

Exclusive breastfeeding practices and stunting in Sawahlunto City, West Sumatera, Indonesia: a cross-sectional study

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ABSTRACT

Introduction: Stunting remains a significant public health concern in Indonesia, with long-term implications for children's growth and development. While exclusive breastfeeding is recognized as a key factor in promoting optimal infant health, its effectiveness in preventing stunting remains inconclusive.

Objective: This study examines the association between exclusive breastfeeding practices, maternal height, and low birth weight with stunting among children aged 6-59 months in Sawahlunto City, West Sumatra, Indonesia, using a cross-sectional approach.

Methods: This was quantitative cross-sectional involving 199 children aged 6–59 months, selected using stratified random sampling. Data were collected through anthropometric measurements, structured questionnaires, and secondary data. Height was measured using a standardized stadiometer, and stunting was defined as a height-for-age z-score < –2 SD based on WHO child growth standards. Statistical analysis was conducted using the chi-square test. The chi-square test was used for statistical analysis.

Results: The prevalence of stunting was 33.2%. A significant association was observed between stunting and maternal height ($p = 0.002$) as well as low birth weight ($p = 0.031$). However, no significant association was found between exclusive breastfeeding and stunting ($p = 0.088$).

Conclusion: Exclusive breastfeeding alone was not significantly associated with stunting in this study. The nutritional

status of children after six months depends not only on breastfeeding but also on the quality of complementary feeding. Maternal height, as a genetic factor, and early-life nutrition (including macro- and micronutrient intake) play essential roles in determining child growth outcomes.

KEYWORDS

Food Insecurity; Malnutrition; Marginal Populations; Maternal and Child Health.

INTRODUCTION

Stunting was a significant issue in global public health, especially in developing countries. Stunting conditions that are not resolved have dangerous long-term consequences because it is associated with limited brain capacity and failure to grow optimally. This condition causes decreased mental abilities and learning capacity, poor school performance in childhood, low human resource capacity, loss of productivity, and increased risk of chronic diseases related to nutrition, such as diabetes, hypertension, and obesity in adulthood^{1,2}.

Stunting is caused by a combination of factors, including poor diet, repeated infections, and insufficient psychological stimulation. Previous studies have shown that multiple determinants contribute to the prevalence of stunting both globally and in Indonesia. These include low socioeconomic status, food insecurity, preterm birth or low birth weight (LBW), lack of exclusive breastfeeding, inadequate complementary feeding, and poor environmental sanitation. The occurrence of stunting in children is also influenced by genetic variables, one of which is the relationship between the child's physical growth and the parents' height. It is more likely that children may inherit the gene and become stunted if one or both parents are short due to pathological disorders (such as hormone deficit growth) and have a gene in their chromosome that carries the trait of being short^{3–5}.

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In 2017, approximately 150.8 million children under five worldwide, or around 22.2%, experienced stunting. More than half of the stunting cases were from Asia, accounting for 55%, and about 39% were from Africa. In Southeast Asia, Indonesia is among the countries with the highest prevalence, making it an urgent public health concern⁶.

Indonesian Survey of Nutritional Status in 2021 reported that national prevalence of stunting remains high at 24.4 percent. This indicates that stunting in Indonesia continues to be a chronic public health issue, as defined by World Health Organization standards. Moreover, this rate is still far from the target set in Indonesia's National Medium-Term Development Plan, which aims to reduce stunting to 14 percent by 2024. Recent data suggest that achieving this target remains a challenge, particularly at the provincial level. Sawahlunto, a district in West Sumatra Province, has been identified as a priority area for stunting reduction efforts. With a prevalence rate of 21.1 percent, the city is striving to address various risk factors contributing to stunting among children under five^{7,8}.

This study offers a distinctive perspective to the existing body of knowledge by providing a comprehensive examination of the interplay between maternal height, low birth weight, exclusive breastfeeding, and child stunting. While previous research has recognized the significance of these factors in relation to child stunting, this study explores a localized setting, aiming to uncover the unique dynamics contributing to child stunting in this specific region.

The primary objective of this study is to examine the relationship between maternal height, low birth weight, and exclusive breastfeeding practices in relation to stunting among children aged 6–59 months in Baringin District, Sawahlunto City, Indonesia. This research contributes to identifying the key risk factors influencing stunting. In doing so, it seeks to provide valuable insights that support ongoing efforts to prevent and manage stunting, ultimately enhancing the nutritional status of children in this community.

METHODS

This is a cross-sectional study. The participants in this research were mothers who has chilrends 6 to 59 months. The sample size used was 199, selected through a stratified random sampling method from the 11 sub-districts in Baringin, Sawahlunto City, Indonesia.

Individual sampling in each district was carried out randomly and adjusted to the inclusion criteria. If a sample did not meet the criteria, randomization was repeated until the desired sample size was achieved. The study's inclusion criteria included the following: respondents' ability to communicate effectively, mothers with children aged 6–59 months, children who did not suffer from physical disabilities, possession of a Maternal and Child Health Book (Buku KIA), and attendance at the Integrated Health Service Post (Posyandu).

Table 1. Sampel Distribution

No	Sub District	Total Number of Children	Sampel
1	Guguk Bungo	86	29
2	Batang Lunto Atas	20	7
3	Batang Lunto Bawah	15	5
4	Lumindai Pasar	101	34
5	Balai Batu Sandaran	56	19
6	Koto	28	10
7	Ladang Laweh	36	12
8	Gugugbalang	66	21
9	Kolok Mudik	53	18
10	Kolok Tengah	49	16
11	Kolok Nan Tuo	82	28

Primary data collection included anthropometric measurements and structured questionnaires. Children's height or length was measured using a stadiometer or a baby length board depending on the child's age and ability to stand. Mothers' height was measured using a stadiometer. Stunting was defined as a height-for-age Z-score (HAZ) below -2 standard deviations based on WHO growth standards.

Anthropometric measurements were conducted by trained personnel following standardized procedures. Exclusive breastfeeding data were collected using a questionnaire adapted from the 2018 Basic Health Research (RISKESDAS) instrument, consisting of four questions. The questionnaire had been tested for validity and reliability, with correlation coefficients above 0.6.

A child was classified as having received exclusive breastfeeding if the mother:

- 1) reported providing colostrum,
- 2) stated that the child received only breast milk for the first 6 months,
- 3) reported no additional foods or liquids other than breast milk before 6 months (*selected the "Tidak Ada" [None] option in the questionnaire*), and
- 4) did not report a confirmed early feeding practice.

Only respondents who fulfilled all criteria were categorized as providing exclusive breastfeeding. To enhance data accuracy, responses were cross-checked with child feeding history

documented in the Maternal and Child Health Book (*Buku KIA*), when available.

Secondary data in this study was in the form of data on the birth weight history of the child recorded in the Maternal Child Health Book (*Buku KIA*) or recapitulation of data from Kolok Health Center, Baringin District. The statistical test in this study used the chi-square test with a 0,05 significance level. The study received ethical approval from the Research Ethics Committee in the Public Health Faculty of Universitas Andalas, with registration number 1/UN16.12/KEP-FKM/2023.

RESULTS

Characteristics of Respondents

The characteristics of the respondents are presented in **Table 2**. A total of 199 children aged 6–59 months partic-

ipated in the study. Among them, 60.6% were between 24–59 months old, and 54.5% were female. Most mothers were aged 36–45 years (46.7%) and had completed senior high school (48.7%).

Factors Associated with Stunting

Stunting was classified using the height-for-age z-score (HAZ), with children considered stunted if their HAZ was below -2 SD according to WHO growth standards. Based on this definition, 33.2% of the children in Baringin District, Sawahlunto City were, classified as stunted. The distribution of factors related to stunting is shown in **Table 3**. Regarding contributing factors, 9.5% of the children had low birth weight (less than 2,500 grams), 25.1% had not been exclusively breastfed, and 26.1% had mothers with short stature (<150 cm).

As presented in **Table 4**, the study found significant associations between maternal height and birth weight with stunting. Children born to mothers with short stature had a significantly higher risk of being stunted, with a p-value of 0.002 and a prevalence odds ratio (POR) of 2.991. This indicates that children of short mothers were approximately 2.9 times more likely to experience stunting compared to those whose mothers had normal height.

Similarly, low birth weight was significantly associated with stunting, with a p-value of 0.031 and a POR of 3.125, indicating that children born with low birth weight had over three times

Table 2. Sociodemographic Characteristics of Children and Mother (n=199)

Children	f	%
Sex		
Male	93	46.7
Female	106	53.3
Age		
6-24 months	91	45.7
25-59 months	108	54.3
Mother		
Age		
<26 tahun	27	13.6
26-35	76	38.2
36-45	93	46.7
>45	3	1.5
Maternal Education		
No Education	4	2
Elementary	31	15.6
Junior High school	42	21.1
Senior High school	97	48.7
Diploma	7	3.5
Bachelor's	18	9

Table 3. Distribution Exclusive Breastfeeding, Maternal Height, Birth Weight, and Stunting

Variable	f	%
Nutritional Status		
Stunted	66	33.2
Normal	133	66.8
Birth Weight		
LBW (<2500 gr)	19	9.5
Normal (≥ 2500 gr)	180	90.5
Exclusive Breastfeeding		
No	50	25.1
Yes	149	74.9
Maternal Height		
Short (<150 cm)	52	26.1
Normal (≥ 150 cm)	147	73.9

Table 4. Maternal Height, Birth Weight, And Exclusive Breastfeeding and Stunting

	Stunting		Normal		Total		P Value	POR (95% CI)
	n	%	N	%	n	%		
Maternal Height								
Short (<150 cm)	27	51.9	25	48.1	52	100	0.002	2.991 (1.552 – 5.762)
Normal (≥150 cm)	39	26.5	108	7,5	147	100		
Birth Weight								
LBW (<2500 gr)	11	57.9	8	42.1	19	100	0.031	3.125 (1.191 – 8.197)
Normal (≥2500 gr)	55	30.6	125	69.4	180	100		
Exclusive Breastfeeding								
No	22	44	28	56	50	100	0.088	
Yes	44	29.5	105	70.5	149	100		

p significant: <0,05.

the risk of stunting compared to those with normal birth weight. In contrast, no statistically significant association was found between exclusive breastfeeding and stunting ($p = 0.088$). Among the children studied, 44.0% of those who were not exclusively breastfed were classified as stunted, compared to 29.5% of those who were exclusively breastfed.

DISCUSSIONS

Stunting and Maternal Height

Maternal height is one of the factors that can influence stunting, as it is part of the internal/genetic factors affecting a child's growth and development. Genetic predisposition to short stature may affect hormonal performance, particularly growth hormones that play a crucial role in promoting bone growth and overall height⁹.

The incidence of stunting among children aged 6–59 months in this study was found to be significantly associated with maternal height. Specifically, 51.9% of children whose mothers had short stature (<150 cm) were stunted, whereas only 26.5% of children whose mothers had normal stature (≥150 cm) were stunted. These findings align with previous studies indicating that maternal height is an important determinant of child stunting. Children born to shorter mothers are more likely to be stunted, particularly those whose maternal height is less than 150 cm^{2, 10,11}. A study conducted in Bangladesh also reported that children of short mothers (145 cm) were approximately twice as likely to suffer from stunting¹².

Additionally, a global analysis across 67 low- and middle-income countries confirmed that maternal height is a significant

predictor of child stunting¹³. If one or both parents are short due to physical conditions or growth hormone deficiencies, there is a possibility that the child may inherit genes associated with short stature, thereby increasing the risk of stunting. However, if parental short stature is due to environmental factors, such as poor nutrition or recurrent infections, it is still possible for the child to attain normal height if provided with proper nutrition and healthcare. In such cases, catch-up growth may occur^{4,14,15}.

Although genetic factors can contribute to stunting, their impact can be minimized through adequate nutritional intake. Nutritional interventions for genetically predisposed children may not produce immediate results but can still have a gradual and meaningful impact on growth. Another study observed that in populations where average height has increased over time, children of short mothers still had the potential to improve their growth outcomes with sufficient nutrition. These findings emphasize the intergenerational nature of height transmission, while also underlining the influence of nutrition and socioeconomic factors (such as diet and income) in shaping adult height^{16,17}.

Nutritional intake plays a crucial role in optimizing a child's growth potential, even when genetic predispositions pose certain limitations. Previous studies have demonstrated that adequate nutrition, particularly during the early growth period, can significantly enhance the development of bones, muscles, and organs. Thus, providing children with adequate and balanced nutrition is a critical investment in their future health and growth, helping to offset potential setbacks from genetic limitations.

Stunting and Birth Weight

According to the 2018 Indonesian Basic Health Research, the national prevalence of low birth weight (LBW) was 6.2%. In comparison, the incidence of LBW in Baringin Village was relatively higher, reaching 9.5%¹⁸. This study found a significant association between LBW and stunting, with infants born with low birth weight having a 3.125-fold higher risk of becoming stunted. This finding is consistent with the results of a previous study reporting a 2.39-fold increased risk of stunting among children born with LBW¹⁹.

Similar associations have been observed in other regions. A study conducted in the Rappocini District found a significant correlation between stunting in children aged 1–3 years and a history of LBW. Likewise, research in Gorontalo City demonstrated a strong link between stunting and LBW among children aged 24–59 months. A similar relationship was also reported in Lampung, where children aged 6–59 months with a history of LBW showed a higher prevalence of stunting^{20–22}. These findings highlight the importance of addressing LBW as a critical risk factor in early childhood development.

Low birth weight (LBW) infants commonly experience functional immaturity of the digestive system, resulting in inefficient protein digestion and fat absorption. This biological limitation disrupts the buildup of vital nutritional reserves required for proper growth. When coupled with insufficient dietary intake and poor caregiving, these children face increased susceptibility to infections, heightening their risk of stunting²³. Furthermore, low birth weight reflects suboptimal maternal nutritional status during pregnancy. Maternal malnutrition is a key factor contributing to intrauterine growth restriction and should be prioritized in public health policies aimed at reducing the prevalence of stunting among children²⁴.

Stunting and Exclusive Breastfeeding

During the growth and development period of toddlers and young children, an adequate intake of high-quality and balanced nutrients is necessary. Infants who are not exclusively breastfed are at greater risk of inadequate nutrients intake, which may compromise optimal growth. Children experiencing growth disorders may eventually become stunted^{25,26}. Breast milk plays a crucial role in protecting infants from chronic illnesses and infections, while also supporting sensory and cognitive development. Moreover, exclusive breastfeeding accelerates recovery process and reduces infant mortality caused by common infectious diseases such as pneumonia and diarrhea²⁷.

In this study, there was no statistically significant association found between exclusive breastfeeding and the prevalence of stunting ($p = 0.088$). Similar findings were reported in a study conducted in Agam District, which also showed no significant relationship between stunting and

exclusive breastfeeding ($p = 0.649$; >0.05)²⁸. However, children who did not receive exclusive breastfeeding but maintained normal height were likely to have received sufficient nutritional intake appropriate to their developmental needs. Thus, even in the absence of exclusive breastfeeding, appropriate dietary practices may enable children to grow and develop well²⁹.

If the dietary intake is adequate and appropriately delivered, stunting can be prevented even in children who are not exclusively breastfed. Stunting is not solely determined by exclusive breastfeeding status; it is also influenced by the quality of complementary feeding, the timing of its introduction, and the child's overall health status^{30–32}. However, the prevalence of stunting was still higher among non-exclusively breastfed children (44.0%) compared to those who were (29.5%), suggesting a possible trend that warrants further investigation.

CONCLUSION

This study found that one-third (33.2%) of children aged 6–59 months in Baringin District, Sawahlunto City were classified as stunted, with their height-for-age z-scores falling below -2 SD based on WHO growth standards. Key contributing factors to stunting included maternal short stature and low birth weight. Mothers with short stature (<150 cm) accounted for 26.1% of the sample, and more than half of them (51.9%) had stunted children. Furthermore, 40.9% of all stunted children were born to short mothers, indicating a strong association between maternal height and child growth outcomes. In addition, 57.9% of children with a history of low birth weight ($<2,500$ grams) were also stunted, suggesting that intrauterine growth conditions may have long-term consequences on linear growth. Although a quarter of children (25.1%) did not receive exclusive breastfeeding, no statistically significant association was found between exclusive breastfeeding and stunting ($p = 0.088$). These findings emphasize the importance of improving maternal nutrition and health before and during pregnancy to reduce the risk of short maternal stature and low birth weight, both of which are significantly associated with childhood stunting.

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