

## Factors Associated with Stunting in Adolescents in Pariaman, Padang, West Sumatera, Indonesia

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### ABSTRACT

**Background:** Stunting refers to irreversible physical growth retardation accompanied by cognitive decline that can last a lifetime and affect the next generation. This research was conducted to determine the factors that influence the incidence of stunting in adolescents at the Youth Posyandu Kota Pariaman.

**Subjects and Method:** This was a cross sectional study. The population is all adolescents aged 10-18 years who are registered at the Kp. Jawa I with 52 people and Andestura Tungkal Selatan integrated health posts with 34 people. The sampling technique uses total sampling. Statistical test used chi square bivariate analysis. The dependent variable was stunting. The independent variables were gender, age, physical activity, and socioeconomic.

**Results:** The results showed that gender ( $p=0.899$ ), age ( $p=0.082$ ), and physical activity ( $p=0.829$ ) had no effect on the incidence of stunting in adolescents. Socioeconomic effect on the incidence of stunting in adolescents ( $p < 0.001$ ).

**Conclusion:** There is no influence between gender, age, physical activity on the incidence of stunting because the nutritional status of stunting illustrates a disturbance in height growth that lasts for a long period of time so that it cannot be described by gender, age or physical activity. Socioeconomic status that can affect the growth process includes income. Family income affects a person's ability to access certain foods which will affect the nutritional status of children. Someone with a low socioeconomic status has limited ability to access certain foods, so they are at risk of consuming less food.

**Keywords:** gender age, physical activity, socioeconomic, stunting.

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### BACKGROUND

Stunting is an event of chronic malnutrition

or lasts for a long time characterized by height for age below  $-2SD$  World Health Organization standards (WHO, 2010). According to

the Ministry of Health (2018), stunting is a state of long-term malnutrition caused by malnutrition over a long period of time, causing problems with child development, namely the child's height is low or shorter than the standard age. Stunting occurs when children are under five years old (toddlers) which is a critical period in the human life cycle where in toddlers, children experience the most rapid physical growth or it is called the golden age.

Globally according to the 2018 WHO/ World Health Organization report, the prevalence of stunting in adolescents in the world is 14.9% and in the region with the highest prevalence in Southeast Asia at 27.3%. Data from Riskesdas (Basic Health Research) 2018 shows the prevalence of stunting in Indonesia in adolescents aged 16-18 years in 2013 reached 2.5% and reached 4.5% in 2018. West Sumatra Province is one of the provinces with stunted youth. According to the 2018 Riskesdas data, the incidence of stunting in adolescents aged 16-18 in the province of West Sumatra reached 3.7%. Judging by the gender category on the height/age indicator, for adolescents aged 16-18 years who experienced stunting, namely 5.5% in adolescent boys, above the national rate of 4.5% and 3.5% for female adolescents.

Pariaman City is one of the areas in West Sumatra Province where teenagers also experience stunting. Riskesdas (2018) states that the prevalence of nutritional status indicators for height/ age in adolescents aged 13-15 years in Kota Pariaman for the short category is 15.05% and the very short category is 4.61%. This figure is still below the average rate for the province of West Sumatra, namely for the short category is 18.39% and the very short category is 7.21%.

Factors that affect stunting in adolescents such as sociodemographic (place of

residence, socio-economic, number of family members, age, gender and environment) and eating habits (skipping meals/ breakfast, eating outside the home (fast food), tea drinking habits, alcohol consumption, less frequent meals and poor/ restricted dietary habits) (Arage et al., 2019; Setiawan et al., 2018; Rengma et al., 2016; Getaneh et al., 2019; Maged et al., 2019; Pius et al., 2020).

Based on the results of an initial survey of research at the youth posyandu in Pariaman City that at the Anggun Nan Tingga youth Posyandu Kampung Jawa 1 Kota Pariaman, it was found that out of 20 teenagers, as many as 2 people had stunting nutritional status according to height/age. then in the Andestura Posyandu, Tungkal Selatan Village, North Pariaman, out of 22 teenagers, 2 people also have stunting nutritional status. This research was conducted to determine the factors that influence the incidence of stunting in adolescents at the Youth Posyandu Kota Pariaman.

## SUBJECTS AND METHOD

### 1. Study Design

The research design used was a cross sectional study.

### 2. Population and Sample

The population is all adolescents aged 10-18 years who are registered at the Kp. Jawa I with 52 people and Posyandu Andestura Tungkal Selatan with 34 people. The sampling technique used total sampling, namely making the entire population a total sample of 86 respondents.

### 3. Study Variables

The research variables are divided into two parts, namely the independent variables in the form of gender, age, physical activity and socio-economic. While the dependent variable is the incidence of stunting.

### 4. Operational Definition of Variables

Stunting is a condition of growth failure due

to long-term (chronic) malnutrition as indicated by a z-score of height/ age (years)  $< -2$  SD.

**Gender** is the biological difference between men and women

**Age** is the life span of adolescents as measured by years.

**Physical activity** is a movement performed by adolescents that requires energy expenditure.

**Socio-economic** is measured based on the amount of income of a teenager's family each month.

## 5. Study Instruments

The instruments used in this study were a microtoe to measure height, a questionnaire on respondent data to record age, gender and socioeconomic (income) for adolescent families, and a PAL questionnaire to measure physical activity in adolescents.

## 6. Data Analysis

Factors related to the incidence of stunting in adolescents were analyzed by Chi square, reporting the odds ratio and confidence interval (CI 95%).

## 7. Research Ethic

This research was approved by the Research Ethics Committee of the Faculty of Medicine, Universitas Sebelas Maret on March 14 2022.

nagers in this study was 16 years. The average family income is IDR 2,393,244. The average physical activity carried out by adolescents is 1.6 PAL. The average teenager has a height of 154 cm. The average Z-score for height per age is  $-1.51$ .

The description of stunting in adolescents is explained in Table 2. The total number of adolescents who are female is 44 people (51.6%) and adolescents who are male are as many as 42 people (48.84%). Respondents who did not experience stunting were 64 people (74.4%) and respondents who experienced stunting were 22 people (25.6%).

## 2. Bivariate Analysis

Table 3 shows the results of the Chi square analysis. Table 3 shows that male and female adolescents have the same tendency to experience stunting (OR= 1.06; 95% CI= 0.39 to 2.73;  $p = 0.899$ ).

Adolescents aged  $< 15$  years are 2.4 times more likely to experience stunting than adolescents in the age group  $\geq 15$  years (OR= 2.4; 95% CI= 0.87 to 6.32;  $p = 0.082$ ).

Adolescents with moderate physical activity (PAL  $\geq 1.70$ ) had a lower risk of stunting than adolescents with low physical activity (PAL  $< 1.70$ ) (OR= 0.87; 95% CI= 0.24 to 2.96;  $p = 0.829$ ).

Adolescents with family income  $< \text{IDR } 1,990,170$  tend to experience stunting 13.3 times than adolescents with family income  $\geq \text{IDR } 1,990,170$  (OR= 13.33; 95% CI= 4.06 to 42.09;  $p = < 0.001$ ).

## RESULTS

### 1. Sample Characteristics

Table 1 shows the characteristics of a sample of youth at the youth posyandu in Pariaman, Padang, Indonesia. The average age of tee-

**Table 1. Characteristics of adolescents based on continuous data**

Variable	Mean	SD	Minimum	Maximum
Age (year)	16.3	1.35	13	18.9
Income (Rp)	2,393,344	1.24	1.600,000	4,300,000
Physical Activity (PAL)	1.6	0.16	0.9	2.3
Height/ age (Z Score)	-1.51	1.4	-3.46	0.66
Body height (cm)	154	0.09	130	180

**Table 2. Characteristics of adolescents based on categorical data**

Variable	Frequency (n)	Percentage (%)
<b>Genre</b>		
Female	44	51.16
Male	42	48.84
<b>Category of height/ age</b>		
Normal	64	74.4
Stunting	22	25.6

**Table 3. Chi Square results of the relationship between gender, age, physical activity, and socio-economics on stunting in adolescents in Kota Pariaman**

Independent Variable	Not Stunting		Stunting		OR	CI 95%		p
	n	%	n	%		Lower limit	Upper limit	
Gender								
Male	31	73.8	11	26.2	1.06	0.39	2.73	0.899
Female	33	75.0	11	25.0				
Age								
< 15 years	24	64.9	13	35.1	2.40	0.87	6.32	0.082
≥ 15 years	40	81.6	9	18.4				
Physical activity								
Inadequate <pal 1.70	13	76.5	4	23.5	0.87	0.24	2.96	0.829
Adequate pal ≥ 1.70	51	73.9	18	26.1				
Social Economic								
Income <Rp1.990.170	13	43.3	17	56.7	13.33	4.06	42.1	<0.001
Income ≥Rp 1.990.170	51	91.1	5	8.9				

## DISCUSSION

### 1. The relationship between gender and stunting in adolescents

The results of this study indicate that male adolescents have a tendency of 1,065 times to experience stunting compared to female adolescents, but this is not statistically significant.

This could be due to the effects of differences in growth. Girls enter puberty two years earlier than boys. Thus, their maturation and growth period occurs earlier and their growth stops two years earlier than male adolescents (Bosch et al., 2008). Gender describes a person's characteristics based on physical and biological. Gender is an internal factor that determines a person's nutritional needs so that the relationship between gender and nutritional status is very influential. This can be because male

adolescents tend to have more physical activity than female adolescents (Barker, 2005).

Stunting nutritional status describes a disturbance in height growth that lasts for a long period of time (Rahayu and Casnuri, 2020). In more detail, it is stated that the causes of stunting are very diverse and complex, but in general they are categorized into three factors, namely the basic causes, which consist of economic, social, and political factors; indirect causes (underlying causes) consisting of factors of food availability, parenting style, and health services; and direct causes (immediate causes) which consist of factor intake of nutrients and infectious diseases (ACC/ SCN\_IFPRI, 2000). The results of this study are in line with Ramadhan et al. (2019) that there is no relationship between gender and stunting in adolescents.

## **2. The relationship between age and stunting in adolescents**

The results showed that age was not related to stunting in adolescents. This can be caused by stunting in adolescents occurring due to nutritional problems during toddlers or pre-school. Malnutrition that occurs in toddlerhood which indicates stunting, will result in stunted growth and development of adolescents (Alwi et al., 2022). Stunting is a condition of growth failure in children (body and brain growth) due to prolonged malnutrition. Thus, children are shorter than normal children of their age and have delays in thinking. Malnutrition for a long time occurs from the time the fetus is in the womb until the beginning of a child's life (the first 1000 days of birth). This is due to low access to nutritious food, low intake of vitamins and minerals, and poor diversity of food and sources of animal protein. Maternal factors and poor parenting styles, especially in the behavior and feeding practices of children, are also the cause of child stunting if the mother does not provide adequate and good nutrition. Mothers whose teenage years lacked nutrition, even during pregnancy, and lactation will greatly affect the growth of the child's body and brain. Other factors that cause stunting are infection in the mother, teenage pregnancy, mental disorders in the mother, short birth spacing, and hypertension. In addition, low access to health services including access to sanitation and clean water is one of the factors that greatly affects children's growth (Ministry of Health RI, 2018).

## **3. The relationship between physical activity and stunting in adolescents**

The results showed that physical activity was not related to stunting in adolescents. This can be caused by the activities carried out by teenagers in the youth Posyandu itself. Sari et al. (2022) stated that physical activity is a way to stimulate children so that they do not

experience stunting which includes all kinds of bodily activities including sports as an effort to balance expenditure and intake of nutrients, the main source of energy in the body. In addition, physical activity also facilitates the metabolic system in the body, including the metabolism of nutrients. Therefore, physical activity plays a role in balancing the nutrients that go out and those that enter the body.

This study shows that adolescents with sufficient physical activity PAL >1.70 experience stunting (26.1%). This can happen because the type of physical activity carried out by adolescents determines the stunting conditions they experience. Stunted children spend more time doing physical activities that emit low energy (Harahap et al., 2015). The results of previous studies in Cameroon showed that stunted children have lower energy expenditure compared to children of normal height. Low energy expenditure is a form of adaptation of the body to carry out light activities (Said-Mohamed et al., 2012)

Although physical activity can affect the incidence of stunting, the incidence of stunting does not just happen in adolescence. This is because the nutritional status of stunting illustrates a disturbance in height growth that lasts for quite a long time (Rahayu and Casnuri, 2020). Stunting in adolescents occurs due to nutritional problems during toddlers or pre-school. Malnutrition that occurs in toddlerhood which indicates stunting, will result in stunted growth and development of adolescents (Alwi et al., 2022). The results of this study are consistent with the results of research by Rahmawati et al. (2018) stating that there is no significant relationship between physical activity and the incidence of stunting in adolescents.

#### **4. Socio-economic relations and stunting in adolescents**

The results showed that adolescents with low family income (<IDR 1,990,170) were more at risk of stunting than adolescents with high family income (>IDR 1,990,170).

The results of observations on adolescents with parents whose socioeconomic conditions were less than Rp. 1,990,170 were only concerned with fulfilling food but not too concerned with meeting the nutritional needs of children. This condition causes the possibility of giving food by parents to children who do not pay much attention to the diversity of food consumed and the possibility of parenting in children is not given too much attention because they are too busy at work or the type of food consumed has poor nutritional quality. One use of income is to spend it on consumer goods. Spending income on consumer goods is done to maintain the standard of living. Food consumption is the most important factor because food is the main type of goods to maintain survival, but if the value of income is low, it will be used as fulfillment without regard to other elements such as nutrition.

This is in accordance with the opinion expressed by Johnston (2002), that people who are socially and economically marginalized greatly affect the growth status of children, including the growth of children which can cause the risk of stunting. Wahyuni and Fithriyana (2020) also stated that increasing income will increase the opportunity to buy food with better quality and quantity, whereas a decrease in income will cause a decrease in the purchasing power of food, both in quality and quantity. High income, which is not matched by sufficient knowledge of nutrition, will cause a person to become very consumptive in his daily diet, so that the selection of a food ingredient is based more on taste considerations than on

nutritional aspects. A state that is not stunted occurs when the body gets enough nutrients to be used efficiently, thus enabling physical growth, brain growth, work ability and general health at the highest possible level. Malnutrition occurs when the body experiences a deficiency of one or more of the more essential substances.

#### **AUTHOR CONTRIBUTION**

Azzahra Nadya Putri as the owner and who conducted the research, Yulia Lanti Retno Dewi and Aditya Nanda Priyatama as supervisors during the research writing.

#### **CONFLICT OF INTEREST**

There is no conflict of interest in this study.

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