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### Factors Related to Stunting on Children Under-Five in Tabunganen Sub-District Barito Kuala District

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#### Abstract

Stunting can result in increased morbidity and mortality in infancy, low cognitive function, and psychological function during school. Stunting can also be detrimental to long-term health, and as adults can affect work productivity, labor complications, and an increased risk of obesity. Obesity can trigger metabolic syndrome. The results of the Nutritional Status Assessment Kalimantan Selatan Province 2015, Barito Kuala District ranked 1 of 13 districts/cities in Kalimantan Selatan for stunting in children under two years, which were 22.3%. In 2016, Barito Kuala District ranked 2 of 13 regencies/cities in Kalimantan Selatan 10.8%. Sub-district, which was the highest number of stunting is the Tabunganen Sb- District by 45%. This study aims to analyze the risk factors associated with the incidence of stunting in Tabunganen Sub-District Barito Kuala. This research method was quantitative research with a case-control study. Total samples in this study were 73 cases and 73 controls with purposive sampling technique. The results showed that there was a relationship between exclusive breastfeeding ( $p=0.045$ ), energy consumption level ( $p=0.000$ ), protein consumption level ( $p=0.000$ ) and history of pregnant women with chronic energy deficiency (CED) ( $p=0.013$ ) with the incidence of stunting. There was no relationship between birth weight ( $p=0.300$ ) and the incidence of stunting. The dominant factor associated with the incidence of stunting is the level of protein consumption ( $p=0.000$ ) and ( $Exp.B=4.119$ ).

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*Keywords:* stunting, exclusive breastfeeding, energy consumption, protein consumption, chronic energy deficiency, children under-five

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## 1. Introduction

Stunting can result in morbidity and mortality in childhood, poor cognitive function, and psychological function at school age. Stunting can also be detrimental to long-term health, and as adults can affect work productivity, labor complications, and increased risk of obesity and obesity that can trigger metabolic syndromes such as coronary heart disease, stroke, hypertension, and type 2 diabetes mellitus. Inadequate energy and nutrient intake and infectious diseases are very important factors in stunting problems. According to the results of the nutritional status assesment at the Barito Kuala District in January 2018, sub-districts with the highest stunting rates from 17 Sub-Districts were Tabunganen Sub-District with a stunting rate of 45%. Exclusive breastfeeding is very strongly associated with a reduced risk of stunting, other risk factors that can cause stunting are birth weight, energy, and protein consumption levels, and history of pregnant women with CED.

## 2. Methods

This study is observational using case-control design. The sample took with a purposive sampling technique. Data analyzed with descriptive analysis and statistical analysis using the chi-square test and multiple logistic regression test.

## 3. Results

### a. The Relationship between Exclusive Breastfeeding and Stunting in Children under-five in Tabunganen Sub-District, Barito Kuala District

The results of the bivariate analysis using the chi-square test showed a p-value of 0.045 ( $p < 0.05$ ). It can be concluded that there was a significant relationship between exclusive breastfeeding and the incidence of stunting. Odds Ratio value of 1.963 (95% CI 1.011 to 3.811). It means that infants who are not exclusively breastfed 1.963 times more at risk of stunting compared to children under-five who carry out exclusive breastfeeding. From the results of this statistical test which p-value  $< 0.25$ , this variable is included in multivariate analysis.

### b. The Relationship between Birth Weight and Stunting in Children under-five in Tabunganen Sub-District, Barito Kuala District

The results of the bivariate analysis using chi-square test showed p-value of 0.300 ( $p > 0.05$ ). It can be concluded that there was no significant relationship between birth weight with the incidence of stunting. From the results of this statistical test which p-value  $> 0.25$ , this variable is not included in multivariate analysis.

### c. The Relationship between Energy Consumption Level and Stunting Children under-five in Tabunganen Sub-District, Barito Kuala District

The results of the bivariate analysis using the chi-square test showed a p-value of 0.000 ( $p < 0.05$ ), which means that  $H_0$  is rejected. It can be concluded that there is a significant relationship between the level of

energy consumption and the incidence of stunting. Odds Ratio value is 3.798 (95% CI 1.897-7.605), this means that children under-five who have energy consumption levels are less than 3.798 times more at risk of stunting compared to children under-five who have a good level of energy consumption. From the results of this statistical test which p-value <0.25, this variable is included in multivariate analysis.

**d. The Relationship between Protein Consumption Level and Stunting in Children under-five in Tabunganen Sub-District, Barito Kuala District**

The results of the bivariate analysis using chi-square test showed p-value of 0.000 ( $p < 0.05$ ). It can be concluded that there is a significant relationship between the level of protein intake with the incidence of stunting. Odds Ratio value is 4,140 (95% CI 2,043-8,388) this means that children under-five who have a level of protein consumption are less 4,140 times more at risk of stunting compared with children under-five who have a good level of protein consumption. From the results of this statistical test which p-value <0.25, this variable is included in multivariate analysis.

**e. The Relationship between History of CED Pregnancy and Stunting in Children under-five in Tabunganen District, Barito Kuala District**

The results of the bivariate analysis using chi-square test showed a p-value of 0.013 ( $p < 0.05$ ), which means that  $H_0$  is rejected. It can be concluded that there is a significant relationship between the history of CED pregnant women and the incidence of stunting. Odds Ratio value of 2.308 (95% CI 1.188 to 4.485), this means that women who have a history of pregnant women CED 2.308 times more at risk of stunting compared to women who had a history of normal pregnant women. From the results of this statistical test which p-value <0.25, this variable is included in multivariate analysis.

**f. The Relationship Between Exclusive Breastfeeding, Energy Consumption Levels, Protein Consumption Levels and History of CED Pregnant Women with Stunting Events in Tabunganen District, Barito Kuala District**

**Table 1. Results of Multiple Logistic Regression**

No.	Independent Variables	p-value	B-value	Exp B	95% CI for Exp B	
1.	Energy Consumption Level	0.000	1.329	3.778	1.810	7.888
2.	Protein Consumption Level	0.000	1.416	4.119	1.957	8.668

Based on table 1 above, it is known that the p-value for the energy consumption level variable and protein consumption level is <0.05, which is 0.000. Multiple logistic regression analysis produces variables that have the most dominant relationship to the incidence of stunting in Tabunganen Sub-District, Barito Kuala District is the level of protein consumption variable because it has the highest Exp. B value of 4.119.

#### 4. Discussion

**a. The Relationship between Exclusive Breastfeeding and Stunting in Children under-five in Tabunganen Sub-District, Barito Kuala District**

Children under-five does not carry out exclusive breastfeeding 1,963 times more at risk of stunting compared to children under-five who carry out exclusive breastfeeding. This matter supported by data that shows the percentage of stunting was more than those who did not carry out exclusive breastfeeding, which was 64.4%, while those in the control respondents (not stunting) who carried out exclusive breastfeeding were 52.1%. The failure of this exclusive breastfeeding practice according to Fajar et al., (2018) is due to various factors such as prelactal feeding, mothers having to work, sick babies, fatigue factors and lack of confidence from their mothers. Children under-five who do not get enough breast milk means they have poor nutrition

and can cause malnutrition, one of which can cause stunting. The results of the Triawanti et al. (2018) also stated that the growth curve of children aged 3-18 months who received exclusive breastfeeding was better than those of children of the same age who did not get exclusive breastfeeding. It is also in line with research conducted by Rahmad et al. (2013) in the city of Banda Aceh which states that there is a significant relationship between exclusive breastfeeding and the incidence of stunting in the city of Banda Aceh with p-value 0.002 and OR 4.2. Children under-five who do not exclusive breastfeeding likelihood 4.2 times more at risk of stunting compared to children who carry out exclusively breastfed.

#### **b. The Relationship between Birth Weight and Stunting in Children under-five in Tabunganen Sub-District, Barito Kuala District**

The results of the analysis using the chi-square test showed a p-value of 0.300 ( $p > 0.05$ ), which means that  $H_0$  is accepted. It can be concluded that there is no significant relationship between birth weight and the incidence of stunting. This prelatik by data showing that the percentage of control respondents (not stunting) have not low-birth-weight (LBW) history, which is 68.5%, while case respondents (stunting) who have not LBW is 60.3%. This is due to children who do not have a history of low birth weight, but experience stunting due to lack of energy and protein intake and do not carry out exclusive breastfeeding so that energy and protein intake is not fulfilled. The effect of birth weight on the incidence of stunting occurs at the age of 6 months early, then decreases until the age of 24 months. If at the beginning of 6 months, the children under-five can pursue growth. Children under-five can likely grow normally. Infants with a history of low birth weight indicate the occurrence of retardation in uterine growth both acute and chronic and more at risk of developing growth disorders in childhood because they are more susceptible to infectious diseases, such as diarrhea (Kusharisupeni, 2002). Children who have not LBW history but are stunted, because several factors influence the incidence of stunting besides the history of LBW. So that children who are not LBW also have the possibility of stunting if you have other factors that influence the incidence of stunting, both direct and indirect factors. Another study conducted by Ardiansyah in 2017 states that the direct causes of stunting are consumption of nutrients, while indirect causes are the age of the baby or child, gender, level of education, employment, number of family members, Early Breastfeeding Initiation (IMD), breastfeeding exclusive, pre-rectal feeding and maternal height (Ardiansyah et al, 2018). This is in line with the research conducted by Meilyasari and Isnawati (2014) which states that there is no significant relationship between birth weight and the incidence of stunting in Purwokerto village, Patebon Sub-District, Kendal District with a p-value of 0.609 and OR 3.28 which means that children under-five are having a history of low birth weight. It is likely 3.28 times more at risk of stunting compared with children under-five who do not have a history of low birth weight.

#### **c. The Relationship between Energy Consumption Level and Stunting Children under-five in Tabunganen Sub-District, Barito Kuala District**

The results of the chi-square test analysis showed a p-value of 0,000 ( $p < 0.05$ ), which means that  $H_0$  is rejected. It can be concluded that there is a significant relationship between the level of energy consumption and the incidence of stunting. Odds Ratiovalue is 3.798 (95% CI 1.897-7.605) this means that children under-five who have an energy consumption level of fewer than 3.798 times more at risk of stunting compared to children under-five who have a right level of energy consumption. It is supported by data showing that the percentage of respondents case (stunting) more likely to have less energy consumption rate is 72.6%, while respondents controls (non-stunting), which has a good level of energy consumption by 58.9%. This is because these children under-five do not carry out exclusive breastfeeding, so they do not get enough energy from breast milk, then there is a history of CED pregnant women which causes children under five born with LBW, making them susceptible to infectious diseases that can cause children to become sick, thereby reducing

appetite to eat it. According to Mugiyanti et al., 2018, a child who has a level of energy consumption that is less able is caused by several factors, including a lack of maternal knowledge about stunting which influences the provision of balanced nutrition in children and the child's appetite is reduced due to infectious diseases. Azmy et al (2018) states that there is a significant relationship between the level of energy consumption and the incidence of stunting in Bangkalan District with  $p$ -value=0.015 and OR = 4.048, which means that children with less energy consumption level 4.048 times more likely to experience stunting than children under-five who have a good level of energy consumption. The better the energy intake in infants, the more nutritional status will be normal. Another study conducted by Nagari et al (2017) where there is a relationship between the level of energy consumption and nutritional status in children.

#### **d. The Relationship between Protein Consumption Level and Stunting in Children under-five in Tabunganen Sub-District, Barito Kuala District**

Children under-five who have a level of protein consumption is less 4.140 times more at risk of stunting compared to children under-five who have a good level of protein consumption. This is supported by data which shows that the percentage of control respondents (not stunting) has a higher level of consumption of good protein which is 75.3%. Whereas the case respondents (stunting) have a good level of protein consumption of 57.5%, and for the percentage of control respondents (non-stunting) which has a low consumption level of 24.7% while the case respondent (stunting) has a low protein consumption level of 42.5%. It is because these children do not carry out exclusive breastfeeding, so they do not get enough protein from breast milk, then there is a history of CED pregnant women which causes children under five born with LBW.

It is susceptible to infectious diseases that can cause children to become sick, thereby reducing appetite. Protein is one of the macro-nutrients that serve as receptors which can affect the function of DNA that controls the growth process by adjusting the nature and material character. The quality and quantity of good protein intake can function as Insulin Growth Factor 1 (IGF-1), which is a mediator of growth hormone and bone matrix formation. Azmy and Mundiastuti (2018) state that there is a significant relationship between the level of protein consumption and the incidence of stunting in Bangkalan District with a  $p$ -value of 0.012 and OR 1.6. Children under-five with a level of protein consumption less likely to be 1.6 times more at risk of stunting than children under-five who have a good level of protein consumption. Another study conducted by Sulistianingsih et al (2015), which indicates that there is a relationship between protein intake and nutritional status in children under-five. Children under-five who lack protein has a risk of 17.5 times suffering from stunting when compared to children under-five who have adequate protein intake. Protein has a very important influence on the growth of children under-five. The function of proteins for growth, the formation of structural components, and the formation of antibodies.

#### **e. The Relationship between History of CED Pregnancy and Stunting in Children under-five in Tabunganen District, Barito Kuala District**

The mother has a history of pregnant women with CED can 2.308 possibility times more at risk of stunting compared to mothers who have a history of normal pregnant women. The percentage of greater control respondents has a history of normal CED pregnant women, which is 63.0% while in case respondents who have a history of CED pregnant women is 57.5%. According to Arisman (2009), lack of chronic energy is a condition in which mothers suffer from chronic food shortages, which can disrupt health so that the needs of pregnant women for increasing nutrients are not met. It can be caused due to infectious diseases, low education levels, lack of maternal knowledge about nutrition, poor family income, age of <20 years or > 30 years, too close birth distance and working mothers. Problem nutrition of pregnant women are often faced with Chronic Energy Deficiency (CED) and nutritional anemia. Sukmawati et al (2018) state that there is a

significant relationship between the history of CED pregnant women and the incidence of stunting in the work area of Bontoa Health Center, Maros District on April 2017 with a p-value of 0.01. Another study conducted by Fajrina (2016) also stated that there was a significant relationship between the history of CED pregnant women and the incidence of stunting in children under five in Piyungan Health Center, Bantul District with a p-value of 0.01 and OR 4.154. Mothers who have a history of pregnant women CED is likely to be 4,154 times more at risk of stunting than mothers who have a history of normal pregnant women.

#### **f. The Relationship Between Exclusive Breastfeeding, Energy Consumption Levels, Protein Consumption Levels and History of CED Pregnant Women with Stunting Events in Tabunganen District, Barito Kuala District**

The most dominant relationship to the incidence of stunting in Tabunganen Sub-District Barito Kuala District is the level of protein consumption because it has the highest Exp. B value of 4.119. The second dominant variable that is also related to stunting is the level of energy consumption with an Exp B value of 3.778. This is because protein is very important in the process of growth and bone maturity because protein is an essential nutrient in growth. Even though energy intake is sufficient if protein intake is lacking, it will inhibit growth in infants (Oktarina and Sudiarti, 2013). Growth in children under-five will increase the total amount of protein in the body so that it requires greater protein than adults. Protein plays an essential role in transporting nutrients from the digestive tract. Lack of protein will interfere with various processes in the body and reduce the body's resistance to disease (Almatsier, 2009). The quantity and quality of protein consumed affect plasma levels of Insulin Growth Factor I (IGF-I), which is a mediator of growth hormone. Protein also affects the growth of the bone matrix, which has an important role in bone formation (Mikhail et al., 2013). At the age of the first 6 months, almost 50% of the adequacy of baby protein is used for growth. Meanwhile, in the second 6 months approximately 40% adequate protein for growth and rest for body maintenance as well as other purposes. While the baby's energy needs based on body size in the early months of life were also very high but began to decrease in the following months when the growth rate declined. (Fikawati, 2015).

#### **5. Conclusion**

There is a relationship between exclusive breastfeeding ( $p=0.045$ ), energy consumption level ( $p=0.000$ ), protein consumption level ( $p=0.000$ ) and history of CED pregnant women ( $p=0.013$ ) with the incidence of stunting. While birth weight is not related to the incidence of stunting ( $p=0.300$ ). The dominant factor associated with stunting was the level of consumption of Exp. B protein=4.119.

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