

# Determinants of Stunting in Children Aged 0-24 Months in Bangka Belitung Province

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**Abstract-** Children under five are an age group that susceptible to malnutrition and considered as one of the vulnerable groups in nutrition. Malnutrition in infants may result in disruption of physical growth and intelligence of children. Failure to grow due to malnutrition in infancy (the golden age) will have a bad impact on the next stages of life, this will be difficult to restore to a normal state. National stunting prevalence in 2013 was 37.2%, which meant there was an increase compared to 2010 (35.6%) and 2007 (36.8%). The prevalence of stunting in infants in Bangka Belitung Province in 2007 was 36% and the Riskesdas 2013 data showed the prevalence of stunting was 30%. However, there was a decrease in the prevalence of stunting, it has not yet reached the national target for nutritional improvement (20%). This study aimed to study the determinant factors of stunting occurred in children aged 0-24 month. This study was an analytical survey with a cross-sectional design. The respondents are children aged 0-24 months from 7 regencies and cities in the Bangka Belitung. Univariate and bivariate analysis was performed using the Chi-square test. Meanwhile, multivariate analysis was conducted using logistic regression. Results, the number of stunted children was 20.3%, especially children aged 0-24 months in Bangka Belitung Province. The families with stunted or non-stunted children known to live in the village. Most parents were known to have an elementary level of education. Consecutively, fathers were all working and most mothers did not work. From the data above, it was concluded that the factors that were not significantly related to nutritional status (TB/U) were the age, sex, father's education, mother's education, father's occupation, mother's working status, mother's age, number of family members and residence. Factors that are significantly related to nutritional status (TB/U) were only the age of the child.

**Keywords:** *nutritional status, stunting.*

## I. INTRODUCTION

Human growth used to be considered as a biological process only. However, environmental factors, especially social and economic factors, are influential to determine growth. The consequences of unfavourable socio-economic conditions will cause members of the community with lower social strata and income to have a poor diet and increase the frequency of morbidity and mortality (1)

Food and Agriculture Organization (FAO) is focusing on its activities to fulfil the demand of food worldwide by ensuring stability in production and access to food. These factors, however, could not be declared as the main causes of the low energy intake in the community. FAO then used a proxy indicator of malnutrition prevalence (Prevalence of Undernourishment/PoU) to represent a community-level minimum energy needs (2). The inability to achieve an adequate food intake in quantity and quality became the main problem, especially in developing countries. This situation further increases the long-term effects of the issue, one of which is one's stature (3).

Furthermore the United Nations Children's Fund (UNICEF) focused its role to counter the issue of low energy intake that occurred in children. This is due to the fact that, the occurrence of this deficiency at this period of life could heavily affect the stature. Therefore, height/weight was often used to measure nutritional status during periods of rapid growth (1). Despite genetic being known as the basic factor that determine human stature, many studies showed that environmental factors were important determinants that aggravate the situation (3).

Linear growth that is not age-appropriate reflects the existing risk of malnutrition. Linear growth disorders (stunting) will have an impact on growth, development, health and productivity. The problem of malnutrition if left untreated will lead to greater problems, this might cost Indonesia a lost generation (4) Suggested that a chase-growth program applied in children of early age might be beneficial, given the success in improving stature for adolescence and adulthood (5) Further implications and impacts will affect income and economic improvement in developing and developed countries.

Some experts argue that stunting or failure of linear growth (Linear Growth Failure) is a condition of physiological adaptation to non-pathological growth. This condition is a manifestation of two main causes, namely inadequate food intake and response to infectious diseases. In other words, an adaptation to energy and nutrient deficiency is not always pathological, it can also be seen in a slowing growth rate. Deficiency of essential nutrients leads to disruption of metabolism which then affect the cell growth and further affect the growth of body tissues (6). Nutritional stunting is a combination of various factors, especially maternal malnutrition, inadequate intake of complementary foods both in quantity and quality (3). Moreover, the existence of disruption in absorption caused by infectious diseases.

This is in line with research conducted in poor areas of Peru which stated that stunting was strongly related to nutrient deficiency and infectious diseases (7). In addition to these factors, stunting was also influenced by various determining factors. A study in Botswana, Africa showed that there were significant factors affecting malnutrition (stunting, wasting, underweight), which were the level of maternal education and income (8). A study in rural areas in India showed age, father's education and occupation, low income, failed to receive vitamin A in the 6 months, and anaemia were determinants that significantly related to stunting. A study in Brazil showed that stunting was associated with mother's age and low socio-economic status. Research conducted in North Maluku also showed that child sex was one of the risk factor for stunting (9).

A study in poor areas in Central and East Java. This showed that the determinants of stunting were age of the children, gender, mother's education and the area of residency. A poor residency might affect the nutritional status of children. This was due to poor environmental sanitation, infectious diseases and insufficient nutrient intake. This was commonly found in rural areas compared to urban areas. (10)

The World Health Organization (WHO) stipulated that the proportion of short children would be reduced by 40% in 2025. However, the results of the Basic Health Research (Riskesdas) showed that from 2007 to 2013 there was no significant decrease in the proportion of short children under five, 37.6% to 37.2% respectively. The prevalence of stunting among children under five in Bangka Belitung Province in 2007 was 36% and in 2013, the prevalence of stunting was 30%. Although there was a decrease in the prevalence of stunting, it had not yet reached the national target for nutritional improvement (20%) (Balitbangkes, 2013). These studies were sufficient evidences to stress that stunting is still an occurring issue in Indonesia (WHO limit  $\geq 20\%$ ).

The purpose of this study was to determine the factors that cause stunting in children aged 0-24 months in Bangka Belitung Province.

## II. METHOD

### A. Design, data collection and subjects

The data used in this study were secondary data obtained from Bangka Belitung Islands Province Nutrition Monitoring (PSG) 2016. This was a survey conducted by the Directorate of Community Nutrition, Directorate General of Public Health, Ministry of Health Indonesia.

The PSG survey was conducted in a descriptive cross sectional. This was intended to illustrate the nutritional status of children under five in Indonesia. Whereas in this study was a further analysis with the design used was an analytical survey. Chi square test was conducted to analyse the significance of the results ( $p < 0.05$ ).

Data collection was conducted in August - November 2016. While data processing was carried out in April - June 2017. The sampling technique is carried out as follows

1. Households sampled in two stages
  - a. Cluster Determination
  - b. Household selection in the cluster
2. The number of clusters in each regency/city was 30 clusters.
3. For each cluster 10 households were selected must include family with toddlers aged 0-59 months. The respondents were the mothers of toddlers or those representing toddlers.

In this study the data collected was filtered according to the age of 0-24 months and according to the completeness of the data of each variable studied with a total of 464 children.

III. RESULT

A. General characteristic of the target group

The age of the children included in this study is in the range of 0-24 months. The age and sex distribution of children were shown in table 1.

Table 1. Distribution of children by sex and age

Variable	Frequency	Percentage
<b>Sex</b>		
Male	234	50.4
Female	230	49.6
<b>Age</b>		
0 – 6 month	155	33.4
7 – 12 month	120	25.9
13 – 18 month	105	22.6
19 – 24 month	84	18.1

Based on the table above it was shown that the number of boys and girls were similar. Children in this study were mostly aged 0-6 month old, 33.4%.

Family characteristics in this study consisted of father's education, mother's education, father's occupation, mother's employment status, mother's age, number of family members and residency. Distribution of children based on family characteristics can be seen in table 3.

Table 2. Distribution of children by family characteristics

Variable	Category	Frequency	Percentage	
Father's education	Elementary	284	61.2	
	Middle school	145	31.2	
	High school	35	7.5	
Mother's education	Elementary	294	63.4	
	Middle school	126	27.2	
	High school	44	9.5	
Father's occupation	Govt Official/TNI/POL RI/BUMN/BUMD	35	7.5	
	Private	53	11.4	
	Entrepreneur	79	17.0	
	Farmer	120	25.9	
	Fisherman	15	3.2	
	Laborer	150	32.3	
	Others	12	2.6	
	Mother's occupational status	Working	259	55.8
		Not working	205	44.2
Mother's age	13 – 19 year old	28	6.0	
	20 – 30 year old	277	59.7	
	31 – 50 year old	159	34.3	
Family members	Small family	361	77.8	
	Big family	103	22.2	
Residency	Rural	357	76.9	
	Urban	107	23.1	

The table showed that most of the education levels of fathers and mothers of toddlers have elementary level education. The majority of fathers' occupations were laborers and farmers. While the number of working mothers and stay-at-home mothers were not much different. The majority of mothers were aged 20-30 year-old. For the number of family members, most were classified as small families. The majority of the respondents live in the countryside.

B. Nutritional Status of children based on Height/Age

Furthermore, a summary of the results of the univariate analysis presented in the form of nutritional status according to height/age (TB/U).

Table 3. Nutritional Status of Children According to Height and Age

Nutritional Status	frequency	Percentage
Stunting	94	20.3
Normal	370	79.7

In the table above it can be seen that based on the results of the analysis of nutritional status according to height/age, it was known that children were categorised as stunted was 20.3%.

C. Stunting Determinant Factors

Table 4. Distribution Nutritional Status Based On Children and Family Characteristics

Variable	Stunting		Normal		p value
	n	%	n	%	
(1)	(2)	(3)	(4)	(5)	(6)
<b>Gender</b>					
Male	51	11.0	183	39.4	0.406
Female	43	9.3	187	40.3	
<b>Age</b>					
0 – 6 month	26	5.6	129	27.8	0.000
7 – 12 month	13	2.8	107	23.0	
13 – 18 month	24	5.2	81	17.5	
19 – 24 month	31	6.7	53	11.4	
<b>Father's education</b>					
Elementary	59	12.7	225	48.5	0.555
Middle school	26	5.6	119	25.6	
High school	9	1.9	26	5.6	
<b>Mother's education</b>					
Elementary	58	12.5	236	50.9	0.064
Middle school	32	6.9	94	20.3	
High school	4	0.9	40	8.6	

	(1)	(2)	(3)	(4)	(5)	(6)
Father's occupation						
Govt Official/TNI/ POLRI/ BUMN/ BUMD	7	1.5	28	6.0		
Private company employee	10	2.2	43	9.3	0.986	
Entrepreneur	15	3.2	64	13.8		
Farmer	25	5.4	95	20.5		
Fisherman	2	0.4	13	2.8		
Laborer	23	5.0	117	25.2		
Others	2	0.4	10	2.2		
Mother's occupational status						
Working	47	10.1	158	34.1	0.203	
Not working	47	10.1	212	45.7		
Mother's age						
13 – 19 year old	1	0.2	27	5.8	0.077	
20 – 30 year old	59	12.7	218	47.0		
31 – 50 year old	34	7.3	125	27.0		
Family members						
Small family	75	16.2	286	61.7	0.604	
Big family	19	4.1	84	18.0		
Residency						
Rural	68	14.7	289	62.3	0.236	
Urban	26	5.6	81	17.4		

Most families in both the stunting and normal groups live in the village. The majority of father and mother education was elementary-level education. Fathers were all identified as working, meanwhile mothers were mostly stay-at-home mother.

#### IV. DISCUSSION

The numbers male and female children were not significantly different. Based on the Chi Square correlation test, there was no relationship between the sex of the child and their nutritional status ( $p > 0.05$ ). Although not significantly related, there were more boys categorised as stunted compared to girls. This study corroborated the results (11), which stated that in general the nutritional status of boys tend to be poorer than girls of the same age. In line with this, Mahgoup (2006) and in their studies showed that wasting, stunting and undernutrition events were significantly more common in boys compared to girls ((12).

Optimal child growth occurred during the first 1000 days (2 years) of life including gestational period. This was a critical period because interventions during this period might correct the health effect as the consequences of malnutrition. Therefore, it is important to focus and invest in early childhood. Based on the Chi Square correlation test, there was a relationship between the child's age and nutritional status ( $p < 0.05$ ). As children grow older, stunting could

only worsen. According to Ramli et al (2009), the highest prevalence of stunting occurred in children aged 24 - 59 months. According to Martorell et al in states, postnatal stunting occurs beginning at the age of the first 3 months of life, a period in which there was a decrease in breastfeeding, supplementary food starts being given and children are susceptible to infection.

Fathers education was known to be mainly up to basic level in both stunting and normal groups. Basic education up to junior or high school level. Only a small proportion of the fathers undertake higher education. Based on the Chi Square correlation test, there was no relationship between father's education and nutritional status ( $p > 0.05$ ). Even though there was no significant relationship between education level of the fathers and stunting occurrence, there was a trend that stunting could be found occurred more in families with fathers having basic education only. This leads to poorer regular income in both stunted and normal groups. The socioeconomic situation of the household contributed to the nutritional status of household members, especially children under five (13).

Based on the Chi Square correlation test, there was no relationship between maternal education and nutritional status ( $p > 0.05$ ). As is the case with father's education, the proportion of maternal education levels was also largely primary education. Although not significantly related, stunting is more common in mothers with primary education. Rosh's study (2012) showed that mothers with an education level below junior high (SMP) have 1.56 times higher chance of having stunted children compared to mothers with basic education. The issue with low level in maternal education might contribute to the poor knowledge about nutrition. Education remained an important factor, as people with higher educational background have better capability in absorbing and adopting information, this was expected to promote good and healthy habits. Research conducted by Picauly and Toy (2013) also showed that mothers with low levels of education have a chance of having their children stunted by 0.049 times greater than mothers with higher education.

In both stunted and normal groups, the heads of the family have jobs. Based on the Chi Square correlation test, there was no relationship identified between father's occupation and nutritional status ( $p > 0.05$ ). Although not significantly related, stunting was more common in fathers who have farmer and laborers' jobs. Occupation is strongly correlated to the regular income achieved., income was closely related to diet. (14). High income was related to better consumption of vitamins in children and family diet. Children from low socioeconomic families in the UK have higher energy

intake and nutrients were sourced from snack instead of proper meals.

Non-working mothers accounted for 10.1% in the stunted group, meanwhile in the normal group, it was at 34.1%. One factor that drove women to work was economic conditions. This occurred due to the increasing number of family dependents (15). When related to the nutritional status of children according to TB / U, there is no significant relationship between maternal occupation and nutritional status ( $P > 0.05$ ). This was argued to be correlated to the fact that mothers relied on caregivers, which could be given to their siblings, parents, or other family members.

The maternal age factor was an indirect factor influencing nutritional status in infants. However, based on the results, it was known that there was no relationship between maternal age with the nutritional status of children under five ( $p > 0.05$ ). Children whose mothers aged 20-30 years have more stunted children compared to mothers aged 31-50. This was presumably because of the frequency of children with mothers aged 20-30 years was greater than the number of children with mothers aged 13-19 years and 31-50 years. This caused higher probability of stunted children to be found in children whose mothers aged 20-30 year-old. Nutritional status could also be determined by mothers ability in child rearing. Attitude and knowledge related to child nutrition were known to essentially contributed to nutritional status in children under 5 year-old (16).

Based on the Chi Square correlation test, there was no relationship between the number of family members and nutritional status ( $p > 0.05$ ). Families with larger family members tend to have poorer economic status. According to Sanjur (1982), a large family would affect family expenses. The greater the number of family members, family expenses would be increased as well. Children under five year-old who were raised in a poor economic condition were the most vulnerable to malnutrition among all family members (Suhardjo 1989).

The correlation test between residence and nutritional status showed no significant result ( $p > 0.05$ ). On the other hand, although not significantly related, majority of children who were stunted live in rural areas. Based on the place of residence, there were more children living in the villages than those living in the city in both groups. Only about 62.3% of children with normal nutritional status according to Height/Age who live in the cities. Rosh's study (2012) showed, there was a significant relationship between the area of residence and stunting. This was due to the poor environmental sanitation, infectious diseases and poor nutritional intake, these were more prominent in the rural area. In

addition, the city area was a place where more diverse jobs could be found, hence better jobs and better income. This allowed parents to meet the nutritional needs for the children to avoid stunting (10).

There were several factors that affect nutritional status in children. Direct causative factors were food and infectious diseases. While the factors that influence indirectly were food availability, child-care patterns and quality of community health services. Parenting, health services and environmental sanitation were influenced by education, health services, and access to information. However, the root cause of this problem was poverty.

## V. CONCLUSIONS

In summary, factors that were not significantly related to nutritional status (height/age) in children aged 0-24 months in Bangka Belitung Province were gender, father's education, mother's education, father's occupation, maternal work status, maternal age, number family member and residence. Factors that were significantly related to nutritional status (height/age) in children aged 0-24 months in Bangka Belitung Province was age of the children. Nutritionists are expected to be able to improve the educational method to properly informed the community about stunting, a proper nutritional care practice, and improving environmental sanitation. Families are expected to pay more attention to health and nutritional needs for children starting from fetus up to 2 year-old.

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