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Research

Determinants of Stunting in Children Aged 24-59 Months in Gorontalo, Indonesia

Rabia Zakaria[1)], Juwita Suma[2)]

[1)]Department of Midwifery, Health Polytechnic, Ministry of Health Gorontalo
[2)]Department of Environmental Sanitation, Health Polytechnic, Ministry of Health Gorontalo

ABSTRACT

Background: Biological and environmental factors play a role in stunting among children under five. Maternal nutrition during pregnancy and child nutrition intake are influenced by the way parents interact with their children. This study aimed to investigate determinants of stunting in children aged 24-59 months in Gorontalo, Indonesia.

Subjects and Method: A cross-sectional study was conducted at Hayahaya Village, Western Limboto Sub-district, Gorontalo, Indonesia, from July to October 2019. A sample of 76 children aged 24-59 months was selected randomly. The dependent variable was stunting (height for age <-2 SD). The independent variables were maternal education, family income, parenting style, birth length, birth weight, birth space, and exclusive breastfeeding. The data were obtained from maternal and child health book monitoring and questionnaire. The data were analyzed by a multiple logistic regression.

Results: High education level (OR= 0.18; 95% CI= 0.03 to 1.21; p= 0.077) and good parenting style (OR= 0.02; 95% CI= 0.01 to 0.18; p <0.001) decreased the risk of stunting in children aged 24-59 months. Birth space <2 years (OR= 12.62; 95% CI= 1.44 to 110.94; p= 0.022) increased the risk of stunting in children aged 24-59 months, and it was statistically significant.

Conclusion: High education level and good parenting style decrease the risk of stunting in children aged 24-59 months. Birth space <2 years increased the risk of stunting in children aged 24-59 months.

Keywords: stunting, parenting style, breastfeeding, birthweight

Correspondence:
Rabia Zakaria. Department of Midwifery, Health Polytechnic of Ministry of Health Gorontalo, Indonesia. E-mail: rabiasubarkah@gmail.com, Phone: +62-823-4879-4086.

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BACKGROUND

Stunting is among the nutritional problems that have adverse effects on the children's life quality, causing the children to grow slower. In 2018, around 151 million (22%) of under-five children suffered from stunting; three-quarters of the prevalence was in Southeast Asia and Africa. Such a high percentage of stunting is detrimental to the development of a country; this causes problems related to morbidity rate and mortality rate (WHO, 2019). Indonesia ranks fifth as the country with the most stunting prevalence in children under-five.

According to a report of Nutritional Status in 2017 (Indonesian Ministry of Health, 2018a), the percentage of stunting prevalence in Gorontalo reached 31.7%, consisting of two categories, i.e., very poor (11.2%) and poor (20.5%). A report of Basic Health Research (RISKESDAS) year 2018, Gorontalo ranked 12th in stunting prevalence with the percentage ranging from

30.8% to 42.6%. In 2017, the highest prevalence of stunting in the province of Gorontalo was in 0-59 month children (36.2%) (Indonesian Ministry of Health, 2018b).

In 2013, RISKESDAS published a report showing the prevalence of stunting in the province of Gorontalo of 32.8% (consisting of 22% low nutritional status and 10.8% poor nutritional status). The report revealed the percentage of stunting in Gorontalo Regency, which measured at 30.4% (21.2% low nutritional status and 9.2% nutritional deprivation) (Gorontalo Provincial Health Office, 2013; Indonesian Ministry of Health, 2013).

Denaa Village and Hayahaya Village are the villages with the stunted children population; the villages are within the working area of *Puskesmas* (community health center) Western Limboto. Health Polytechnic of Ministry of Health Gorontalo has cooperated with Hayahaya village since 2019. In Western Limboto, until July 2018, around 158 under-five children (11.1% of the total child population) were stunted. The prevalence rate in Hayahaya Village in 2018 was 9.6%; of 95 children in the village, 16 of them are stunted.

This study aimed to investige determinants of stunting in children aged 24-59 months in Hayahaya Village, Western Limboto Sub-district, Gorontalo, Indonesia.

SUBJECTS AND METHOD

1. Study Design

This was analytical observational study with a cross-sectional design. The study was conducted in Hayahaya Village, Western Limboto Sub-district, Gorontalo, Indonesia, from July to October 2019.

2. Population and Sample

All 95 children with aged from 24 to 59 months were involved as study population. A sample of 76 children aged 24-59 months was selected randomly.

3. Study Variables

The dependent variable was stunting (height for age <-2 SD). The independent variables were maternal education, family income, parenting style, birth length, birth weight, birth space, and exclusive breastfeeding.

4. Operational Definition of Variables

Stunting was defined as a nutritional status of children by height for age <2 standard deviations.

Birth weight was defined as infant weight at birth. Body weight was measured to the nearest gram. Weighing scale was calibrated to zero before measurement. Infants were weighed with minimal clothing and with minimal movement on the scale. It was assessed with infant weight scale.

Birth length was defined as infant length at birth. Birth length was assessed using infantometer. The length was then read to the nearest 0.1 cm.

Exclusive breastfeeding was defined as breastmilk provision to infants from birth to 6 months of age without other drink or food.

Birth spacing was defined as duration of pregnancy interval from the latest pregnancy to the current pregnancy.

Maternal education was defined as the highest education attained by the mother.

Family income was defined as the average of money/purchasing power earned by family members monthly.

Parenting style was defined as a constellation of attitude or a pattern of parental authority towards nutritional provision to their children.

5. Study Instruments

The data were obtained from maternal and child health book monitoring and questionnaire.

6. Data Analysis

Chi-square test was used for the bivariate analysis, while the multivariate analysis relied on a multiple logistic regression.

7. Research Ethic

The data was collected after the study proposal passed the ethical clearance and passed by Health Research Ethics Commission of Health Polytechnic of Ministry of Health Gorontalo. All study respondents have been explanation and information about the purpose and method of this study and have signed the form of willingness to be the study subjects.

RESULTS

Table 1 showed that there was a correlation between maternal education and stunting in children aged 24-59 months. High maternal education reduced the risk of stunting in children aged 24-59 months (OR= 0.19; p= 0.001).

Table 1. Correlation of Maternal Education and Stunting in Children Aged 24-59 Months

Maternal Education	Stunting				Total		OR	p
	Normal		Stunting					
	n	(%)	n	(%)	N	(%)		
Low	15	44.1	19	55.9	34	100	0.19	0.001
High	34	81.0	8	19.0	42	100		

Table 2. Correlation of Family Income and Stunting in Children Aged 24-59 Months

Family Income	Stunting Prevalence				Total		OR	p
	Normal		Stunting					
	N	(%)	n	(%)	N	(%)		
Low	18	48.6	19	51.4	37	100	0.24	0.005
High	31	79.5	8	20.5	39	100		

Table 2 showed that there was a correlation between family income and stunting in children aged 24-59 months. High family income reduced the risk of stunting in children aged 24-59 months (OR= 0.24; p= 0.005).

Table 3. Correlation of Parenting Style and Stunting in Children Aged 24-59 Months

Parenting Style	Stunting				Total		OR	p
	Normal		Stunting					
	N	(%)	n	(%)	n	(%)		
Good	43	93.5	3	6.5	46	100	57.33	<0.001
Poor	6	20.0	24	80.0	30	100		

Table 3 showed that there was a correlation between parenting style and stunting in children aged 24-59 months. Poor parenting style increased the risk of stunting in children aged 24-59 months (OR= 57.33; p<0.001).

Table 4. Correlation of Birth Length and Stunting in Children Aged 24-59 Months

Birth Length	Stunting				Total		OR	p
	Normal		Stunting					
	N	(%)	n	(%)	n	(%)		
Normal	37	78.7	10	21.3	47	100	5.24	0.001
Short length	12	41.4	17	58.6	29	100		

Table 4 showed that there was a correlation between birth length and stunting in children aged 24-59 months. Short birth length increased the risk of stunting in children aged 24-59 months (OR= 5.24; p= 0.001).

Table 5. Correlation of Birthweight and Stunting in Children Aged 24-59 Months

Birth Weight	Stunting				Total		OR	p
	Normal		Stunting					
	N	(%)	n	(%)	n	(%)		
Low birthweight	8	38.1	13	61.9	21	100	0.21	0.003
Normal birthweight	41	74.5	14	25.5	55	100		

Table 5 showed that there was a correlation between birth length and stunting in children aged 24-59 months. Short birth length increased the risk of stunting in children aged 24-59 months (OR= 5.24; p= 0.001).

Table 6. Correlation of Birth Space and Stunting in Children Aged 24-59 Months

Birth Spacing	Stunting Prevalence				Total		OR	p
	Normal		Stunting					
	N	(%)	n	(%)	n	(%)		
<2 years	30	58.8	21	41.2	51	100	0.45	0.142
≥2 years	19	76.0	6	24.0	25	100		

Table 6 showed that there was a correlation between birth space and stunting in children aged 24-59 months. Birth space ≥2 years reduced the risk of stunting in children aged 24-59 months, but it was statistically non-significant (OR= 0.45; p= 0.142).

Table 7. Correlation of Exclusive Breastfeeding and Stunting in Children Aged 24-59 Months

Exclusive Breastfeeding	Stunting				Total		OR	p
	Normal		Stunting					
	N	(%)	n	(%)	n	(%)		
Exclusive Breastfeeding	25	92.6	2	7.4	27	100	13.02	<0.001
Non-Exclusive Breastfeeding	24	49.0	25	51.0	49	100		

Table 7 showed that there was a correlation between exclusive breastfeeding and stunting in children aged 24-59 months. Non exclusive breastfeeding increased the risk of stunting in children aged 24-59 months (OR= 13.02; p<0.001).

Table 8. The Results of Multiple Logistic Regression Analysis on the Factors Correlated with the Risk of Stunting

Independent variables	OR	95% CI		p
		Lower limit	Upper limit	
High education Level	0.18	0.03	1.21	0.077
High income	3.65	0.45	29.67	0.226
Good parenting style	0.02	0.01	0.18	<0.001
Normal birth length	0.97	0.12	7.51	0.974
Normal birth weight	4.15	0.58	29.61	0.156
Birth space <2 years	12.62	1.44	110.94	0.022
Non-exclusive breastfeeding	0.46	0.04	5.34	0.537

Table 8 showed the results of multiple logistic regression analysis on the factors correlated with the risk of stunting. Table 8 showed that high education level (OR= 0.18; 95% CI= 0.03 to 1.21; p= 0.077) and good parenting style (OR= 0.02; 95% CI= 0.01 to 0.18; p <0.001) decreased the risk of stunting in children aged 24-59 months. Birth space <2 years (or= 12.62; 95% CI= 1.44 to 110.94; p= 0.022) increased the risk of stunting in children aged 24-59 months, and it was statistically significant.

DISCUSSION

1. Correlation of Maternal Education and Stunting

The results of this study showed that high maternal education decreased the risk of stunting in children aged 24-59 months, and it was statistically significant.

A study by Abuya et al. (2012), showed that there is a strong linkage between maternal education and children's health. Children born to educated women suffer less from malnutrition which manifests as underweight, wasting and stunting in children.

The relationship between maternal level factors and child nutritional status has also been documented in several other studies. These factors however only minimally attenuate the effect of mother's education on stunting (Frost et al., 2005; Abuya et al., 2012; Ali et al., 2017).

2. Correlation of Family Income and Stunting

The results of this study showed that high family income increased the risk of stunting in children aged 24-59 months, but it was statistically non-significant.

There was a similar pattern with Jonah et al. (2018), which compare household wealth status and stunting in Ghana. In Ghana, the highest stunting rates were in the poorest households.

Mustikaningrum et al. (2016) point out that the economic condition of a family and income level is inseparable. Further, the income level is the factor determining the quality and quantity of diet. Low-income level lessens purchasing power, by which it hinders a person from practicing a healthy diet.

In the rural area, a greater risk of stunting was associated with father's occupation as farmer, family income, and the presence of family networks for child care (Reyes et al., 2004).

Macroeconomic growth is generally considered to be related to the nutrition status in developing countries. The increases in income for all population groups, especially among low-income groups, enable them to access and to consume nutrition-promoting foods, and the increase of investment in public programs such as educational and cultural services are also of benefit to nutritional improvements (Preston, 2003; Subramanyam et al., 2011; Rajan et al., 2013; Wu et al., 2015; Vitolo et al., 2018)

3. Correlation of Parenting Style and Stunting

The results of this study showed that good parenting style decreased the risk of stunting in children aged 24-59 months, and it was statistically significant.

The development of healthy eating behaviors in toddlers is often of concern to parents because many chidlren show difficulties with eating such as picky eating behaviors (Dovey et al., 2008).

Parents influence children food intake through the foods they make available as well as through the way they interact with their children. Previous studies suggested a relationship between particular parental feeding strategies and children's energy intake, diet quality and body weight. Restrictive parenting practices were often asso-

ciated with poorer child eating outcomes (e.g., the consumption of more unhealthy foods) (Faith et al., 2004; Ventura and Birch, 2008; Ban et al., 2017)

The indicator of parenting styles consists of several interrelated aspects. The first aspect is the appropriate dietary pattern, which associates with the fulfillment of healthy food and nutrition for children. Kusharto and Supariasa (2014) define the term dietary pattern as the number of different foods and beverages (this also includes the way the food is processed) in a diet and the frequency with which the food is consumed (Kusharto and Supariasa, 2014).

4. Correlation of Birth Length and Stunting

The results of this study showed that normal birth length decreased the risk of stunting in children aged 24-59 months, but it was statistically non-significant.

Studies by Ernawati (2013) and (Mentari and Hermansyah, 2018) reported a significant correlation between birth length and stunting. The likelihood of stunting in infants aged 12-month-old with short birth length (<48 cm) was higher than those with normal height (≥48 cm).

Other study in Philippines by Blake et al. (2016) reported that LBW infants had significantly increased odds of stunting.

5. Correlation of Birth Weight and Stunting

LBW is reported in many previous studies as a risk factor for mortality and morbidity in children under five years of age. These studies identify LBW is associated with malnutrition in children during their early years of life (Rahman et al., 2016).

The correlation between LBW and child malnutrition could possibly be described by the increased vulnerability of children with LBW to infections, such as, diarrheal and lower respiratory infections and the increased risk of complications including sleep apnea, jaundice, anemia, chronic lung disorders, fatigue and loss of appetite compared to children with normal birth weights (Arifeen et al., 2000; Rahman et al., 2016)

Evidence suggests that poor early growth retardation coincides with sub-optimal cognitive development and the inhibited growth of internal organs may result in a low cognitive ability and increase risks for chronic diseases in later life (Victoria et al., 2008). A study in Zimbabwe found that growth of the LBW babies are well behind the growth of normal weight babies and significant length differences were apparent at 12 months of age. Intrauterine growth restriction and/or erratic growth during the first 2 years of life can lead to a lower economic productivity in adult-hood (Xie et al., 2016; Aryastami et al., 2017).

6. The Correlation of Birth Spacing and Stunting

Rutstein (2005) observed a strong relationship between stunting and birth interval, noting a nearly linear decrease in stunting with increasing birth interval length. In particular, children born following an interval of less than 18 months were 43% more likely to suffer from stunting than children born following an interval of 60 months or longer. A study by Aerts et al. (2004) in Brazil found that children with short preceding birth intervals were more likely to experience stunting than those with longer preceding birth intervals.

Longer intervals of more than 3 years can also provide protection against stunting. In particular, compared to intervals between 24 and 29 months, intervals between 36 and 41 months were associated with up to a 29% decrease in the risk of stunting (Rutstein, 2003; Sobrino et al., 2017).

Gribble et al. (2009) reported that the window for intervention in undernutrition is short (before pregnancy to 2 years of age). They suggested opportune points of time to reach women of reproductive age to provide counseling and promote health behaviors to prevent child undernutrition risks – preconception, prenatal, post-partum, infancy and early childhood (2 years).

7. Correlation of Exclusive Breast-feeding and Stunting

The results of this study showed that non-exclusive breastfeedng decreased the risk of stunting in children aged 24-59 months, but it was statistically non-significant.

According to a study by Mugianti et al. (2018), the provision of exclusive breast milk means that the infant only receives breast milk without any additional food until six months (Mugianti et al., 2018). Breast milk functions as the source of quality protein; it enhances the child's immunity and prevents stunted growth.

A study by Lestari et al. (2018), reported that there was a correlation between non-exclusive breastfeeding and stunting (aOR= 0.23; 95% CI= 0.06 to 0.89).

Breastfeeding in the first days of life provides the newborn with colostrum which is rich in nutrients and antibodies which are important for the development of the intestinal microbiota and the immune system (Kuchenbecker et al., 2015).

However, low prevalence on exclusive breast-feeding was due to habitual in older time or by older people such as the grandmother by giving breast milk to infants until the age of 4 months as much as possible. The quality of breast milk given is not an important for the mothers. Thus, the nutrients needed by the infants come mostly from complementary foods. In most of the cases, the mothers breastfeeding are undernourished themselves, resulting in low production of breast milk and earlier introduction of complementary foods (Aryastami et al., 2017).

AUTHOR CONTRIBUTION

Rabia Zakaria and Juwita Suma collected the data, did data analysis, interpreted the results, and wrote the paper.

CONFLICT OF INTEREST

There are no conflicts of interest in this study.

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