



## Stunting Incidence in Infant Related to Mother's History During Pregnancy

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### Abstract

Stunting in an infant aged under two years old will affect the health and well-being of the children in the future. Banyumas Regency has 10 stunting locus villages with various nutritional problems that could lead to the incidence of stunting. Diet, nutritional status, and mother's history during pregnancy will affect stunting in infants aged under two. This study aims to determine the relationship between the incidence of stunting in under-two infants related to parenting styles and mother's history during pregnancy in stunting locus villages in Banyumas Regency. This study used a case-control design using a total sampling technique with 181 respondents. This type of data was collected through interviews using a questionnaire to mothers of the infants aged under two. While the measurement of body height and weight of under-five children was derived from the latest weighing data conducted by research enumerators using infatometers and digital baby scales. There was no relationship between maternal age ( $p = 0.21$ ), birth spacing ( $p = 0.63$ ), nutritional status ( $p = 0.40$ ) with the incidence of stunting, and there was a significant relationship between maternal parenting styles and the incidence of stunting ( $p = 0.04$ ).

### Introduction

Several low and middle-income countries are facing the double burden of malnutrition. It is characterized by facing the problem of malnutrition and an increasing incidence of overweight and obesity (Demaio & Branca, 2018). One of the chronic nutritional problems in infants aged under two that becomes the world's concern is stunting or shortness in body length or height. Eighty percent of under-five children were reported to be stunted in 14 countries worldwide. Indonesia is in the 5th with the number of stunting (UNICEF, 2013). Stunting is the result of a formula measurement by dividing body length or height according to age which value is less than minus 2 Standard Deviations (-2 SD) from the World Health Organization (WHO) reference of median value (Ikeda et al., 2013). Stunting that occurs in infants aged under two could lead to poor health of children in the future, such as short

height during adulthood, poor learning performances, and risks of developing chronic diseases (Dewey & Begum, 2011).

In Southeast Asia, the prevalence of under-five children with stunting has reached 33.8%, and Indonesia is in fifth place with the highest number of stunting amongst 81 countries in the world (Ohyver et al., 2017). The prevalence of stunting under-five children becomes a public health problem if its prevalence exceeds up to 20%. According to Basic Health Research Results in 2018, the prevalence of stunted children in Indonesia reached 29.6% (Kemenkes, 2018). So stunting in Indonesia is one of the health problems that need to be addressed.

The causes of growth faltering in toddlers are maternal parenting style and family income. Another study also has identified maternal factors that have a role in under-nourished children under five years old, such as education,

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nutrition knowledge, unemployed mother, parenting style of feeding, and exposure to information. The following research also identified the factors that influenced stunting in children aged 6 to 24 months. They are infectious disease, food availability, and environmental sanitation. The incidence factors of stunting under two were short body posture of the mother, short birth spacing, maternal age either too young or too old during pregnancy. Other factors also come from the baby, socio-economy, and environment (Kemenkes, 2018). Furthermore, those factors related to the incidence of stunting from the previous studies mentioned above lead to this study to choose the independent variables that were parenting styles and mother's history namely maternal age, birth spacing, and mother's nutritional status.

Infants aged more than 6 months to two years old or under two years old are vulnerable groups. At that age, complementary foods should be introduced, since it's also resulting in the importance of parents as the vital role in parenting styles, especially the mothers in implementing the right complementary foods' quantity and quality for the children (García Cruz et al., 2017). The feeding patterns then affect the growth and development of under-two infants because malnutrition is irreversible during that moment. Hence it requires good nutritional intake. Maternal behavior seen from parenting and adverse health and health is more common in stunting children (Pertiwi et al., 2019).

Antenatal Care (ANC) also affects the nutritional status of under-two infants. Antenatal care (ANC) is the obstetric care for pregnant women who aim to maintain the health of pregnant women and ensure to have a healthy pregnancy by conducting ANC at least four times before delivery. Pregnant women who are more frequently checking on their pregnancy at health facilities are less likely to experience chronic malnutrition (Khan et al., 2019). This ANC access will indirectly affect the health of under-two infants, both in the short and long terms (Addo et al., 2013).

Banyumas Regency is one of the districts included in the 100 priority cities/districts for the stunting program (Tim Nasional

Percepatan Penanggulangan Kemiskinan, 2018). Banyumas Regency has 27 sub-districts with a stunting prevalence of 33.49% in 2013, and 10 villages are included in 1000 Villages in Phase 1 Priority Districts or Cities 2018 (Tim Nasional Percepatan Penanggulangan Kemiskinan, 2018). Because of its position as a locus stunting village in one of the priority cities and based on those mentioned, the purpose of this study was to determine the relationship between the incidence of stunting in under-two infants related to parenting styles and mother's pregnancy history at stunting locus villages in Banyumas Regency.

## Methods

This research was an analytic observational study with a case-control study design. There were ten stunting locus villages in Banyumas Regency that were used to be selected as study area, namely Gunung Wetan Village, Karanglewas Village, Gentawangi Village, Srowot Village, Karangendep Village, Paningkaban Village, Banjarnyar Village, Gununglurah Village, Datar Village and Pandak Village. Data collection was carried out in October-November 2019. This study used a total sampling technique for selecting case samples with a 1: 1 comparison of case samples and controls. Sampling for control was determined by matching techniques based on gender and age. The case and the control groups were then chosen by meeting the inclusion and exclusion criteria. The case group inclusion criteria were children with stunting and their parents' willingness to be a respondent. Meanwhile, the exclusion was children with congenital impairments or physical disabilities. For the control group, the inclusions criteria were children without stunting and their parents' willingness to be a respondent. For exclusion criteria namely children with congenital impairment and has physical disabilities.

The dependent variable in this study was the incidence of stunting, while the independent variables were parenting styles, mother's nutritional status during pregnancy, and the number of visits to health facilities during pregnancy. This type of data was collected through interviews using a

questionnaire to the Mothers of under-two infants, while the measurement of body height and weight of under-five children was derived from the latest weighing data conducted by research enumerators using infatometers and digital baby scales. Maternal age is categorized as at risk when maternal age > 30 years and not at risk if the maternal age is ≤ 30 years. Birth spacing is considered at risk if it's <2 years and not if it's ≥ 2 years. This research has received approval from the Ethics Commission of the Faculty of Health Sciences, Jenderal Soedirman University No. 002 / EC / KEPK / X / 2019. Data analysis was conducted to see the relationship between variables and odds ratio (OR) using the Chi-Square or Fisher Exact test if the requirements for the Chi-Square test were not met with a confidence level of 95% ( $\alpha = 0.05$ ).

## Results and Discussions

The characteristics of the research

subjects are listed in Table 1 below. The number of study subjects was 181 infants aged (0-24 months) with an average z-score of body length according to age (height/age) of the case group was  $-2.9 \pm 1.4$  and in the control group was  $-0.6 \pm 1.4$ . The mean age of under-two infants' mothers in the case group was 30.8 years old and in the control group was 29.9 years old. Most of the under-two infants' mothers in both groups work as a housewife up to 93.4% in the case group and 90% in the control group and had the latest education, namely graduating from elementary school, 41.4% in the case group, and 36.5% in the control group. Most of the under-two infants' fathers work as laborers, namely 60.2% in the case group and 51.4% in the control group, and had the latest education, namely graduating from elementary school, 39.8% in the case group, and 38.1% in the control group.

Table 1. Characteristics of Respondents

Variables	Case	Control
	n= 181	n= 181
<b>Mother's Age</b> (year)	30,8 ± 6,7	29,9 ± 6,2
<b>Body Height/Age of under-two infants</b> (z-score)	-2,9 ± 1,4	-0,6 ± 1,4
<b>Gender of the under-two</b>		
Male	108 (59,7%)	95 (52,5 %)
Female	73 (40,3 %)	86 (47,5 %)
<b>Mother's Occupation</b>		
Housewife	169 (93,4 %)	163 (90 %)
Farmer	1 (0,5 %)	0 (0 %)
Civil servant/Army/Police Officer	1 (0,5 %)	5 (2,8 %)
Teacher	7 (3,9 %)	7 (3,9 %)
Employee	3 (1,7 %)	6 (3,3 %)
<b>Father's Occupation</b>		
Farmer	7 (3,9 %)	6 (3,3 %)
Civil servant/Army/Police Officer	4 (2,2 %)	2 (1,1 %)
Teacher	33 (18,2 %)	43 (23,8 %)
Employee	28 (15,5 %)	37 (20,4 %)
Laborer	109 (60,2 %)	93 (51,4 %)
<b>Latest Education of the Mother</b>		
Not graduated from Elementary School	9 (5 %)	4 (2,2 %)
Elementary School Graduate	75 (41,4 %)	66 (36,5 %)
Middle School Graduate	57 (31,5 %)	67 (37 %)
High School Graduate	33(18,2 %)	32 (17,7 %)
University Graduate/higher	7 (3,9 %)	12 (6,6 %)
<b>Latest Education of the Father</b>		
Not graduated from Elementary School	11 (6,1 %)	5 (2,8 %)
Elementary School Graduate	72 (39,8 %)	69 (38,1 %)
Middle School Graduate	50 (27,6 %)	50 (27,6 %)
High School Graduate	44 (24,3 %)	47 (26 %)
University Graduate/higher	4 (2,2 %)	10 (5,5 %)

Source: Primary Data, 2019

The relationship between the risk factors and the incidence of stunting is shown in Table 2 below. Most of the maternal age was in the group without risk (age during pregnancy <30 years), the birth spacing was not at risk (> 2 years), and the nutritional status of the mother during pregnancy was normal. Based

on the chi-square test, there was no relationship between maternal age, birth spacing, and maternal nutritional status with the incidence of stunting in under-two infants in Banyumas Regency. Maternal parenting style in under-five had a significant relationship with the incidence of stunting with a p-value of 0.04 ( $p < 0.05$ ).

Table 2. Risk Factors Relationship in the Incidence of Stunting

Variables	Case		Control		p-value
	n	%	N	%	
<b>Maternal age</b>					
Risk	38	21	48	26,5	0,21
No Risk	143	79	133	73,5	
<b>Birth spacing</b>					
Risk	159	87,8	158	86,2	0,63
No Risk	22	12,2	25	13,8	
<b>Mother's Parenting Styles</b>					
Not very good	78	43,1	103	56,9	0,04
Good	103	56,9	78	43,1	
<b>Nutritional Status of Mother</b>					
Underweight	29	16	38	21	0,40
Normal	117	64,6	114	63	
Overweight	35	19,4	39	16	

Source: Primary Data, 2019

The results of this study indicated that maternal age was not significantly associated with the incidence of stunting. Maternal age in <20 years old or >30 years old has a greater risk of their lifetime death or fetal death, either during pregnancy, delivery, or during the puerperium. The results found the prevalence of stunting in Indonesia in 2014 was 36.6%. The stunting prevalence is higher in toddlers of married mothers of adolescents (42.4%) compared to mothers of married mature (35%) (Simbolon et al., 2021). Entering the age of 30, pregnant women experienced decreasing in their digestibility of several nutrients, makes their nutritional intake was not well balanced, and might experienced decreasing in body resistance that leads to a greater risk of experiencing various diseases (Green et al., 2018).

The result obtained was different between the previous studies and this study. Previous research conducted in West Java showed the majority of under-five children indicated as stunted were found due to mothers' risky age to be in pregnancy and had a significant relationship between them (Sani et al., 2019). Other studies also showed that maternal age

affects on the incidence of stunted infants (Rahmawati et al., 2018). Two previous studies have stated that the risk of maternal age was more in subjects who had a history of early marriage or were pregnant at the age of under 20 years old (Sani et al., 2019). However, the main difference between the results in this study and the previous study might be the percentage of respondents. The number of maternal age with no risk during pregnancy both in control and case group were higher in percentage.

Birth interval is the length of time between a child's birth and a previous and/or subsequent sibling's birth. A short subsequent birth interval can place the child at risk for several reasons. Long birth interval affects maternal, child healthy, and nutritional outcomes, while the short birth spacing could lead to preterm birth and low birth weight as the mother may not have recovered her nutritional status yet (Afeworki et al., 2015). Another study revealed that birth spacing influences the outcome of mother, newborn, and child. The prevalence of stunting and underweight decreases as birth spacing increases. Moreover, previous birth spacing of at least 36 months was associated with a 10–50% reduction in

childhood stunting. Contrarily, birth spacings of less than 12 months and 12–23 months were associated with higher risks for stunting as compared to 24–35 months (Chungkham et al., 2020).

Sufficient pregnancy or birth interval allows the mother to recover optimally and creates good parenting styles (Kinyoki et al., 2016). However, the result in Table 2 showed that at-risk-birth interval did not have a significant relationship with the stunting in the Banyumas Regency. It could happen due to the high proportion of risk pregnancies in each group. Another study in India conducted by (Chungkham et al., 2020) also showed the result of stunting and underweight percentage among the children born after birth interval of fewer than 24 months is higher than the percentage of stunting and underweight among the children born after birth interval of greater than 59 months. Children born after birth interval of fewer than 24 months experienced 46% of stunting. But there was no significant association between the outcomes (stunting and underweight) and preceding birth interval in the Union Territories (Chungkham et al., 2020).

Inadequate mother's nutritional status before delivering process as indicated by the Body Mass Index (BMI), could also cause inadequate nutritional-intake of the babies the mothers carrying (Abeway et al., 2018). Maternal nutritional factors before and during pregnancy are among indirect causes of infant growth because pregnant women with malnutrition may cause the fetus to experience malnutrition and low birth weight (LBW). Thus, growth failures became crucial to treat and eventually leads the baby to become stunted. In the past studies, maternal nutritional status was assessed by the incidence of Chronic Energy Deficiency (CED). CED is a marker of malnutrition for a long time. The CED occurred in pregnant women will be riskier in giving birth to children with short body lengths and might last until they are infants.

Stunting can be caused by several factors, one of which is the parenting factors. Parents play a vital role in shaping children's eating behaviors through parenting styles and feeding patterns (Wang et al., 2017). During the

postnatal period, adequate feeding can prevent further effects of poor intrauterine growth (Titaley et al., 2019). After delivery, if dietary intake is inadequate, aggravated by unhealthy environmental conditions, children will have an increased susceptibility to infections, thus leading to poor absorption of nutrients and eventually leading to poor growth (Rahman, 2016). In this study, maternal parenting style in under-five had a significant relationship with the incidence of stunting with a p-value of 0.04 ( $p < 0.05$ ). This study found that parenting styles as poor feeding patterns included delaying feeding of the under-two infants, not paying attention to quality and quantity of nutritional needs that could cause stunting in under-two infants. Pertiwi et al. (2019) also stated that parenting style through poor feeding is the main factor that causes stunting in under-two infants. Feeding patterns are related to eating consumption patterns. They include food hygiene, preparing food, food safety, eating habits. Providing good quality foods is very important in determining the quality of the stunting incidence. Poor quality of feeding is indicated by low variation (less than four variations of food/drink in a day), low consumption of meat-protein sources, and low intake of micronutrients (vitamins and minerals). Well-fed infants who get at least four variations of food daily would likely have lower risks of stunting (Balalian et al., 2017). Furthermore, infants who started complementary feeding at six months showed a lower risk of stunting than those who only received complementary breastfeeding for less than six months (Abeway et al., 2018). Breastfeeding needs to be accompanied by the provision of complementary foods because breast milk alone is not enough to meet the nutritional needs of under-two.

## Conclusions

There was no significant relationship between the mother's history during pregnancy and the incidence of stunting in the stunting locus villages in Banyumas Regency. However, there was a significant relationship between maternal parenting styles and the incidence of stunting in stunting locus villages in Banyumas Regency. Researchers would like

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