ELECTRON

(Journal of Science and Technology)
Vol.6, No.2, May 2024, pp. 56 – 62
ISSN 2622-6618 (Online), ISSN 2623-2219 (Print)
https://journal.ahmareduc.or.id/index.php/electron

Factors affecting stunting in toddlers

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Info Article

Article History:
Received:
April 16, 2024
Revised:
May 21, 2024
Accepted:
May 31, 2024

Keywords:
Stunting, Maternal Education, Breast Milk, Low Birth Weight

Abstract

Stunting is a condition in which toddlers have a height or body length below the standard for their age. Indonesia ranks fifth globally in the number of children experiencing stunting. In Pontianak City, the stunting rate reached 31.2% in 2017, and 34 cases were recorded in the UPTD Health Center of East Pontianak District. Stunting is influenced by long-term factors such as maternal education, exclusive breastfeeding history, and low birth weight. This study aimed to identify factors associated with stunting in the UPTD Health Center work area in East Pontianak District. The research employed an analytical observational design with a case–control approach involving 68 respondents. Relationships and risk magnitude were analyzed using the Chi-Square test and Odds Ratio. The results showed no significant relationship between maternal education and stunting (p = 0.145). However, a significant relationship was found between stunting and exclusive breastfeeding history (p = 0.001), as well as low birth weight history (p = 0.006). In conclusion, low birth weight increases the risk of stunting by 11.88 times.

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INTRODUCTION

Stunting is a form of chronic malnutrition that has serious effects on a child's growth and development. Globally, approximately 162 million children under five experience stunting, and more than two million deaths among children under five are directly linked to malnutrition, particularly stunting and wasting. In Asia, the prevalence of stunting reaches 36%, with the highest rates found in South Asia (World Health Organization, 2015). Stunting is defined as impaired growth resulting from chronic nutritional deficiencies beginning in the womb, with visible signs typically appearing after the age of two. According to WHO-MGRS 2006 and the Ministry of Health, stunting is indicated by a height-for-age z-score below –2 SD to < –3 SD for the severely stunted category. During this period, children require adequate nutritional intake, as deficiencies can hinder physical and intellectual development and potentially reduce the quality of future generations (Wirjatmadi, 2012).

Nutritional problems in Indonesia occur at various stages of life, characterized by protein-energy malnutrition, micronutrient deficiencies, low birth weight, and growth impairments reflected in height-for-age indicators. These growth impairments represent the cumulative effects of macro- and micronutrient deficiencies as well as chronic or recurrent infections (Humphries, Scott, & Vermund, 2021; Kiani et al., 2022; Tummolo et al., 2023). Stunting is also categorized as a chronic nutritional problem that affects a child's quality of life, as it can reduce brain development, motor skills, intelligence, and future productivity (Mitra, 2015; Meliyasari, 2014). These long-term consequences demonstrate that stunting is not only a health issue but also a barrier to human resource development. Indonesia ranks fifth globally in the number of stunted children, with higher prevalence rates than other ASEAN countries such as Myanmar, Vietnam, and Thailand.

Data from the Nutritional Status Monitoring (PSG) indicate that the prevalence of stunting in Indonesia has fluctuated but remains high: 29.0% in 2015, 27.5% in 2016, and rising to 29.6% in 2017 (Kustanto, 2021). In West Kalimantan Province, stunting prevalence reached 34.1% in 2015, increased to 34.9% in 2016, and 36.5% in 2017. Pontianak City showed a similar trend, with rates of 30.3% in 2015 and rising to 31.2% in 2017. These high rates are influenced by various factors, including low maternal knowledge, inadequate parenting practices, poor sanitation, limited access to health services, and community perceptions that short stature is normal (Mitra, 2015). In addition, unbalanced diets, low birth weight, and a history of illness are significant contributors, along with environmental, economic, educational, and clean-water access factors.

Another important factor is infant and young child feeding practices, especially exclusive breastfeeding and timely complementary feeding. Exclusive breastfeeding for less than six months or early introduction of complementary foods increases the risk of infections such as diarrhea and respiratory illnesses, which further worsen a child's nutritional status (Rahayu, 2011). Maternal conditions during pregnancy also play a crucial role, as chronic energy deficiency and anemia can result in low birth weight infants, who are at higher risk of stunting (Meilysari, 2014). Data from the UPTD Health Center in East Pontianak District in 2018 reported 34 children categorized as severely stunted or stunted out of 274 children who visited the facility. Furthermore, exclusive breastfeeding coverage remains low, and maternal education levels vary, with many mothers having only completed basic education.

Based on this information, it is evident that there is a gap between the high prevalence of stunting and the suboptimal interventions addressing key contributing factors such as maternal education, exclusive breastfeeding, and low birth weight history. Although previous studies have identified various determinants of stunting, there is still limited research that specifically examines these three factors together in the unique social and health context of East Pontianak. The novelty of this study lies in its comprehensive analysis of these factors simultaneously within a local case-control model, providing a more detailed understanding of stunting determinants in the region. Therefore, this study aims to analyze the factors

influencing stunting among toddlers in the working area of the UPTD Health Center in East Pontianak District.

METHOD

This study employed a case–control design, which is used to identify the relationship between independent and dependent variables by observing conditions retrospectively (Dharma, 2015). This design is appropriate for assessing factors associated with stunting because it allows the comparison of exposure histories between children who are stunted and those who are not.

The population in this study included all toddlers registered at the UPTD Community Health Center in East Pontianak District. Population, as defined by Arikunto (2010), refers to the entirety of research objects, while Hidayat, (2011) describes it as a generalization area consisting of subjects with specific characteristics determined by the researcher. From this population, a sample was selected to represent the characteristics of the larger group.

The sample is a subset of the population used to obtain information and draw conclusions about the population as a whole. According to Hidayat (2011), the sample must accurately represent the population to ensure valid generalization. In this study, the case group consisted of all toddlers identified as stunted, selected using a total sampling technique. This resulted in 34 toddlers in the case group. The inclusion criteria for this group were: toddlers aged 24–59 months, registered in the cohort, having complete data, and whose parents or guardians were willing to participate.

For the control group, toddlers who were not stunted were selected. The number of controls was matched to the number of cases using a 1:1 ratio, resulting in 34 toddlers in the control group and a total sample of 68 respondents. The sampling technique used for the control group was systematic random sampling. The sampling interval was calculated as follows: (total population – number of cases) ÷ number of cases = (274 – 34) ÷ 34 = 7. Therefore, every seventh child from the list of eligible non-stunted toddlers was selected as a control.

This research was conducted from August 2 to 12, 2019, within the working area of the UPTD Puskesmas of East Pontianak District. The location was chosen because it had a high number of stunting cases and complete cohort data, enabling accurate identification of both case and control groups for the study.

RESULTS AND DISCUSSION

Table 1. Frequency of Respondent Characteristics.

Variable	Frequency (n)	Percentage
Mother's Education		
Basic	36	52.9
Secondary	26	38.2
Higher	6	8.8
Total	68	100
History of exclusive breastfeeding		
Not exclusively breastfed	32	47.1
Exclusively breastfed	36	52.9
Total	68	100
History of LBW		
LBW	10	14.7
Normal	58	85.3
Total	68	10

Based on Table 1 above, it is known that some of the respondents with basic maternal

education were 36 people (52.9%), some of the respondents with a history of non-exclusive breastfeeding were 36 people (52.9%), and very few respondents had a history of low birth weight, namely 10 people (14.7%).

Table 2. Analysis of the relationship between maternal education and stunting incidence.

Variable	Incidence of Stunting				Total		p-value	OR
	Stunting	%	No Stunting	%		%		
Basic	21	30.9	15	22.1	36	52.9	0.145	2.046
Medium-High	13	19.1	19	27.9	26	47.1		
Total	34	50.0	34	50.0	68	100		

Table 2 above shows the relationship between maternal education history and stunting. It is known that 21 respondents (30.9%) with elementary education experienced stunting and 15 respondents (22.1%) did not experience stunting. Among mothers with secondary-higher education, 13 respondents (19.1%) experienced stunting and 19 respondents (27.9%) did not experience stunting. Based on this, to test the existence of a relationship between the mother's education and the incidence of stunting, an analysis was carried out through computerization. The results of the statistical test using the Chi-Square test obtained a p-Value = 0.145, which is greater than the significance level set by the researcher, namely α = 0.05, so it can be concluded that there is no relationship between the mother's education and the incidence of stunting.

Table 3. Analysis of the relationship between exclusive breastfeeding history and stunting.

Variable	Incidence of Stunting				Total		p-value	OR
	Stunting	%	No Stunting	%		%		
ASI Exclusive	11	16.2	25	36.8	36	52.9	0.002	5.808
Not breastfed Exclusive	23	33.8	9	13.2	32	47.1		
Total	34	50.0	34	50.0	68	100		

Table 3 above shows the relationship between exclusive breastfeeding history and stunting. It is known that among those who were exclusively breastfed, 11 respondents (16.2%) experienced stunting and 25 respondents (36.8%) did not experience stunting. In the non-exclusive breastfeeding category, 23 respondents (33.8%) experienced stunting and 9 respondents (13.2%) did not experience stunting. Based on this, to test whether there was a relationship between exclusive breastfeeding history and stunting, an analysis was conducted using computerized processes. The results of the statistical test using the Chi-Square test obtained a p-Value = 0.001, which is less than the significance level set by the researcher, namely α = 0.05, so it can be concluded that there is a relationship between exclusive breastfeeding history and the incidence of stunting.

Table 4. Analysis of the relationship between LBW history and stunting.

Variable	Incidence of Stunting				Total		p-value	OR
	Stunting	%	No Stunting	%		%		
Normal ≥ 2500 g	25	36.8	33	48.5	58	85.3	0.017	11.880
LBW < 2500 g	9	13.2	1	1.5	10	14.7		
Total	34	50.0	34	50.0	68	100		

Table 4 above shows the relationship between birth weight (BBL) history and stunting. It was found that among infants with normal birth weight, 25 respondents (36.8%) experienced stunting and 33 respondents (48.5%) did not experience stunting. Among infants with low birth weight (LBW), 9 respondents (13.2%) experienced stunting and 1 respondent

(1.5%) did not experience stunting. Based on this, to test whether there is a relationship between low birth weight history and stunting, an analysis was conducted using computerization. The results of the statistical test using the Chi-Square test obtained a p-Value = 0.006, which is smaller than the significance level set by the researcher, namely α = 0.05, so it can be concluded that there is a relationship between low birth weight (LBW) history and stunting.

DISCUSSION

The findings of this study indicate that maternal education was not significantly associated with the incidence of stunting in toddlers, as reflected by a p-value of 0.145 based on the Chi-Square test. This result is consistent with the study by Ni'mah, & Muniroh (2015), which similarly found no relationship between maternal education and the incidence of wasting and stunting, with p-values of 0.581 and 0.605 respectively. Maternal education did not emerge as a risk factor because mothers with low education did not always have stunted children, while mothers with higher education were not necessarily able to ensure normal nutritional status in their children. This supports the notion that education represents only one underlying factor among many interacting determinants of malnutrition, as stunting is influenced by multiple interrelated variables. Community beliefs that formal education is unimportant and limited family support for pursuing schooling may contribute to low maternal education levels. Maternal education indirectly shapes knowledge and skills related to health care, particularly nutrition, and influences employment, lifestyle, dietary practices, and access to resources. Mothers with adequate education generally demonstrate a better ability to understand, process, and apply health information, including preparing nutritious meals, maintaining food hygiene, and responding to food allergies.

Although this study found no significant relationship, contrasting evidence is presented by Ni'mah (2014), whose research at the Tanah Kali Kedinding Community Health Center in Surabaya demonstrated a significant association between maternal education and stunting, with a p-value of 0.029 and an OR of 3.378. Based on the present study's results, however, maternal education does not appear to be a determining factor of stunting. It is possible that mothers with lower educational attainment still possess adequate practical knowledge to meet their children's nutritional needs, suggesting that environmental, cultural, or behavioral factors may play a more dominant role in influencing stunting outcomes.

In terms of exclusive breastfeeding, this study revealed a significant association with stunting, supported by a p-value of 0.001 from the Chi-Square analysis. These results align with Ni'mah (2014), who reported a significant relationship between exclusive breastfeeding and stunting, with toddlers who were not exclusively breastfed being 4.643 times more likely to experience stunting (p = 0.25). Interviews with mothers showed various reasons for not exclusively breastfeeding, including low initial milk production, early introduction of formula, continued mixed feeding, and the early provision of complementary foods to reduce infant fussiness. Exclusive breastfeeding is known to provide substantial protection against infections and to support immune system development, whereas formula feeding carries risks such as diarrhea, obesity, and diabetes. The nutritional and immunological components in breast milk play a fundamental role in promoting infant health and reducing the likelihood of illnesses that contribute to malnutrition.

WHO and UNICEF have responded to these challenges through the Global Strategy for Infant and Young Child Feeding, which the Indonesian government adopted under Government Regulation No. 33 of 2012. This policy emphasizes Early Breastfeeding Initiation (EBI), exclusive breastfeeding for six months, continued breastfeeding for two years, and the provision of appropriate complementary feeding (UNICEF, 2013). Despite these efforts, achieving exclusive breastfeeding remains difficult due to early complementary

feeding, pervasive formula advertising, limited maternal knowledge, and cultural influences that discourage exclusive breastfeeding practices.

The study also demonstrated a significant relationship between low birth weight (LBW) history and stunting, with a p-value of 0.006. LBW reflects fetal growth conditions during pregnancy and increases infants' vulnerability to environmental exposures (Umboh, 2013). Many maternal factors contribute to LBW, including maternal age, parity, birth spacing, hemoglobin levels, preeclampsia, nutritional intake, occupation, education, and socioeconomic status. Fetal conditions such as distress or multiple pregnancies, and placental factors such as placenta previa or abruption, also play a role. Although some LBW infants may have normal length at birth, stunting often becomes apparent in later months and may go unnoticed by parents. Therefore, infants with LBW require close monitoring for growth faltering, and early intervention is crucial to prevent long-term complications. Toddlers with normal birth weight typically show greater resistance to infections than those with LBW (Wiwien et al., 2016), and the impacts of LBW may affect multiple organ systems, including cardiovascular, respiratory, digestive, neurological, and immune functions, increasing the risk of growth and developmental challenges.

CONCLUSION

Based on the objectives of this study, it can be concluded that maternal education is not associated with the incidence of stunting in the working area of the UPTD Puskesmas Pontianak Timur. In contrast, a history of exclusive breastfeeding shows a clear relationship with stunting, indicating that toddlers who are not exclusively breastfed are more likely to experience growth problems. The study also finds that a history of low birth weight is strongly linked to the occurrence of stunting, suggesting that infants born with inadequate weight face a higher risk of impaired growth. Overall, these findings highlight the importance of optimal breastfeeding practices and adequate fetal growth as key factors in preventing stunting in early childhood.

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