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# Exclusive Breastfeeding History Risk Factor Associated with Stunting of Children Aged 12–23 Months

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## Abstract

Stunting (low height-for-age) remains a global and national health problem because it increases the risk of disturbances in growth and development and mortality. Banjar Margo District, Tulang Bawang Regency, has the second-highest prevalence in Lampung Province, Indonesia. This study aimed to analyze the association of exclusive breastfeeding history and stunting in children aged 12–23 months in Banjar Margo District. This study used a cross-sectional design on 193 children aged 12–23 months. It was primary data conducted between April and May 2018 with a questionnaire. Data analysis was performed using the chi-square test and multiple logistic regression. The result showed that of 193 children, 29.5% were stunted. Children who were not exclusively breastfed were 3.1 times (95% CI = 1.5–6.4) more at risk of stunting than those exclusively breastfed, after controlling for mothers with low education and unemployment factors as confounding variables. Health promotion activities in primary/integrated health care should be focused not only on mothers but also on other people involved in child care, such as grandparents, at-home caregivers, and daycares.

**Keywords:** children aged 12–23 months, exclusive breastfeeding, stunting

## Introduction

Stunting is a nutritional status based on the body length-for-age/height-for-age World Health Organization (WHO) Child Growth Standards, where the Z-score value should be less than –2 standard deviations (SD) from the mean.<sup>1</sup> Stunting is a chronic condition on a child's poor linear growth, accumulating the impact of various factors, such as low nutrition and health before and after a child's birth.<sup>2</sup> In 2006, the World Bank stated that stunting is considered chronic malnutrition that occurs in the womb. During the first two years of a child's life, it could lead to lower intelligence and decreased physical capacity, which results in productivity decrease, economic growth slowdown, and prolonged poverty. Stunting could also impact a weak immune system and chronic disease vulnerability such as diabetes mellitus, heart disease, cancer, and maternal reproductive disorders in adulthood.<sup>2,3</sup> Other effects of stunting were related to hypertension, morbidity, and mortality. Stunting occurs in the first two years of life, with increased blood pressure at 7–8 years.<sup>4</sup>

The worldwide prevalence of stunting in children un-

der five years of age was 22.2%, equivalent to 150.8 million children in 2017. Indonesia continued to have a high prevalence of stunting.<sup>3,5,6</sup> Results of data analysis on nutritional status monitoring showed that the prevalences of stunting among children aged 0–59 months in Indonesia were 29%, 29%, and 29.6% from 2015 to 2017, respectively.<sup>7–9</sup> Furthermore, the prevalence of Basic Health Research Surveys was 32.9% in 2013 and 30.8% in 2018, above the WHO-defined limit (20%).<sup>10,11</sup> Tulang Bawang Regency ranked third in stunting in Indonesia,<sup>11</sup> with prevalences of 22.9% in 2015, 30.7% in 2016, and 24.4% in 2017.<sup>8,9</sup> In Tulang Bawang Regency, Banjar Margo District has the highest rate.<sup>9</sup>

The stunting policy brief stated that exclusive breastfeeding is one of the frameworks for action to reduce stunting.<sup>12</sup> Some studies,<sup>1,12–14</sup> revealed that one of the highest risk factors for stunting was exclusive breastfeeding. Babies who were allowed to breastfeed early will get the colostrum, successfully obtain exclusive breastfeeding, and be breastfed longer. Children who were not exclusively breastfed have a 7.86 times risk of stunting

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than those who received exclusive breastfeeding. Furthermore, children with no early breastfeeding initiation history were 2.63 times more likely to have stunting than those with early breastfeeding initiation history.<sup>15</sup> Banjar Margo District has a stunting prevalence above the WHO limit and, based on data analysis results on nutritional status monitoring, even though exclusive breastfeeding coverage is extensive. If this happens continuously, future generations in this region could be threatened. Therefore, this study was conducted after looking at the results of previous studies, theories, programs, and stunting conditions in Banjar Margo District. This study aimed to analyze the relationship between exclusive breastfeeding and stunting in children aged 12–23 months in Banjar Margo District, Tulang Bawang Regency.

## Method

This study was approved by the Health Research Ethics Commission, Health Polytechnic, Ministry of Health, Tanjung Karang, with ethical clearance no. 42/EC/KEP-TJK/III/2018. This study used a cross-sectional design. Data collection activities were conducted in 12 active integrated services postes (ISPs)/ *pos pelayanan terpadu (Posyandu)* from April to May 2018 in Banjar Margo District, Tulang Bawang Regency. Proportional simple random sampling was used to obtain participants. The study population included mothers who had toddlers aged 12–23 months in Banjar Margo District, totaling 829 children. The calculation of large samples using the two-proportion hypothesis test formula<sup>16</sup> obtained 180 samples with an additional 10% to avoid dropping out of samples. A total of 193 mothers who had children under 12–23 months were selected. The inclusion criteria were mothers who had children aged 12–23 months and have a maternal and child health book containing their children's body weight and length at birth. The exclusion criteria were mothers who have children with premature birth and/or spinal abnormalities.

The dependent variable was the incidence of stunting. The child's body was measured using an infant meter (0.1 cm). The dependent variable was divided into two categories: yes (if the Z-score is lower than  $-2$  SD) and no (if the Z-score higher than  $-2$  SD).<sup>1</sup> The Z-score value was determined using the WHO Anthro 2005 software. The independent variable was exclusive breastfeeding history, which was divided into yes (if the child was given breast milk without other food except vitamins, minerals, or drugs from birth to six months old) and no (if the child was given extra food before six months of age). The confounding variables were early breastfeeding initiation history, maternal education, and maternal employment. The early breastfeeding initiation history was categorized into yes and no. Maternal education was low (if less than

senior high school) and moderate-high (if senior high school or higher). Maternal employment was divided into yes and no. All variables were collected using a questionnaire with mother characteristics, exclusive breastfeeding history, and early breastfeeding initiation history. The questionnaire was administered to the mothers who visited ISP in Banjar Margo District and had a maternal and child health book.

A chi-square test was used to determine relationships between dependent to independent and confounding variables. Multiple logistic regression with risk factor models was conducted to validate the relationship of the independent variable (exclusive breastfeeding history) with stunting by controlling the confounding variables (early breastfeeding initiation history, maternal education, and maternal employment). Confounding assessment was performed by excluding variables with a p-value of  $> 0.05$ , starting from the variable with the highest p-value. Modeling was conducted by considering changes in the odds ratio (OR). If the difference in OR was more than 10%, the variable was returned to the model.

## Results

The study results found that 57 (29.5%) children could be categorized as stunted. Over half of the sample of mothers had exclusive breastfeeding history (65.8%), early breastfeeding initiation history (68.9%), low education (68.9%), and unemployment (83.4%). The bivariate analysis with the chi-square test (Table 1) showed a significant relationship between the stunting incidence in children aged 12–23 months with exclusive breastfeeding history, maternal education, and maternal employment with a p-value of 0.01. The stunting incidence of those with nonexclusive breastfeeding history was 32 (48.5%), nonearly breastfeeding initiation history 13 (21.7%), low education 51 (85%), and employment 20 (62.5%).

Furthermore, multivariate analysis was conducted by including all the independent variable candidates with a p-value of  $< 0.25$  (based on bivariate analysis). In this study, all independent variables were eligible for entry into the multivariate analysis. Multivariate analysis was performed to analyze variables related to stunting. Multiple logistic regression test was performed to determine the influence of the exclusive breastfeeding history factor as the main factor. In this analysis, the early breastfeeding initiation history variable had to leave the model because it did not reach 10% upon OR value calculation.

The final model analysis (Table 2) proved the relationship between exclusive breastfeeding history and stunting incidence. Children who were not exclusively breastfeeding were 3.1 times (95% confidence interval 1.5–6.4) more at risk of stunting than those who were exclusively breastfeeding, with a statistically significant p-value of 0.01 after controlling for maternal education

**Table 1. Relation of Exclusive Breastfeeding History, Early Breastfeeding Initiation History, Maternal Education, and Employment with Stunting in Children Aged 12–23 Months**

Variable	Category	Stunting				Total	p-value	OR
		No		Yes				
		n	%	n	%			
Exclusive breastfeeding history	Yes	102	80.3	25	19.7	127	0.01	Ref
	No	34	51.5	32	48.5			
Early breastfeeding initiation history	Yes	89	66.9	44	33.1	133	0.150	Ref
	No	47	78.3	13	21.7			
Maternal education	Moderate-high	48	36.1	85	63.9	133	0.01	Ref
	Low	9	15.0	51	85.0			
Maternal employment	No	124	77.0	37	23.0	161	0.01	Ref
	Yes	12	37.5	20	62.5			

Note: OR = Odds Ratio

**Table 2. Final Model of the Relation of Exclusive Breastfeeding History with Stunting in Children Aged 12–23 Months**

Variable	Category	p-value	OR	95% CI
Exclusive breastfeeding history	Yes		Ref	
	No	0.01	3.1	1.5–6.4
Maternal education	Moderate-high		Ref	
	Low	0.01	5.5	1.8–16.5
Maternal employment	No		Ref	
	Yes	0.01	12.2	4.2–35.4

Notes: OR = Odds Ratio; CI = Confidence Interval

and employment factors. The results proved the study's hypothesis that exclusive breastfeeding is associated with stunting in children aged 12–23 months compared with children who were not exclusively breastfed in Banjar Margo District. Maternal education and employment factors were confounding variables and substantially significantly related to exclusive breastfeeding.

### Discussion

The study's stunting prevalence was 29.5% (children aged 12–23 months), which was higher than the 24.4% report of the Nutritional Status Monitoring in 2017 for Tulang Bawang Regency (children aged 0–59 months).<sup>9</sup> Of 57 children aged 12–23 months with stunting, one 12-month-old toddler had severe stunting with a body length of 68.7 cm. The length and height gauge was not available at the ISP. The availability of measuring instruments for length and height is not available at the ISP, so the length of the toddler's body cannot be monitored every month. Exclusive breastfeeding was defined as the practice of giving an infant only breastmilk for the first six months of life, with no other food, liquid, or even water.<sup>17</sup> It has many widely known benefits; however, social, societal, and environmental factors made this practice challenging for millions of mothers globally.<sup>18</sup> Recall bias on exclusive breastfeeding status may occur in this study

because subjects spend more time with caregivers than mothers. Thus, to get accurate information on the mothers' exclusive breastfeeding status and early initiation history, the researchers had to visit on weekends or return in the afternoon when they are home from work. However, the recall bias for early breastfeeding initiation was high as the respondents did not understand the early breastfeeding initiation process.

Exclusive breastfeeding history had a significant association with the incidence of stunting. A similar result was shown by if the study of Wahdah, *et al.*,<sup>13</sup> found that children who were not exclusively breastfed are at 2.02 times greater risk of suffering stunting than those who were exclusively breastfed.<sup>12,14</sup> In India's Empowered Action Group States, stunting severity showed a decreasing trend as the children were exclusively breastfed.<sup>19</sup> Babies who are allowed to breastfeed early will get the colostrum, obtain exclusive breastfeeding, and take more prolonged breastfeeding. According to the WHO, exclusively breastfeeding babies can avoid digestive tract and respiratory infections.<sup>12,14,20,21</sup> Near-full scale-up of exclusive breastfeeding practices could prevent 823,000 annual deaths in children under five years old.<sup>22</sup> Non-breastfed children are nearly three to four times more likely to die of illnesses in the first six months. There is overwhelming evidence of the positive effects of

breastfeeding in preventing pneumonia and diarrhea in young children.<sup>22</sup>

Barriers to exclusive breastfeeding are that breast milk has not come out on days 1–3 after birth, leading formula milk use, hereditary beliefs in the community to give honey to newborns, and children who cry often are assumed to be hungry. Hence, mothers/caregivers give other foods such as milk formulas, bananas, honey, and filtered porridge.<sup>12</sup> Mother and family understanding of the importance of exclusive breastfeeding for babies 0–6 months needs improvement. Every baby (0–6 months) who receives nutrition according to their needs can avoid infectious diseases. Health promotion can help by providing information on exclusive breastfeeding. The intervention can be done by counseling mothers and caregivers on good infant and young child nutrition and hygiene practices.<sup>18</sup> Optimal feeding of infants and young children includes immediate breastfeeding initiation, early and exclusive breastfeeding until six months of age, and age-appropriate complementary feeding from 6–24 months with continued breastfeeding until two years of age. Good infant and young child feeding and hygiene practices are promoted at various levels: health facilities, community/home settings, and mass media campaigns.<sup>18</sup>

Education level may also affect food consumption through the selection of foodstuff. The father's education level will improve the household economic status as it is closely related to obtaining employment and higher income to increase the households' purchasing power to provide food for family members. Children born to educated women suffer less from malnutrition, manifested as underweight, wasting, and stunting.<sup>23</sup> Mothers with higher education levels are expected to have a positive attitude toward food nutrition to help fulfill adequate nutrition for the family.<sup>13,14,23</sup> Mothers who have higher education tend to be better in child care pattern and infant food type selection. Mothers with higher education have more significant opportunities in accessing information related to nutrition and health.<sup>23,24</sup> Maternal education and maternal employment have a significant relationship with stunting events. Mothers with low education had a greater risk of stunting than those with higher education.<sup>25–27</sup> A study by Shine, *et al.*,<sup>28</sup> suggests that children born to working mothers are at 3.10 times greater risk of stunting than mothers who do not work. A study by Wahdah, *et al.*,<sup>13</sup> revealed that toddlers with low family income are at 24.42 times higher risk of stunting than those with high-income families.

Maternal employment is another risk factor of stunting as toddlers with working mothers are at 11.5 times higher risk of stunting than those with mothers who do not work. These findings are in line with Shine, *et al.*,<sup>28</sup> that children born to working mothers are at 3.10 times greater risk of becoming stunted than nonworking mot-

hers. The role of mothers is significant, namely, as caregivers and family food consumption and nutrition improvement effort regulators. In this study, one mother works as a farmer, entrepreneur, teacher, and household assistant. She admitted that exclusive breastfeeding was challenging because she worked from morning to evening leaving her child with relatives and neighbors. In this study, mothers also said that toddlers' full consumption is regulated by the people who care for them, even though the mothers sometimes do not know what their children consume in one day.

Childhood is a period in which growth and development occur very progressively, especially in times of critical windows, popularly known as “The Window of Opportunity,” which is the first 1,000 days of life up to two years.<sup>14</sup> Mothers are critical in this period because of their powerful influence in fulfilling the toddlers' needs and diet. Working mothers face more challenges in nurturing their toddlers and ensuring that they can meet their child's nutritional needs.

Nowadays, providing parenting and fulfilling toddlers' nutritional needs, such as using milked milk placed in the freezer and preparing food menus to monitor dietary intake, are cared for by relatives or other people to support working mothers. However, facts show that there is a lack of information/knowledge between mothers and caregivers when entrusting their child to caregivers. The caregivers often make their own decisions to give any meals to children. Health promotion activities in primary health care (PHC)/ISP should be focused on inviting other people involved in child care, such as grandparents, at-home caregivers, and daycares.

## Conclusion

Exclusive breastfeeding history was associated with stunting in children aged 12–23 months in Banjar Margo District, after controlling maternal education and employment factors.

## Recommendation

It is recommended that health promotion activities in PHC/ISP be focused on mothers and other people involved in child care, such as grandparents, at-home caregivers, and daycares.

## Abbreviations

WHO: World Health Organization; SD: Standard Deviation; ISP: Integrated Services Pos; *Posyandu*: *Pos Pelayanan Terpadu*; OR: Odds Ratio; PHC: Primary Health Care.

## Ethics Approval and Consent to Participate

Respondents were addressed before the survey about the survey's objectives and purposes, and verbal consent to participate in the study was taken from them.



### Competing Interest

The authors declare that there are no significant competing financial, professional, or personal interests that might have affected the performance.

### Availability of Data and Materials

Research data can be provided upon request.

### Authors' Contribution

NS and MYM conceptualized the study; NS created the methodology; NS, Z, and MR wrote, reviewed, and edited the manuscript; NS and MYM wrote the original draft.

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