaired physical growth (short stature/stunt) but also disrupted brain development, which, of course, will significantly impact achievement in school, as well as productivity and creativity at age productive (Simanjuntak et al., 2023).

The stunting problem is becoming increasingly worrying, so the government

of Indonesia, especially the president, issued Presidential Regulation Number 72 of 2021 regarding the acceleration of stunting reduction. The existence of this Presidential Regulation expected all components to converge and integrate to achieve acceleration, reducing stunting to 14% in 2024, according to the target government. In order to accelerate the reduction of stunting, it must be implemented can be useful and targeted to all corners of Indonesia (Aryastami,2017)

Several factors that influence the incidence of stunting include factors parental characteristics such as education, employment, income, parenting, eating patterns, genetic factors, infectious diseases, low birth weight, lack of energy and protein, frequent chronic illnesses, and inappropriate feeding practices in accordance. Stunting experienced by children can also be caused by not being exposed to periods. The first 1000 days of life (golden period) receive special attention because it determines a person's level of physical growth, intelligence, and productivity in the future (Wahyu et al., 2022).

Research conducted by Khoiriyah et al (2019) regarding factors related to the incidence of stunting in toddlers aged 24-59 months in Bantargadung Village Sukabumi Regency in 2019 obtained

results that showed stunting amounted to 38.6%. There was a significant relationship between energy intake (p 0.001), breast milk three exclusive (p 0.001), MP-ASI (p 0.039), hygiene and sanitation practices (p 0.017), and family economic status (p 0.027) with the incidence of stunting in toddlers (Khoiriyah et al.,2021) Actions to prevent stunting are certainly wiser to be implemented by everyone environment, especially those containing toddlers and young couples the possibility of stunting, rather than having to take action to treat it. This research aims to determine the relationship between body weight, exclusive breastfeeding, MP-ASI, and energy intake with stunting in toddlers aged 24–59 months.

2. METHODS

This was a descriptive analytical with a cross sectional design. The study was conducted in Attaya Ujung Tanjung Rokan Hilir Hospital, Indonesia. The sample consisted of 92 respondents selected using simple random sampling technique from 120 toddlers aged 24–59 months. Participants who met the inclusion and exclusion criteria were recruited into the study. Data collected with body weight measurements for birth weight, exclusive breastfeeding and MP-ASI questionnaires, energy intake calculate

using daily energy requirements calculator, and stunting incidence questionnaire. Data analysis using the Chi-square test with significance level $\alpha = 0.05$.

3. RESULTS

The research results are presented in the table below:

Table 1. Frequency distribution of Body Weight, Exclusive Breastfeeding, MP-ASI, and Intake Energy (n=92)

Variable	n	Percentage (%)
Weight		
Normal	55	59,8
Abnormal	37	40,2
Exclusive Breastfeeding		
Given	28	30,4
Not Given	64	69,6
MP-ASI (Weaning food)		
Appropriate	69	75
Not Exactly	23	25
Energy Intake		
Enough	64	69,6
Not Enough	28	30,4

Table 1 explains that based on body weight levels, the majority of toddlers' weight was normal, 55 people (59.8%), and the minority was abnormal, as many as 37 people (40.2%). Based on exclusive breastfeeding, the majority of respondents, 64 people (69.6%), were not given exclusive breastfeeding, and a minority were given it as many as 28 people (30.4%).

Based on giving MP-ASI, the majority of respondents, 69 people (75%), got MP-ASI correctly, and 23 people got incorrect MP-ASI people (25%). Based on energy intake, the majority of respondents have energy intake 64 people were sufficient (69.6%), and 28 people were inadequate minorities (30.4%).

Table 2. Frequency Distribution of Stunting Events in Toddlers Aged 24-59 Months (n=92)

Stunting	n	Percentage (%)
Stunting	33	35,9
Not Stunting	59	64,1

Table 2 explains that the majority of respondents do not experience stunting as

many as 59 people (64.1%) and 33 minorities experienced stunting (35.9%).

Table 3. Relationship between body weight and incidence of stunting in toddlers aged 24–59 months

Body Weight	Stunting Incident				Total		p-value
	Stunting		Not Stunted		n	%	
	n	%	n	%			
Normal	20	36,4	35	63,6	55	100	0,000
Abnormal	30	81,0	7	19,0	37	100	

Based on the table 3, it can be concluded that of the 55 respondents with 55 people had normal weight, the majority did not experience stunting as many as 35 people (63.6%) and minorities experienced stunting as many as 20 children (36.4%) while for respondents whose weight was not normal, the majority experienced no 30

people (81%) were stunted, and 7 people (19%) did not experience stunting. The analysis using chi-square obtained P-value = 0.000 so that P-value α (0.000<math><0.05</math>), so it can be concluded that there is a relationship between body weight and incidence of stunting in toddlers aged 24–59 months.

Table 4. Relationship between exclusive breastfeeding and the incidence of stunting in toddlers aged 24–59 months

Exclusive breastfeeding	Stunting Incident				Total		p-value
	Stunting		Not Stunted		n	%	
	n	%	n	%			
Given	5	17,9	23	82,1	28	100	0,003
Not Given	28	43,4	36	56,6	64	100	

Based on the table 4, it can be concluded that of the 28 respondents given exclusive breastfeeding, the majority were not stunted as many as 23 people (82.1%) and the minority 5 children (17.9%) experienced stunting, while respondents who did not give exclusive breastfeeding, the majority of toddlers experienced

stunting, 36 people (56.6%) and 28 people (43.4%) of the minority have non-stunted toddlers. Analysis results using chi-square, we get P-value = 0.001 so P-value α (0.000<math><0.05</math>), so it can be concluded that there is a relationship between exclusive breastfeeding and the incidence of stunting in Toddlers Aged 24–59 Months.

Table 5. Relationship between MP-ASI and the incidence of stunting in toddlers aged 24-59 months

MP-ASI	Stunting Incident				Total		p-value
	Stunting		Not Stunted		n	%	
	n	%	n	%			
Appropriate	10	14,5	59	85,5	69	100	0,004
Not Exactly	23	100	0	0	23	100	

Based on the table 5, it can be concluded that of the 69 respondents giving MP-ASI, the majority did not experience stunting as many as 59 people (85.5%) and minorities were not stunted as many as 10 people (14.5%), while 23 respondents with inappropriate MP-ASI

experienced stunting people (100%). The results of the analysis using chi-square obtained P-value = 0.004, so P-value α (0.000<math><0.05</math>), so it can be concluded that there is a relationship between MP-ASI and Risk of stunting in toddlers aged 24–59 months.

Table 6. The relationship between energy intake and the incidence of stunting in toddlers aged 24-59 Month

Energy Intake	Stunting Incident				Total		p-value
	Stunting		Not Stunted		n	%	
	n	%	n	%			
Enough	5	17,9	23	82,1	64	100	0,000
Not Enough	28	43,4	36	56,6	28	100	

Based on the table 6, it can be concluded that of the 64 respondents, their energy intake is sufficient, the majority are not stunted, 23 people (82.1%) and 5 children (17.9%) experienced stunting, while respondents who did not enough, the majority of toddlers experience stunting, 36 people (56.6%) and a minority have 28 children (43.4%) were not stunted. Analysis results using chi-square obtained P-value = 0.000 so that P-value α (0.000<math><0.05</math>) then it can be concluded that there is a relationship between energy

intake and the incidence of stunting in toddlers aged 24–59 months.

4. DISCUSSIONS

The relationship between body weight and the incidence of stunting in toddlers aged 24–59 months

The results of the study explained that of the 55 respondents with body weight, 55 people are normal, the majority do not experience stunting, 35 people (63.6%), and minorities experienced stunting as many as 20 children (36.4%), whereas of respondents whose body

weight was not normal, the majority did not experience stunting 30 people (81%) and 7 people (19%) did not experience stunting. Results analysis using chi-square shows a relationship between body weight and the incidence of stunting in toddlers aged 24–59 months with a p-value of 0.000.

In contrast with Rahmadi's (2019) research on the relationship between birth weight and birth length with the incidence of stunting in children aged 12-59 month in Lampung Province, which found that there was no relationship between birth weight and the incidence of stunting in children aged 12-59 months in the Province Lampung in 2015 and there is a relationship between birth length and incidence stunting in children aged 12-59 months in Lampung Province (Rahmadi Antun, 2019) Birth weight is one of the factors that influence nutritional status toddler. Babies who have low birth weight are at 1.74 times higher risk for experiencing stunting compared to babies born with normal weight. Based on this data, it is also known that male toddlers are at 1.27 times higher risk of experiencing stunting compared to female toddlers. Christian et al state that LBW babies have a 2.5 - 3.5 times higher risk of experiencing wasting, stunting, and being underweight (Helmyati et al., 2020).

According to researchers' assumptions, seeing how serious the

consequences of LBW are is necessary for various efforts to pursue normal growth (catch-up growth) over time so that it does not result in stunting. Aside from that, there need to be various efforts to prevent LBW births to reduce the prevalence of LBW. The relationship between exclusive breastfeeding and the incidence of stunting in toddlers aged 24–59 months

The results of the research concluded that of the 28 respondents who were given breast milk exclusively, the majority were not stunted, as many as 23 people (82.1%), and a minority stunting was 5 children (17.9%), while respondents who were not given breast milk exclusively, the majority of toddlers experience stunting, 36 people (56.6%) and a minority have 28 children (43.4%) were not stunted. Analysis results using chi-square, obtained a p-value of 0.003 so that the P-value $< \alpha$ ($0.000 < 0.05$) then it can be concluded that there is a relationship between exclusive breastfeeding and the incidence of stunting in toddlers aged 24–59 months. Research conducted by Latifah et al (2020) on The relationship between exclusive breastfeeding and the incidence of stunting in toddlers 1-5 years old showed that the majority (87.5%), or a total of 42 respondents, give exclusive breast milk, as many as (12.5%) or 6 respondents not exclusively breastfed, as many as (2.4%) or

1 respondent those who are exclusively breastfed experience stunting and there is a significant relationship between Exclusive breastfeeding with the incidence of stunting in toddlers aged 1-5 years (Latifah et al., 2020).

The problem of stunting is determined by factors that influence it, among other direct and indirect causes. Direct factors include a lack of nutrition intake in children. One of the factors causing nutritional intake is exclusive breastfeeding. According to Aini et al (2020), which was carried out at the Gandusari Community Health Center, Blitar Regency, showed that exclusive breastfeeding affected the incidence of stunting. Studies and other cases show that there is a relationship between exclusive breastfeeding and the incidence of stunting (Neherta et al., 2023).

The incidence of stunting is influenced by the distribution of exclusive breastfeeding because breast milk contains antibodies that can improve the system the baby's immune system so that the baby does not get sick easily, such as diarrhea, when the baby is sick Fulfillment of nutrition will be disrupted, resulting in the risk of the baby experiencing malnutrition balanced and affects the baby's growth and can cause stunting.

Relationship between MP-ASI and the incidence of stunting in toddlers aged 24–59 months

Based on the research results, it was found that out of 69 respondents who gave MP-ASI, the majority did not experience stunting, as many as 59 people (85.5%). There are 10 minorities (14.5%) who are not stunted, while respondents with Inappropriate MP-ASI resulted in a total of 23 people experiencing stunting (100%). The analysis results, using chi-square, obtained a p-value of 0.004 so that the P-value $< \alpha$ (0.000 < 0.05), so it can be concluded that there is a relationship between MP-ASI and risk incidence of stunting in toddlers aged 24–59 months.

In accordance with research by Amalia et al (2022) on relationships between the practice of giving MP-ASI and the level of protein adequacy and the incidence stunting in toddlers in the working area of the Bantaran Community Health Center, Probolinggo Regency, Java Timur who got the results that toddlers did not experience stunting got it MP-ASI practices are appropriate (63.6%) and the level of protein adequacy is in the sufficient category (59.1%). There is a relationship between the practice of giving MP-ASI (p=0.002, OR 7.87) and the level of protein adequacy (p=0.005, OR 6.5) with the

incidence of stunting in toddlers (Amalia et al., 2022).

Giving MP-ASI is related to stunting rates, namely too early MP-ASI (weaning food), the frequency of giving MP-ASI is also not scheduled, and the variation of MPASI does not exceed two types, only including carbohydrates and protein in one menu for toddlers. The research results in Semarang show a significant relationship between early MP-ASI and stunting. Besides that, there is an insignificant relationship between the MP-ASI variable categories, consistency of MP-ASI, and parental income. (Sulistiani et al., 2023)

The frequency and amount of giving MP-ASI to toddlers can affect the incidence of stunting because the frequency and amount of MP-ASI are not correct, causing a lack of nutrients needed by toddlers and can resulting in the emergence of infectious diseases and the process of bone growth can be disrupted.

Relationship between energy intake and the incidence of stunting in toddlers aged 24–59Month

Based on the research results, it was found that of the 64 respondents who had intake had sufficient energy, the majority were not stunted as many as 23 people (82.1%), and the minority 5 children (17.9%) experienced stunting, while

respondents who did not enough, the majority of toddlers experience stunting, 36 people (56.6%) and a minority have 28 children (43.4%) were not stunted. Analysis results using chi-square, obtained $P\text{-value} = 0.000$ so that $P\text{-value} < \alpha$ ($0.000 < 0.05$) then it can be concluded There is a relationship between energy intake and the incidence of stunting in toddlers aged 24–59Month.

The results of this research are in accordance with research conducted by Fitri et al (2020) regarding the relationship between energy intake and the incidence of stunting in toddlers aged 2-5 years at the Limapuluh Community Health Center, Pekanbaru City, which obtained the results that there was a significant relationship between energy intake and the incidence of stunting in toddlers 2-5 years at the Limapuluh Community Health Center, Pekanbaru City in 2019 where the $p\text{-value}$ was 0.001 (Fitri et al., 2020).

Energy intake or food consumption can influence a person's nutrition or nutritional status. Energy is a vital substance in life to prevent malnutrition. Even more interesting is that children have stunting. The average intake of protein meets the nutritional adequacy rate (RDA). Although The child's protein intake meets the RDA, it cannot support its growth. When the body experiences a lack of

energy, the body will use protein to meet energy needs (Imani, 2020).

According to researchers' assumptions, energy intake is appropriate, and there is a need to improve the nutritional status of toddlers. The required energy intake is not only the quantity of food intake but also the quality of nutritional intake to improve the growth and development of toddlers.

5. CONCLUSION

Based on body weight levels, it was found that the majority of toddlers' weight was normal 55 people (59.8%); The majority of respondents did not provide exclusive breastfeeding. Exclusive breastfeeding was 64 people (69.6%); Giving MP-ASI, the majority of respondents getting the right MP-ASI as many as 69 people (75%); energy intake, the majority of respondents had sufficient energy intake, 64 people (69.6%). The majority of respondents did not experience stunting, 59 people (64.1%) and 33 minorities experienced stunting (35.9%). There is a relationship between body weight ($p=0.000$), exclusive breastfeeding ($p=0.003$), MP-ASI ($p=0.004$), and Energy Intake ($p=0.000$) with Stunting in Toddlers Aged 24–59 Months.

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AUTHOR CONTRIBUTIONS

Substantial contributions to conception, data collection, and analysis: Verawaty Fitrinelda Silaban, Lilys Ratna Dewi, Lena Murniati Sinaga, Linda Asmita, Lina Juwanti Ginting, and Linawati Simanjuntak. Writing manuscript and revisions: Verawaty Fitrinelda Silaban

CONFLICT OF INTEREST

The authors declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

DATA AVAILABILITY STATEMENT

The data are not publicly available due to privacy or ethical restrictions.

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