

# Childhood Stunting: Analysis Affecting Children's Stunting In Sulawesi

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## ABSTRACT

The study aimed to analyze the effect of breastfeeding duration, mother's age at pregnancy, the type of milk the baby drank for the first six months and infectious diseases on the incidence of stunting in children. The research stage was to identify the number of stunted children, and then all the stunted children were measured for height. The mother of the stunting child filled out the relevant questionnaire about the variables studied. The research design used was descriptive-analytic with a cross-sectional study approach with retrospective study data. The descriptive study results on 139 mothers who had children aged 4-12 months found that there were 13 stunted children in Makassar City and 46 stunted children in Tanah Toraja Regency. The variable mother's knowledge about stunting was found that 45 (46.4%) had poor knowledge and 14 (33.3%) had good knowledge. The results of the bivariate analysis were found to have a significant relationship with the incidence of stunting, namely the length of breastfeeding and infectious diseases with  $p$ -value  $< \alpha$ , meaning that the length of breastfeeding given to babies is up to at least six months, so it can help the child's height growth to be normal, and infectious diseases suffered by children from 0-12 months can cause the child's height growth is not normal. The logistic regression test results found that the most dominant factor causing the occurrence of stunted children was a respiratory disease at the age of 4-12 months.

**Keywords:** Stunting, length of breastfeeding, type of milk, mother's age, infection

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## INTRODUCTION

Stunting is stunting due to long-term malnutrition (Galasso & Wagstaff, 2019; Meera Shekar, Jakub Kakietek, Julia Dayton Eberwein, 2017; Millward, 2017). Stunting is a chronic condition that should get special attention. Stunting in toddlers can hinder children's physical and mental development (Arafah et al., 2014; Conway et al., 2020; Song et al., 2019; Surani & Susilowati, 2020). Toddlers who are stunted have a risk of decreased intellectual ability, productivity, and an increased risk of degenerative diseases (Manggala et al., 2018; et al., 2018). Children who are stunted tend to be more susceptible to infectious diseases, resulting in the risk of experiencing a decrease in the quality of understanding (Casale et al., 2020; Leroy & Frongillo, 2019). Stunting also increases the risk of obesity, because people with short stature should also have low ideal body weight (Ferreira et al., 2020; Keino et al., 2014; Minh Do et al., 2018), Indonesia is one of 17 countries out of 117 countries with three problems: stunting, wasting, and overweight. Countries that have a high prevalence of stunting, wasting and in children under five include Indonesia. (Kemenkes RI, 2018a). Based on data from basic health research in 2018, the national prevalence of stunting is 30.8%, while in 2013, the national prevalence of stunting is 37.2%. This value indicates a decline even though it has not met the 2019 National Mid-Term Development Plan target, a decline of 28%. Therefore, the percentage of short children in Indonesia is still high and is a public health problem that must be addressed. Compared to several neighbouring countries such as Myanmar (23%), Malaysia (17%), Vietnam (23%), Thailand (16%), and Singapore (14%). The 2014 Global Nutrition Report shows that Indonesia is included in 17 countries out of 117 countries with three nutritional problems, namely

stunting, wasting, and overweight in children under five. (Kemenkes, 2016).

Jahari (2018) states that the average height of toddlers for boys and girls in Indonesia, according to the 2005 WHO standard, is below the normal line, from 50 cm to 110 cm. According to Achadi (2015) states that Indonesia is included in 17 countries, among 117 countries that have problems regarding stunting (37.2%), Wasting (21.1%), and Overweight problems (11.9%). Indonesia has a high prevalence of stunting, wasting and overweight in under-five. Indonesia is one of 47 countries out of 122 countries with stunting and anaemia in women of reproductive age.

The target of Human and Community Development in the 2015-2019 Medium-Term Development Plan is health development by increasing the Health and Nutrition Status of the Community, especially in reducing the prevalence of stunting (short and very short) of under-five children, which is expected to decrease in 2019 to 28%, from 28,9% in 2018. The hope of achieving a reduction in stunting prevalence in children under five years (under five years old), namely from 2015 as much as 35.6%, is expected to decrease in 2019 to 32.4%. (Jahari, 2018). The Government's strategy of efforts to combat stunting is supported by cross-sectoral development and research. Research conducted by Esfarjani et al. (2013) found that the incidence of stunting was significantly associated with birth weight, maternal age and father's height.

Toraja Regency is one of the districts with the highest stunting rate in South Sulawesi Province, then Soe City, which is 7229 very short children, and 7910 short children, so that the percentage of children under five with stunting is 53.03% of the total 28,548 children under five, with brief details: 7910 and very short 7229

children. (Soe, 2017). In Makassar City, 17.6% of children are stunted at SD. (Nuraeni, 2019).

Based on this data, our research team is interested in knowing and analyzing other causes that are suspected of causing stunted children, namely the length of breastfeeding, the mother's age at pregnancy, the type of milk that the baby drinks until the age of 12 months, and infectious diseases that the child has suffered from when infants up to 12 months of age. Lestari, et al. (2015) research on cigarette smoke in pregnant women with an increase in low birth weight babies in Gianyar, Bali. Low birth weight in infants is significantly associated with maternal cigarette smoke exposure during pregnancy, and stunting is strongly associated with low birth weight.

**METHOD**

The research design used in this study is descriptive-analytic with a cross-sectional study approach, which is to see the relationship between the independent variable

and the dependent variable at the same time and a retrospective study, which is to determine current events with past events. (Chandra, 2013; Sugiyono, 2018). The total sample size was 139 mothers (59 mothers who had stunted children and 80 mothers who had children who were not stunted). Sampling was purposive sampling, namely sampling according to the area and objectives the researcher wanted. (Sugiyono, 2018). Univariate analysis and bivariate analysis using chi-square statistical tests and multivariate analysis using logistic regression statistical tests.

**RESULT**

**Descriptive Analysis Results**

Characteristics of respondents include the mother's level of knowledge, length of breastfeeding, age at pregnancy, types of milk, and infectious diseases experienced by children. Characteristics of respondents based on stunting can be seen in table 1.

Table 1 Characteristics of Respondents based on Stunting (n = 139)

Respondent Characteristics	Stunting (n=59)		Not stunting (n=80)		Total	
	n	%	n	%	n	%
<b>Knowledge</b>						
Less	45	46,4	52	53,6	97	100,0
Good	14	33,3	28	66,7	42	100,0
<b>Age at pregnancy</b>						
20-35 years	55	42,0	76	58,0	66	100,0
35-40 years	4	50,0	4	50,0	8	100,0
<b>Length of Breastfeeding</b>						
<6 months	22	33,3	44	66,7	66	100,0
≥6 months	37	50,7	36	49,3	73	100,0
<b>Type of Milk</b>						
Formula milk	26	48,1	28	41,9	54	100,0
No formula milk	33	38,8	52	61,2	85	100,0
<b>Symptoms of Infection</b>						
There are no symptoms.	1	2,5	39	97,5	40	100,0
Diarrhea	6	23,1	20	76,9	26	100,0
Fever	1	16,7	5	83,3	6	100,0
Stomach ache	3	30,0	7	70,0	10	100,0
Diarrhea + fever	42	93,3	3	6,7	45	100,0
Diarrhea + stomachache	2	25,0	6	75,0	8	100,0
Diarrhea + fever + abdominal pain	4	100,0	0	0,0	4	100,0

Table 1 shows the characteristics of the respondent's level of knowledge, length of breastfeeding, type of milk, and infection symptoms based on stunting. Respondents generally lacked knowledge about stunting. The proportion of poor knowledge in stunting was 46.4%, and the proportion of good knowledge in non-stunting was 66.7%. Based on the pregnancy age, most pregnant women are 20-35 years old. The age of pregnant women 35-40 years, there are four people each (50%) who are stunting and not stunting. The proportion of stunting among mothers who breastfed ≥ six months was 37 people (50.7%). Most mothers did not use formula milk,

and there were no stunting as many as 52 people (61.2%). Based on the symptoms of infectious diseases, most of the stunting had diarrhea + fever symptoms, as many as 42 people (93.3%).

**RESULT OF INFERENTIAL ANALYSIS**

1. The relationship between the length of breastfeeding and stunting

The length of breastfeeding for the mother categorized as < 6 months and ≥ six months. The relationship between the length of breastfeeding and stunting can be seen in table 2.

Table 2. The relationship between the length of breastfeeding and stunting (n=139)

the length of breastfeeding	Stunting				Total	p	OR (95% CI)	
	Stunting		Not stunting					
	n	%	n	%				
< 6 months	22	33,3	44	66,7	66	100,0	0,38	0,50

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≥ 6 months	37	50,7	36	49,3	73	100,0	0,24-0,96
Total	59	42,4	80	57,6	139	100,0	

Table 2 shows the relationship between the length of breastfeeding and stunting; 22 (33.3%) mothers who breastfed <6 months had stunted children. Meanwhile, among mothers who breastfed ≥ six months, 37 (50.7%) children stunted. The statistical test results obtained by  $p = 0.058$  show no relationship between the proportion of stunting among mothers who breastfeed <6 months and mothers who breastfeed ≥ six months.

2. The relationship between age at pregnancy and stunting

Maternal age at pregnancy categorizes into periods 20-35 years and ages 35-40 years. Age 20-35 years is the age with the lowest health risk and is the ideal age for pregnancy and childbirth. The relationship between age at gestation and stunting can be seen in table 3.

Table 3 The relationship between age at pregnancy and stunting (n=139)

age at pregnancy	Stunting				Total	<i>p</i>	OR (95% CI)
	Stunting		No Stunting				
	<i>n</i>	%	<i>n</i>	%			
20-35 years	55	42,0	76	58,0	131	100,0	0,72 0,33-5,76
35-40 years	4	50,0	4	50,0	8	100,0	
Total	59	42,4	80	57,6	139	100,0	

Table 3 shows the relationship between age and stunting; it found that most pregnant women at the age of 20-35 years had children who are not stunting, namely 76 (58.0%). Meanwhile, pregnant women at the age of 35-40 years had the same proportion between stunting and non-stunting, namely four people (50%). The results of statistical tests with fisher exact test obtained  $p = 0.72$ , so it can conclude that there is no relationship between the proportion of stunting between pregnant women at the

age of 20-35 years and women who are pregnant at the age of 35-40 years.

3. The relationship between the type of milk and stunting

The types of milk given to toddlers are categorized into formula milk and without formula milk. The relationship between the type of milk and stunting can be seen in table 4.

Tabel 4. The relationship between the type of milk and stunting (n=139)

Type of milk	Stunting				Total	<i>p</i>	OR (95% CI)
	Stunting		No Stunting				
	<i>n</i>	%	<i>n</i>	%			
Formula milk	26	48,1	28	51,9	54	100,0	0,36 0,73-2,91
No formula milk	33	38,8	52	61,2	85	100,0	
Total	59	42,4	80	57,6	139	100,0	

Table 4 shows the analysis of the relationship between types of milk and stunting; it found that giving formula milk or without formula milk to children did not cause stunting. Formula feeding did not cause stunting in 28 people (51.9%). Meanwhile, children who breastfed without formula milk had a proportion not stunting, namely 52 (61.2%). The statistical test results obtained  $p = 0.36$ ; it can conclude that there is no relationship between the proportion of stunting among toddlers who get formula milk and those without formula milk.

4. The relationship between infectious diseases and stunting

Infection categorizes into no infection symptoms, diarrhea, fever, abdominal pain, diarrhea + fever, diarrhea + abdominal pain, fever + abdominal pain, diarrhea + fever + abdominal pain. However, during the statistical test, seven cells had an expectation value of <5. The infection categorizes into two; namely, there were no infection symptoms, and there were symptoms of infection if you had one or more diarrhea complaints, fever, and abdominal pain. The relationship between infectious diseases and stunting can be seen in table 5.

Table 5. The relationship between infectious diseases and stunting (n=139)

Infectious diseases	Stunting				Total	<i>P</i>	OR (95% CI)
	Stunting		No Stunting				
	<i>n</i>	%	<i>n</i>	%			
there is an infection	58	58,6	41	41,4	99	100,0	0,00 0,002-0,13
no infection	1	2,5	39	97,5	40	100,0	
Total	59	42,4	80	57,6	139	100,0	

Table 5 shows the results of the analysis of the relationship between infectious diseases and stunting; it found that children who had contagious diseases mostly stunting, as many as 58 people (58.6%). Meanwhile, 39

children who did not have an infectious disease were not stunted (97.5%). The statistical test results obtained  $p = 0.00$ ; it can conclude a relationship between the proportion of stunting among children under five who

have an infectious disease and those who do not experience a infectious disease.

5. The dominant factor against stunting  
The dominant factor against stunting test using logistic regression. This test conduct to test the variables that

affect stunting. Multiple logistic regression performs by linking the independent variable with the dependent variable. The results of the logistic regression can be seen in table 6

Table 6 Relationship between the length of breastfeeding, mother's age, type of milk, and infectious diseases with stunting (n = 139)

Variables	B	Exp(B)	p-value
The length of breastfeeding	0,72	0,48	0,04
Mother's age	0,32	1,38	0,65
Type of milk	0,38	1,46	0,27
Infectious diseases	4,01	0,01	0,00

Table 6 shows that based on bivariate selection, the variables that qualify for inclusion in the logistic regression test are the length of breastfeeding and infectious disease. The variables included in selecting

multiple logistic regression candidates were variables with p values less than 0.25 in the bivariate selection. The results of multiple logistic regression analysis can be seen in Table 7.

Table 7 Results of multiple logistic regression analysis of dominant factors on stunting (n = 139)

Variables	B	S.E.	p-value	Exp (B)	95%CI
The length of breastfeeding	0,255	0,049	0,533	0,775	0,348-1,726
Infectious diseases	3,947	1,037	0,000	0,019	0,003-0,147

The analysis showed that the most dominant variable affecting stunting was infectious diseases (p = 0.000), and it was the only variable in this study that involved stunting. Children who have an infectious disease have 0.019 times the stunting chance than children who do not have an infectious disease.

6. Comparison of the dominant factor with stunting in Makassar City and Tana Toraja

The dominant factor affecting stunting is infectious diseases. The following table presents the comparison of infections in Makassar City and Tana Toraja.

Table 8 Comparison of Infections in Makassar City and Tana Toraja (n=139)

Location	Infectious diseases				Total		P	OR (95% CI)
	Yes		No					
	n	%	n	%	n	%		
Makassar City	19	31,1	42	68,9	61	100,0	0,72	1,228 0,587-2,567
Tana Toraja	21	26,9	57	73,1	78	100,0		
Total	40	28,8	99	71,2	139	100,0		

Table 8 shows that the proportion of infectious diseases is largely absent, both in Makassar City and Tana Toraja. However, there are still infectious diseases that affect stunting in Makassar City, namely 19 people (31.1%) and Tana Toraja as many as 21 people (26.9%). The statistical analysis results show that there is no correlation between the proportion of infections in Makassar City and Tanah Toraja. It indicates no correlation between the dominant factor (infectious disease) on stunting in Makassar and Tana Toraja City.

## DISCUSSION

The initial plan was to collect data as many as 200 mothers and children in two locations: Makassar City and Tanah Toraja Regency. Still, due to the corona outbreak pandemic starting in March 2020, health service activities were closed until June 2020, primary data collection we are also the youngest. Research activities in Makassar city began in February 2020 while processing a research permit, continued on July 19, 2020, because all health service activities were reopened. Likewise, health service activities in Tanah Toraja opened in July 2020; thus, the sample found in this study was 139 respondents. The data analysis results found that the knowledge of mothers who had stunted children was 45 mothers (46.4%) lacking knowledge and 14 mothers (33.3%) had good

knowledge in Makassar City and Tanah Toraja Regency. This knowledge of mothers shows that the majority of mothers who have stunting children do not understand the causes of stunting, such as a good age for pregnancy, exclusive breast milk can help children grow normally and healthily, the type of milk needed by children to accompany breast milk and infectious diseases suffered by a child as a baby can affect the growth and development of babies and children.

The analysis of the relationship between maternal age at pregnancy and stunting showed that most of the women who were pregnant at the age of 20-35 years had children who were not stunted, namely 76 (58.0%). Meanwhile, pregnant women at the age of 35-40 years had the same proportion between stunting and non-stunting, namely four people (50%). The results of statistical tests with fisher exact test obtained p = 0.72. It can be concluded that there is no correlation between the proportion of stunting incidence between pregnant women at the age of 20-35 and women who are pregnant at the age of 35-40 years. Maternal age at pregnancy is categorized into ages 20-35 years and ages 35-40 years. Age 20-35 years is the age with the lowest health risk and is the ideal age for pregnancy and childbirth. The results of this study indicate that stunting in children is not a factor of maternal age at pregnancy because, with the same age of

pregnant women with non-stunting children, the mother's age is between 20 and 40 years, meaning that the mother's age is still considered not to affect stunting in the child. The analysis of the relationship between the length of breastfeeding and stunting showed that 22 (33.3%) mothers who breastfed <6 months had stunted children.

Meanwhile, there were still 37 (50.7%) stunted children among mothers who breastfed six months. The statistical tests result obtained  $p = 0.058$ ; it can be concluded that there is no relationship between the proportion of stunting between mothers who breastfeed <6 months and mothers who breastfeed  $\geq$  six months. The OR value = 0.48, meaning that mothers who have breastfed for less than six months have a 0.48 times chance of their babies being stunted than mothers who have breastfed for more than six months.

The results of this study are supported by Doddy Izwardy (2019) statement. He is the Director of Public Nutrition of the Ministry of Health of the Republic of Indonesia, namely that children who are weaned before the age of 6 months have a higher chance of stunting. The results of basic health research issued by the Ministry of Health of the Republic of Indonesia in 2018 states that with exclusive breastfeeding given to babies for at least six months, it can affect babies and children's growth and development nominally. The analysis of the relationship between types of milk and the incidence of stunting showed that giving formula milk or without formula milk to children did not cause stunting. Formula feeding did not cause stunting in 28 people (51.9%).

Meanwhile, children who breastfed without formula milk had a proportion not to be stunted, namely 52 (61.2%). The statistical test results obtained  $p = 0.36$ ; it can be concluded that there is no correlation between the proportion of incidence of stunting among toddlers who get formula milk and without formula milk. This study's results are strongly related to children getting exclusive breast milk and breast milk, so on until they are in the first 1000 days of life. It means that children drink formula milk or not, it does not affect the child to grow abnormally, as long as the child has received breast milk for more than six months.

The results of the analysis of the relationship between infectious diseases and stunting showed that children who had infectious diseases were mostly stunting, as many as 58 people (58.6%). Meanwhile, most of the children who did not have an infectious disease were not stunted, namely 39 (97.5%). The statistical test results obtained  $p = 0.00$ ; it can be concluded that there is a relationship between the proportion of stunting among children under five who have an infectious disease and those who do not experience an infectious disease. The OR value = 0.13 means that babies who have had infectious diseases such as diarrhea, fever and abdominal pain have 0.13 times the chance for them to become stunted, compared to babies who have never suffered from diseases and infection symptoms.

The results of this study indicate that an infectious disease suffered by infants aged 4-12 months can cause the baby's body growth to be abnormal. It is supported by Doddy Izwardy (2019) opinion, which states that children's infectious diseases are one of the factors that can inhibit the normal growth of children. However, this result is refuted by the results of a similar study conducted by Wellina et al. (2016) which states that adherence to vitamin A consumption, frequency of diarrhea and respiratory tract infections are not risk

factors for stunting. Lestari et al. (2014) stated that the results of a study with children with seven days of diarrhea in children aged 6-23 months with the incidence of stunting had an OR = 5.04, 95% CI, meaning that children who had diarrhea for seven days at that age had a chance of 5 times to be stunted compared to children of the same age who did not have diarrhea for seven days. The results of the research also support it by Dewi and Adhi (2014) which states that a history of infectious diseases with a value of  $p = 0.0039$ , meaning that there is a relationship between a history of infectious diseases and the incidence of stunting in elementary school children and is the dominant factor affecting stunting in the public health centre area, with a value of OR = 5.41 means that there is a five times chance of stunting in children who have suffered from an infectious disease compared to children who have never suffered from an infectious disease.

This study's results are also supported by the movement of the first 1000 days of life with one of the activities, namely preventing the occurrence of infectious diseases that can cause stunted children. Infectious diseases can cause stunted children, while non-communicable diseases have the opportunity to occur in stunted children in their adulthood; therefore special attention is needed by the government and health workers to prevent disease or symptoms of infection when the child is in the first 1000 days of life (Kemenkes RI, 2018a)

Makassar City is the 4th most stunting child in South Sulawesi Province, after North Toraja, Bone and Enrekang. (Kemenkes RI, 2018b). The number of children in Makassar is more than the children aged 6-12 months in Tanah Toraja. The results of the analysis in this study found that the dominant factor affecting stunting is infectious diseases. Still, the proportion of infectious diseases is largely absent, both in Makassar City and Tana Toraja. However, there are still infectious diseases that affect stunting in Makassar City, namely 19 people (31.1%) and Tana Toraja as many as 21 people (26.9%). The statistical analysis results show that there is no relationship between the proportion of infections in Makassar City and Tanah Toraja. It shows no correlation between the dominant factor (infectious disease) on stunting in Makassar and Tana Toraja City.

## CONCLUSION

The majority of mothers' knowledge about stunting is lacking, namely knowledge of the relationship between maternal age at pregnancy, types of milk drunk by children, exclusive breastfeeding and infectious diseases suffered by children 0-12 months with stunting in children. There is no relationship between maternal age at stunting with stunting in children and between drinking formula milk and not drinking formula milk with stunting. There is a significant relationship between breastfeeding mothers and stunting in children. There is a significant relationship between infectious diseases that have been suffered by children since 0-12 months with stunting. The dominant factor affecting stunting is infectious diseases, but the proportion of infectious diseases is mostly not. Exist, both in Makassar City and Tana Toraja. However, there are still infectious diseases that affect stunting in both Makassar City and Tanah Toraja Regency.

Supervision and attention to mothers and children's health to prevent infection symptoms, especially in infants aged 0-12 months, can prevent stunting so that the stunting rate can decrease. It is recommended for

prospective mothers (young women) and mothers who are still productive pregnant to pay attention to getting breast milk that can fulfil their babies for at least six months, for families of couples of childbearing age to maintain the health of mothers and their babies starting in the womb until the baby is born at age 0 -12 months so as not to get infectious diseases such as symptoms of fever, diarrhea and abdominal pain, and other infectious diseases. And to health workers to always pay attention to pregnant women and babies so that their health is maintained until the age of 12 months, as basic data can be used as a reference in health promotion and prevention related to stunting prevention, to reduce stunting rates.

#### CONFLICTS OF INTEREST

The authors declare that there is no conflicts of interest.

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