

Factors Related to Stunting Events in Children

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Abstract

One of Indonesia's nutritional problems is stunting (short stature), which occurs as a result of chronic nutrient deficiencies during pre and post-natal periods. The impact caused by stunting in early childhood is related to mental deterioration and the level of intelligence of children, cognitive, psychomotor, and motor development, as well as in adulthood the risk of reducing workability and susceptibility to continuing infectious diseases that can lead to death. This study aimed to analyze the factors associated with the incidence of stunting in children under five. This research is a quantitative study with a cross-sectional design. The subjects of this research are mothers who have children under five. The research location is in Semarang Regency, Central Java Province, Indonesia. Sampling was carried out with a total sampling of 128 respondents. It collected data using a questionnaire and anthropometric measurements, including weight, body length, and head circumference of the baby. Based on the results of the analysis of factors related to the incidence of stunting, the p value was obtained for the parents' last education factor (0.161), a history of exclusive breastfeeding (0.794), LBW (1,000), exposure to cigarette smoke in the womb (0.303), and exposure to cigarette smoke after birth. (1,000). Although the relationship test showed no association between a history of exposure to cigarette smoke during pregnancy and the incidence of editing, there was a tendency for the group exposed to cigarette smoke in the womb to have more stunted children than the unexposed group. Although the relationship test showed no association between a history of exposure to cigarette smoke after birth and the incidence of editing, there was a tendency for the group exposed to cigarette smoke after birth to have more children who were stunted than the unexposed group. It is necessary to provide intensive education to pregnant women and accompanying families and families with children under five to be given knowledge about stunting and assistance or supervision so that children can avoid stunting. It can be done by providing exclusive breastfeeding to babies, avoiding exposure to cigarette smoke while in the womb and after birth.

Keywords: stunting, toddlers, history of cigarette smoke exposure

INTRODUCTION

Developing countries, including Indonesia, still have many nutritional problems, especially for toddlers and pregnant women. One of Indonesia's nutritional problems is stunting (short stature), which occurs as a result of chronic nutrient deficiencies during pre and post-natal periods. Stunting can be seen with the height for age indicator (Z-value *score* below minus 2)[1]. The impact caused by stunting in early childhood is related to mental deterioration and the level of intelligence of children, cognitive, psychomotor and motor development, as well as in adulthood, the risk of reducing workability and susceptibility to continuing infectious diseases that can lead to death.

The incidence of stunting in Indonesia is still quite high. This can be seen from the results of Riskesdas in 2007 amounting to 36.8%, and in 2010 amounting to 35.5%. According to WHO, the limit of the prevalence of stunting in a region is 20%. Nationally, the prevalence of stunting in Central Java decreased from 37.2% (2013) to 30.8% (2018). Even though it has

decreased, it is still far from the WHO limit. The incidence of stunting in 2018 in Central Java Province, out of 35 districts/cities, 11 districts/cities are still high^[2].

Stunting is caused by several interrelated factors. There are five clusters, namely maternal nutrition and infection, adolescent motherhood and short birth intervals, fetal growth restriction (Intrauterine growth restriction) and preterm birth, child nutrition and infection, and environmental factors such as exposure to cigarette smoke.^[3] In addition, the cause of stunting, in general, is due to malnutrition so that the body fails to grow. However, in particular, many factors play a role. For example, The mother lacks knowledge about nutrition and health both before and during pregnancy. Babies are not exclusively breastfed when they are 0-6 months. This occurs in 60% of babies in that age range. As many as 2 out of 3 children aged 6-24 months do not get the right complementary foods. Pregnant women have anemia. This occurs in 1 in 3 pregnant women. Even 2 out of 3 pregnant women have not taken enough iron supplements. Lack of access to nutritious food due to constraints on nutritious food is expensive. The cause of stunting can be due to parenting factors, an unhealthy lifestyle^[1].

Birth weight is a risk factor for stunting^[4]. Research conducted in India showed that children with low birth weight (LBW) had a 1.82 higher likelihood of becoming stunted compared to children with a normal birth weight of the same age.^[5] LBW babies are more likely to be stunted than babies with normal birth weight. LBW babies are more at risk of experiencing health problems and stunted growth. LBW affects the development and health of children related to child problems in the future^[1]. Other studies have shown that birth weight has a direct effect on stunting. Group perspective studies in Cebu, the Philippines and Ethiopia on children aged 12 months showed a significantly higher prevalence of stunting in LBW infants^[6].

Another study that analyzed data from *Indonesian Family Life Survey* (IFLS) in 2007-2014 obtained the results that smoking on children causing stunting was seen in lower weight and height of children. Children born to smoking parents have the potential for stunting and chronic malnutrition. The reason is that exposure to cigarette smoke continuously in pregnant women is at risk of experiencing a narrowing of the blood vessels and placenta. Descriptive data results from IFLS by the Indonesian University Social Security Research Center in 2007-2014 show that children of smoking parents have a lower body weight of 1.5 kg compared to children of non-smoking parents. In addition, children of smoking parents also had a lower height of 0.34 cm when compared to children from non-smoker families. The study was obtained from observing the weight and height of children aged less than five years in 2007-2014 to determine the impact of smoking and cigarette consumption on stunting. The study also took into account genetic factors (height of parents), environmental factors including breastfeeding during childhood, consumption of anemia pills during pregnancy, poverty conditions, and access to clean water.^[7]

In order to prevent stunting at an early age, research is needed that shows the determinants of stunting incidence in Indonesia, so that it can become the basis for the government in planning the existing stunting prevention and control. The purpose of this study was to analyze the factors associated with the incidence of stunting in children under five and to make recommendations for programs that can be carried out in the context of preventing and overcoming stunting through health promotion.

RESEARCH METHOD

This research is a quantitative study with a cross-sectional design. The subjects of this research are mothers who have children under five. The research location is in Semarang Regency, Central Java Province, Indonesia. A total sampling of 128 respondents did sampling. In collecting the data using a questionnaire and anthropometric measurements, including weight, body length, and head circumference of the baby. Data analysis used univariate and bivariate analysis with test *Chi Square*. Data processing using the SPSS program from a computer.

RESULTS AND DISCUSSION

This study produced data on factors associated with the incidence of stunting in children under five, consisting of recent parent's education, history of exclusive breastfeeding, low birth weight (LBW), and exposure to cigarette smoke during pregnancy and after childbirth. The following is the distribution of stunting in children under five:

Table 1. Distribution of Frequency of Stunting in Children under five

No.	Stunting Incidents	Frequency (f)	Percentage (%)
1	Stunting	32	25
2	Not Stunting	96	75
	Total	128	100

From table 1. it is known that the number of respondents who experienced stunting was 32 people, while those who were not stunted were 96 people. Stunting is a state of the nutritional status of children based on Z- score height according to age lies in the value ≤ -2 SD. The general indicator of height is an anthropometric index used to describe the nutritional status of the past and is related to environmental and socio-economic conditions.^[8]

The direct factor that affects the incidence of stunting is the intake of nutrients that do not meet the nutritional elements needed, the incidence in Indonesia is mostly due to the lack of animal protein intake in children and contributes to the high prevalence of stunting^[9]. The second factor is children under five suffering from infectious diseases (worms, acute respiratory infections, and diarrhea), which will worsen the situation if there is a lack of nutrient intake and low birth weight, which can inhibit cognitive growth and development. Birth weight is also a potential indicator for infant growth, response to environmental stimuli, and infant survival^[10]. Indirect factors include parental education, social economy, environmental sanitation, exclusive breastfeeding, and parenting styles. The following is a table of the frequency distribution of the analysis of the determinants of stunting in children under five years:

Table 2. Distribution of Parents Last Education Frequency

No.	Highest education	Stunting Incidents						p
						Total		
		Not Stunting		Stunting				
		f	%	f	%	f	%	
1	School dropout	1	33.3	2	66.7	3	100	0,161
2	Elementary School	7	100	0	0	7	100	
3	Junior high school	10	62.5	6	37,5	16	100	

4	High School	52	76.5	16	23.5	68	100
5	Scholar	26	76.5	8	23.5	34	100
Total		96	75	32	25	128	100

From table 2. it can be seen the comparison of the latest education between mothers and children who were stunted and those who were not stunted. There is no clear pattern related to the comparison according to the last education level in this table. Still, in both the case and control groups, the highest proportion is in the last high school education. Meanwhile, 66.7% of those who did not attend school were stunted. The results of hypothesis testing also support this cross-tabulation. There was no difference between the mother's last education level and the incidence of stunting, this can be seen from the p-value: 0.161 ($> \alpha$).

The level of education will make it easier for a person or society to absorb information and implement it in daily behavior and lifestyle^[11]. The insignificant level of parental education is thought to be related to parents' employment status, where highly educated parents usually have jobs. Working mothers cause less time for mothers to care for their children so that the attention to feeding their children is reduced, and it causes the child to suffer from malnutrition, which in turn has a negative impact on the growth and development of the child.^[11].

Table 3. Frequency Distribution of Exclusive Breastfeeding History

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No.	Exclusive breastfeeding history	Stunting Incidents				Total		2
		Not Stunting		Stunting		f	%	0,794
		f	%	f	%			
1	Not exclusive breastfeeding	17	70.8	7	29.2	24	100	
2	Exclusive breastfeeding	79	76	25	24.0	104	100	
	Total	96	75	32	25	128	100	

Although the relationship test shows there is no relationship between a history of exclusive breastfeeding with the incidence of stunting if seen from table 3. It can be seen that children who have a history of not getting exclusive breastfeeding are less likely to experience stunting (70.8%), as well as children who have a history of exclusive breastfeeding (76%). However, there is a tendency for stunting to be higher in children who do not receive exclusive breastfeeding.

Breast milk contains protein which is the main ingredient in the growth process. Although the protein content in breast milk is lower than formula milk, the quality of the protein in breast milk is very high. The specialty of breast milk protein is its ratio *whey protein* and *casein* balanced (60:40) compared to cow's milk (20:80)^[12]. This condition benefits the baby because whey protein is more refined, making it easier to digest^[13]. In addition, the main benefit of exclusive breastfeeding for 6 months compared to exclusive breastfeeding for 3 months is a significant reduction in the risk of infection. *gastrointestinal*^[14]. Children who are breastfed for the first 6 months will grow well because breast milk helps protect babies from infectious diseases and maintain optimal body growth.^[15]. Exclusive breastfeeding for the first 6 months in early life can result in optimal height growth^[16].

Table 4. Frequency Distribution of History of Low Birth Weight

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No.	LBW history	Stunting Incidents				Total		
		Not Stunting		Stunting		f	%	
		f	%	f	%			
1	Not LBW	85	74.6	29	25.4	114	100	
2	LBW	11	78.6	3	21.4	14	100	
	Total	96	75	32	25	128	100	

Based on table 4, it is known that the same comparison pattern between LBW history and the incidence of stunting, both respondents with a history of LBW (74.6%) and LBW (78.6%) had a tendency not to experience stunting. The hypothesis testing results also showed no correlation between LBW history and the incidence of stunting with a p value of 1,000 (greater than alpha). This is because the proportion of the average proportion of birth weight babies, both stunted and normal, is not much different. The nutritional status of the mother can influence this comparison during pregnancy which is quite good. The nutritional status of pregnant women greatly affects the growth of the fetus that is being conceived. If the mother's nutritional status is normal during pregnancy, she will likely give birth to a healthy baby at full term with a normal weight. The quality of the baby that is born depends on the state of nutrition of the mother during pregnancy^[17]. During pregnancy, the mother's nutritional needs increase due to the fulfillment of nutrients for the fetus. The nutrients needed must also be balanced, otherwise, it will have an impact on fetal development. This is following the opinion of Kristiyanasari (2010) that during young pregnancy, additional nutrients are needed in the form of vitamins and minerals, while the need for calories and protein is needed at the eighth week until birth. A pregnant woman who is malnourished, the baby born will have low body weight, get sick easily, and affect intelligence^[18].

The results of this study are not in line with Rahayu research in 2015, which states that there is a relationship between birth weight and stunting, and it is found that 39.3% of children under five who are not LBW have stunting nutritional status and 51.35% are normal. Stunting is a result of *growth faltering* or growth failure. This can also decrease the nutritional status of children (underweight), which generally occurs within a short period of early life (before birth to approximately 2 years of age). This disruption to growth will become a serious problem in the future. The impact, among others, can decrease boys' work productivity, which in turn has an impact on economic status. Growth disorders (stunting) in girls can increase the risk of having a baby with low birth weight^[19].

Birth weight can be an indicator of the likelihood of survival, growth, long-term health, and psychological development of children. Anthropometric assessment of nutritional status in newborns by measuring body weight, baby length, upper arm circumference, and head circumference is a nutritional method for assessing newborns, which is very influential in infant morbidity and mortality later^[20].

Low birth weight babies during pregnancy (*dismatur*), since the womb has experienced intrauterine growth retardation, will continue until the next age after birth. Namely, experiencing slower growth and development than babies born normally, and often fail to follow the growth rate that should be reached at the age after birth^[21]. Growth retardation that occurs is related to brain maturity, where before 20 weeks of gestation, there is an obstacle to brain growth, such as somatic changes^[22].

Table 5. Distribution of Frequency of History of Exposure to Cigarette Smoke While in Gynecology

No.	Exposure to cigarette smoke while in the womb	Stunting Incidents				Total		2
		Not Stunting		Stunting				303
		f	%	f	%	f	%	
1	Not Exposed	29	82.9	6	17.1	35	100	
2	do not take it lightly	67	72	26	28	93	100	
	Total	96	75	32	25	128	100	

Although the relationship test shows there is no relationship between the history of exposure to cigarette smoke during the womb and the incidence of editing, if seen from table 5. between exposure to cigarette smoke while in the womb and the incidence of stunting, it shows that the respondents with a history of not being exposed to cigarette smoke while in the womb (82.9%) and respondents who were exposed to cigarette smoke while in the womb (72%) were stunted, it just that there is a tendency for the group exposed to cigarette smoke while in the womb to have more children who are stunted than in the unexposed group.

In recent years the dangers of secondhand smoke have focused not only on active smokers but also on the impact of secondhand smoke. The increasing problem that secondhand smoke accepts both at home and in the workplace allows the impact caused by cigarette smoke. This shows that there is a double danger posed by cigarette smoke which is not only accepted by active smokers but also by those around them^[23].

Cigarette smoke exposure, both during pregnancy and during child development, is associated with the risk of stunting. Especially in countries with lower middle income, cadmium in cigarette smoke can disturb the balance of cadmium-zinc and cadmium-calcium in the body. This results in inhibition of bone formation and slows down the growth of body length^[24].

One cigarette contains a variety of chemicals. The chemicals in burnt tobacco contain 4000 types of chemicals, and 200 are poisonous^[25]. The three main toxic components found in cigarettes are carbon monoxide, tar, and nicotine. Carbon monoxide in cigarette smoke is found five times as much inside smoke as in main smoke. Carbon monoxide lasts for several hours indoors after a smoker has quit smoking^[26].

Table 6. Distribution of Frequency of History of Exposure to Cigarette Smoke After Birth

No.	Exposure to Cigarette Smoke After Birth	Stunting Incidents				Total		2
		Not Stunting		Stunting				1,000
		f	%	f	%	F	%	
1	Not Exposed	33	75	11	25	44	100	
2	do not take it lightly	63	75	21	25	84	100	
	Total	96	75	32	25	128	100	

Although the association test showed no association between a history of exposure to cigarette smoke after birth and the incidence of editing. However, if seen from table 6., both respondents with a history of not being exposed to cigarette smoke after birth (75%) and

exposure to cigarette smoke after birth (75%) did not experience stunting. There is a tendency that in the group exposed to cigarette smoke after birth, more children were stunted than in the unexposed group.

The results of research by the Center for Social Security Studies at the University of Indonesia (2018) are based on data exploration *Indonesian Family Life Survey*. It is known that the incidence of stunting of parents of smokers is $> 5.5\%$ compared to parents of nonsmokers^[27]. The effect of parental smoking behavior on children's intelligence is statistically indirect, but it results from stunting in children. In general, it is known that children living in households with chronic smoking parents as well as with transient smoking tend to have slower growth in weight and height than those living in households without smoking parents.^[28] The length of exposure to cigarette smoke received by children depends on the environment. If the child lives with a family member who has a smoking habit, then the child will be exposed to cigarette smoke. Where the longer a child is exposed to cigarette smoke, the greater it will have detrimental effects on health. The health problems that arise in secondhand smoke depend on the type and length of exposure to cigarette smoke received from the environment^[29].

CONCLUSION

Data on the determinants of the incidence of stunting used a questionnaire and anthropometric measurements, including weight, body length, and head circumference of infants. Based on the results of the analysis of factors related to the incidence of stunting, the p value was obtained for the parents' last education factor (0.161), a history of exclusive breastfeeding (0.794), LBW (1,000), exposure to cigarette smoke in the womb (0.303), and exposure to cigarette smoke after birth (1,000).

Although the relationship test showed no association between a history of exposure to cigarette smoke during pregnancy and the incidence of editing, there was a tendency for the group exposed to cigarette smoke in the womb to have more stunted children than the unexposed group.

Although the relationship test showed no association between a history of exposure to cigarette smoke after birth and the incidence of editing, there was a tendency for the group exposed to cigarette smoke after birth to have more children who were stunted than the unexposed group.

RECOMMENDATION

It is necessary to provide intensive education to pregnant women and accompanying families. The children under five need to be given knowledge about stunting and assistance or supervision so that children can avoid stunting by providing exclusive breastfeeding to babies, avoiding exposure to cigarette smoke while in the womb and after birth.

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