

## Risk Factors for Stunting Incidence in Children Under Three in the Working Area of the Korbafo Community Health Center, Pantai Baru Sub-District, East Nusa Tenggara

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### ABSTRACT

**Background:** The incidence of stunting in children under three can be generated by several factors, namely family income, maternal education, maternal knowledge concerning nutrition, energy intake, and protein intake. This study aimed to discover the risk factors for stunting in children under three in Korbafo Community Health Center working area, Pantai Baru Sub-District in 2022.

**Subjects and Method:** The analytical survey study with a case-control study design was conducted in Korbafo Community Health Center working area, Pantai Baru Sub-District, East Nusa Tenggara. A total of 96 children under three divided into 2 groups, 48 children in case group and the other 48 in control group, were selected using purposive sampling. The dependent variable was the incidence of stunting. The independent variables consisted of family income, maternal education, maternal knowledge concerning nutrition, energy intake, and protein intake. The data were analyzed using a simple logistic regression test.

**Results:** The incidence of stunting in children under three increased with low family income ( $b = 1.29$ ; 95% CI= 1.46 to 9.20;  $p = 0.006$ ), low maternal education ( $b = 1.69$ ; 95% CI= 2.26 to 13.20;  $p < 0.001$ ), insufficient maternal knowledge concerning nutrition ( $b = 2.19$ ; 95% CI= 3.57 to 22.67;  $p < 0.001$ ), inadequate energy intake ( $b = 1.86$ ; 95% CI= 2.48 to 16.61;  $p < 0.001$ ), and inadequate protein intake ( $b = 1.79$ ; 95% CI= 2.47 to 14.56;  $p < 0.001$ ), and they were statistically significant.

**Conclusion:** The incidence of stunting in children under three years increases with low family income, low maternal education, insufficient maternal knowledge concerning nutrition, inadequate energy intake, and inadequate protein intake.

**Keywords:** stunting, children under three years old, risk factors.

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## BACKGROUND

Stunting is a condition of the nutritional status of children under five whose body length or height is not in accordance with their age. Children under five are said to be stunting if the child's body length or height is below -2 SD of WHO standards (Ramdhani et al., 2020). One of the health problems often experienced by countries in the world is stunting. More than half of stunted children under five are in Asia at 55%, while more than a third are in Africa at 39% (UNICEF et al., 2018). The prevalence of stunted children under five in Indonesia according to data from the World Health Organization (WHO) shows that from 2005 to 2017 the average stunting prevalence was 36.4% and is the third highest prevalence of stunted children under five in the Southeast Asia region (Pusat Data dan Informasi Kementerian Kesehatan RI, 2018).

Children who suffer from stunting have both short-term and long-term impacts on their growth and development. The short-term impact that can occur in stunted children is for example disruptions in brain development, cognitive, physical growth, and metabolism, while the long-term impact can result in a decrease in the body immunity so that children have a risk of being susceptible to diseases in old age such as degenerative diseases (Anggraini, 2019). The problem of stunting in children can be influenced by various factors. According to Unicef (2012) in (Bulu, 2022) the incidence of stunting can be generated by various factors, both indirectly and directly. Food intake, infectious diseases, low birth weight, and genetics are examples of direct causes of stunting. While indirect factors are maternal knowledge concerning nutrition, parental education, food distribution, family size, and exclusive breastfeeding.

The problem of stunting in children under five requires special attention, in-

cluding children aged one to three years (children under three). The growth process of children at the age of one to three years or known as children under three tends to experience a slowdown thus the chances of catch-up growth is lower than those aged zero to two years. The age of one to three years is the age at which children experience rapid development in motor skills and cognitive abilities (Kusuma & Nuryanto, 2013).

Data from the National Team for the Acceleration of Poverty Reduction, Rote Ndao Regency is one of the Regencies in East Nusa Tenggara Province and is included in the 100 priority regencies for stunting reduction. Puskesmas Korbafo is a Puskesmas in Pantai Baru District which has a high incidence of stunting. Data on the nutritional status of the Korbafo Health Center for the February 2022 period shows that, of the 710 children under three whose height was measured, there were a total of 206 stunted children under three with a prevalence of 29%. The problem of stunting at the Korbafo Health Center is still far from the WHO criteria, which is above 20%, so it is still a health problem. This study aimed to determine the risk factors for stunting in children under three in the working area of the Korbafo Community Health Center, Pantai Baru Sub-district in 2022.

## SUBJECTS AND METHOD

### 1. Study Design

The study method used was quantitative study with analytical survey study and case-control study design carried out in the working area of the Korbafo Community Health Center, Pantai Baru Sub-District, Rote Ndao Regency in December 2022.

### 2. Population and Sample

The population in this study was divided into case populations, namely all stunting

children under three in the Korbafo Health Center work area, Pantai Baru District, who underwent examinations and whose data were recorded at the Korbafo Health Center totaling 109 children under three, while the control population was all children under three who were not stunted in Korbafo Community Health Center work area Pantai Baru sub-district who underwent examinations and whose data were recorded at Korbafo Community Health Center, with a total of 93 children under three. The sample in this study was divided into case sample and control sample calculated using the Lemeshow formula, having inclusion and exclusion criteria with a ratio of 1: 1. The number of samples used was 48 children under three in each group with purposive sampling method.

### 3. Study Variables

The dependent variable was the incidence of stunting. The independent variables consisted of family income, maternal education, maternal knowledge concerning nutrition, energy intake, and protein intake.

### 4. Operational Definition of Variables

**Stunting** is a condition in which a child's body length according to age (PB/U) and a child's height according to age (TB/U) does not match their age, which is under  $-2$  SD. The data were obtained from the nutritional status of children at the Korbafo Community Health Center in 2022.

**Family income** was income per month discovered from the amount of monthly family expenditure including food and non-food expenditures based on the standard Regional Wage Rate of Rote Ndao Regency. The data were obtained using questionnaires.

**Maternal education** was the level of formal education that had been taken by mothers of children under three.

**Maternal knowledge about nutrition** was the ability of mothers of children under

three to answer all questions of the questionnaire related to information or publication about nutrition. The data were obtained using questionnaires.

**Energy intake** was the total amount of energy in the food consumed by children under three during a day in units of kcal, then compared with the RDA using the 1x24 hour food recall form, FFQ, and using the Nutrisurvey application. The data were obtained using questionnaires.

**Protein intake** was the total amount of protein in the food consumed by children under three during a day in units of grams, then compared with the RDA using the 1x24 hour food recall form, FFQ and using the Nutrisurvey application. The data were obtained using questionnaires.

### 5. Study Instruments

The data collected included primary data, which was the data obtained through interviews using questionnaires.

### 6. Data Analysis

The measurement of the risk of stunting incidence in children under three in this study was carried out by calculating the odds ratio using a simple logistic regression statistical test.

### 7. Research Ethics

This study has obtained ethical clearance from the Ethics Commission of the Faculty of Public Health, Nusa Cendana University with an ethics certificate number 2022388-KEPK on November 14, 2022.

## RESULTS

### 1. Sample Characteristics

Descriptively the characteristics of children under three are presented in the form of frequency (n) and percentage (%) distributions which can be seen in Table 1. Table 1 shows that the majority of children under three aged 25-36 months that of 71.9% and most were male at 60.4%. The majority of family income levels were low at 67.7%.

**Table 1. Distribution of Respondents based on Variables studied in the Working Area of the Korbafo Community Health Center, Pantai Baru Sub-District in 2022.**

Study Variables	Category	Frequency	Percentage
<b>Age</b>	12-24 Month	27	28.1
	25-36 Month	69	71.9
<b>Gender</b>	Male	58	60.4
	Female	38	39.6
<b>Family Income Level</b>	Low	65	67.7
	High	31	32.3
<b>Maternal Educational Level</b>	Low	43	44.8
	High	53	55.2
<b>Maternal Knowledge Level on Nutrition</b>	Insufficient	48	50
	Good	48	50
<b>Energy Intake Level</b>	Inadequate	61	63.5
	Adequate	35	36.5
<b>Protein Intake Level</b>	Inadequate	44	45.8
	Adequate	52	54.2

## 2. Bivariate Analysis

The results of the simple logistic regression test in table 2 shows that the family income variable was low ( $b = 1.29$ ; 95% CI = 1.46 to 9.20;  $p = 0.006$ ), low maternal education ( $b = 1.69$ ; 95% CI = 2.26 to 13.20;  $p < 0.001$ ), insufficient maternal knowledge concerning nutrition ( $b = 2.19$ ; 95% CI = 3.57 to 22.67;

$p < 0.001$ ), inadequate energy intake ( $b = 1.86$ ; 95% CI = 2.48 to 16.61;  $p < 0.001$ ), and inadequate protein intake ( $b = 1.79$ ; 95% CI = 2.47 to 14.56;  $p < 0.001$ ) increased the incidence of stunting in children under five and it was statistically significant.

**Table 2. The Association of risk factors for stunting incidence in children under three in the working area of the Korbafo Health Center, Pantai Baru Sub-District in 2022.**

Independent variable	Category	b	95% CI		p
			Lower limit	Uper limit	
<b>Family Income</b>	Low < Rp. 1.950.000	1.29	1.46	9.20	0.006
	High: $\geq$ Rp. 1.950.000				
<b>Maternal Knowledge</b>	Low: Secondary School and lower	1.69	2.26	13.20	<0.001
	High: High School and upper				
<b>Maternal Knowledge concerning Nutrition</b>	Insufficient (< 60% answers)	2.19	3.57	22.67	<0.001
	Good: $\geq$ 60% answers				
<b>Energi Intake</b>	Inadequate: < 77% AKG	1.86	2.48	16.61	<0.001
	Adequate: $\geq$ 77% AKG				
<b>Protein Intake</b>	Inadequate: < 77% AKG	1.79	2.47	14.56	<0.001
	Adequate: $\geq$ 77% AKG				

## DISCUSSION

### 1. The Association of Family Income with the Incidence of Stunting in Children under three.

Family income depends on the type of work performed by husbands, wives and other family members (Suhendri, 2009). Family income will be even greater if the husband, wife or family members work outside the house. The interview results showed that more respondents worked as housewives and their husbands worked as farmers. Based on the results of family income interviews with household expenditure approaches, it was discovered that the average family income level in the Korbafo Health Center work area ranged from Rp 500,000 to Rp 800,000 per month. Although people have foodstuffs, such as rice since they worked as farmers, however they were forced to sell little of what they got to buy other necessities.

The result of this study showed that the income level of most parents was discovered to be classified as low family income at 67.7%. The results of a simple logistic regression test on the family income variable toward the incidence of stunting showed that there was a significant association (Sig. 0.006) between family income with the incidence of stunting with a value of OR = 3.667. This means that respondents with low family income level were 3,667 times more likely to have children with stunting incidence compared to families with high family income.

Families with income level less than the regional minimum wage (UMR) may increase the incidence of stunting. This can happen because families with low-income level cannot afford to buy diverse or varied food ingredients (Agustin & Rahmawati, 2021).

The level of family income can affect the quantity and quality of foodstuffs con-

sumed by the family (Nurmalasari et al., 2020). Based on the results of the interview, it was discovered that the types of food most often given by parents for their children were rice and moringa leaf. Parents provided food sources of protein such as eggs, fish, and chicken for their children when they got more income. Although Moringa has good nutritional content, children must eat a variety of foods to get a variety of nutritional content as well.

### 2. The Association between Maternal Education and the Incidence of Stunting in Children under three

Maternal education is one of the indirect factors affecting the incidence of stunting in children under three. Generally, the mother is the main caregiver for her child. Mothers with a high level of education generally have extensive knowledge of childcare practices, able to maintain and care for the residential environment to keep it clean, while mothers with low education will find it difficult to assimilate information including information about stunting problems and nutritional needs of children (Nurmalasari et al., 2020).

The result of a simple logistic regression test on maternal education variable toward the incidence of stunting showed that there was a significant association (Sig. 0.000) between maternal education with the incidence of stunting with a value of OR= 5.47. This means that mothers with low levels of education were 5.47 times more likely to have children with a stunting incidence compared to mothers who had a high level of education. Education is related to one's knowledge. The mother's ability to absorb information depends on the level of education that has been taken. The more knowledge a mother has depends on the higher level of education she has taken. Conversely, poorly educated mothers have

less knowledge and will hinder the development of attitudes towards values (Wardani, 2017). Based on the results of interviews, researchers discovered that numerous mothers did not know information about nutrition such as the nutritional content of foods e.g., protein, carbohydrates, vitamins and minerals, there were even mothers who still did not know what stunting is.

The level of education of mothers indirectly affects the ability of mothers to arrange menus, choose and shop for food-stuffs, cook, serve, and distribute food accordingly to each of their children based on their needs respectively. Mothers who have good nutritional knowledge will consider the type and amount of food that will be given to their children (Rahayu & Khairiyati, 2014).

### **3. The Association of Maternal Knowledge about Nutrition with the Incidence of Stunting in Children under three.**

Through the eyes and ears one can gain knowledge (Notoatmodjo, 2014). According to Sediaoetama (2010) The knowledge that a person has is the result of knowing after doing a sensing activity on an object. Knowledge can be obtained through formal education, through social media such as Google, counseling, books, newspapers, and others. Maternal knowledge about nutrition includes information that mothers know about nutrition such as nutritional content in food and how to process and serve food to the family. Poor nutritional status of children can be caused by lack of knowledge about nutrition in mothers resulting in a lack of ability to apply information, especially about nutrition (Susanti, 2018).

The results of a simple logistic regression test on the maternal knowledge variable about nutrition toward the incidence of stunting showed that there was a

significant association (Sig. 0.000) between maternal knowledge about nutrition and the incidence of stunting with a value of OR= 9.00. This means that mothers with a less level of nutritional knowledge were 9,000 times more likely to have children with stunting incidence o compared to mothers who have a good level of nutritional knowledge. It is important for mothers to know the nutritional fulfillment for children, that depends on the age of each child. Good nutritional knowledge can determine the behavior of mothers in providing food for their children (Sari et al., 2020). Mothers who have good nutritional knowledge will choose, process. and serve good food with the amount and type of food according to the nutritional needs of their children.

Based on the results of interviews, it was discovered that a lot of mothers did not know the nutritional content of foods such as protein, carbohydrates, vitamins and minerals, and exclusive breastfeeding. There were respondents who had good nutritional knowledge but their children were stunted. This is because good nutritional knowledge was not supported by family income. Low family income forces parents to feed their children meagerly.

### **4. The Association of Energy Intake with the Incidence of Stunting in Children under three.**

Energy can be obtained from micronutrients such as carbohydrates, proteins and fats. Energy sources derived from carbohydrates of 4 kcal/g, protein 4 kcal / gr, and fat of 9 kcal/g. The results of a simple logistic regression test on the energy intake variable toward the incidence of stunting showed that there was a significant association (Sig. 0.000) between energy intake and the incidence of stunting with a value of OR= 6.42. This means that children under three with inadequate energy intake level were 6.42 times more likely to be

stunting compared to children under three who had adequate energy intake.

The adequacy of energy intake consumed greatly affects the growth process of children under three. Energy needs in children under three will increase along with increasing body size and child activity. The energy needs of children aged one to three years according to the Regulation of the Minister of Health Number 28 of 2019 concerning Recommended Daily Allowance (RDA) is 1350 kcal / day. If the energy intake of children under three is not in accordance with the adequacy of energy needed by the body, then the body will use the energy reserves in the muscles. If this problem lasts for a long time, it can cause an energy imbalance resulting in the children's growth is not in accordance with age, which is called stunting.

Moringa leaf clear soup are mothers' mainstay menu to be served to family including children because it is easy to obtain and considered containing good nutrients. This presumption is not entirely true because moringa contains phytochemicals that can inhibit the absorption of iron in the body, such as tannins, sterols, flavonoids, terpenoids, anthraquinones, saponins, alkaloids, and reducing sugars (Arviyani et al., 2022). This is in line with what was said by (Taringan et al., 2020) that in Moringa leaves contains phytate that can inhibit iron absorption. Iron deficiency can affect a child's physical and even mental development (Badriah, 2014).

There is an interaction between iron intake and the incidence of stunting. This is because the inhibition of immune system activation can be caused by low iron intake so that inflammation is easy to occur when exposed to infectious diseases and repeatedly occurring, it can contribute to the incidence of stunting (Sirajuddin et al., 2020).

## **5. The Association of Protein Intake with the Incidence of Stunting in Children under three.**

Protein has a major role in a child's growth. According to Pipes (1985) in (Rahayu et al., 2018) protein as an energy provider also has an essential function to ensure normal growth. Vegetable protein sources for example are legumes such as soybeans, peas, and seeds such as wheat, while animal protein sources are for example beef, mutton, lamb, chicken, fish, eggs, milk and processed products (Marmi, 2013). Protein is divided into essential amino acids (obtained from food) and non-essential amino acids (produced by the body itself). Similar to carbohydrates, protein as an energy source provides four kcal per one gram of protein. Children aged one to three years (children under three) need protein intake of 20 grams / day. If the level of protein intake in children under three is not appropriate, it can cause protein reshuffling in the body so that the use of protein as growth and building substances can be hampered and being ignored over time it will cause stunting (Bulu, 2022).

The results of a simple logistic regression test on protein intake variable toward the incidence of stunting showed that there was a significant association (Sig. 0.000) between protein intake and the incidence of stunting with a value of OR = 6,000. This means that children under three with inadequate protein intake levels were 6,000 times more likely to be stunting compared to children under three who had adequate protein intake.

The low quality and quantity of protein intake, as well as protein consumption that is less varied over a long period of time can cause children's nutritional status to be disrupted and at risk of stunting. Based on the results of interviews, researchers found that most children under three

who suffer from stunting only consume rice and porridge, or clear Moringa soup and rice without being accompanied by animal side dishes or other protein sources. Mothers more often serve carbohydrate food sources, namely rice and vegetables that are available around the house such as moringa, while children need protein to support their development and growth including height and brain growth.

#### **AUTHOR CONTRIBUTION**

Aprianjen Yehentina Kekado was the main researcher, Lewi Jutomo and Rut Rosina Riwu were supervisors in writing the article.

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This study is self-funded.

#### **CONFLICT OF INTEREST**

There is no conflict of interest in this study.

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