DETERMINANTS OF STUNTING AMONG CHILDREN AGED 0-59 MONTHS IN TUAH NEGERI SUB-DISTRICT, MUSI RAWAS REGENCY

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KEYWORDS

Toddlers; Stunting; Children Characteristics; Parental Characteristics

Background: Stunting is a condition of stunted children growth due to chronic malnutrition. Compared to urban areas, stunting rates are higher in rural areas. Therefore, further research needs to be done to find out the factors that cause the high stunting rate in rural areas. This study aims to analyze the determinants of the incidence of stunting in children aged 6-59 months in Tuah Negeri Sub, Musi Rawas Regency.
Methods: This study was an observational study with a cross-sectional approach. Subjects totaled 109 children aged 0-59 months who were selected by random sampling in 3 villages of Tuah Negeri Sub-district. The data studied included children characteristics (gender, exclusive breastfeeding, history of infectious diseases) and parent characteristics (age, education, occupation, family income). Children's nutritional status was measured as well as data collection on children and mother characteristics. Nutritional status was obtained by measuring height/age which was then processed using *WHO anthro* and grouped into stuntingand normal. Furthermore, the data were processed univariately, bivariately and multivariately.
Results: The results of measuring nutritional status showed that 33% of children were stunted. There was no significant relationship ($p \geq 0.05$) between gender ($p=0.339$), history of infectious disease ($p=0.141$), mother's occupation ($p=0.697$) and family income ($p=0.202$) with children's nutritional status. There was asignificant association ($p<0.05$) between breastfeeding ($p=0.041$), maternal age ($p=0.008$), maternal education ($p=0.010$) and paternal occupation (0.022) with children's nutritional status. The factor most associated with stunting was maternal age ($p=0.011$, OR=3.935). Mothers who are <20 years old have a 3.935 times risk of having stunted children.
Conclusions: Maternal age <20 years is the most dominant factor associated with the incidence of stunting in Tuah Negeri Sub-district, Musi Rawas Regency. It is necessary to conduct health education for mothers aged <20 years related to nutritional knowledge and parenting, so that the stunting rate in Musi Rawas Regency can be reduced.

1. INTRODUCTION

Stunting is a condition of a short or very short body that is not in accordance with age, which occurs due to malnutrition and repeated diseases for a long time in the fetal period until the first 2 years of a children's life. The community, especially parents of children, considers that the incidence of stunting is common and not a serious problem. Parents believe that their children will grow and develop according to their age because they are still toddlers. But in reality, if a children is proven to be stunted at least before the age of 2 years and is not detected early, it will experience delays in nutritional improvement the following year [1].

According to WHO, the estimated prevalence of stunted toddlers worldwide in 2020 is 22%, with a total number of 149.2 million stunted toddlers [2]. Data from the *Basic Health Research* (Riskesdas) in 2018 showed that the prevalence of stunted children under five in Indonesia reached 30.8%. This places Indonesia as the countrywith the 2nd highest burden of stunted children in the Southeast Asia Region and 5th in the world [3]. Data from the Indonesian Nutrition Status Survey, in 2022 stated that the prevalence of stunting in Indonesia had decreased to 21.6% [4] and based on data from the Indonesian Health Survey in 2023 the stunting rate in Indonesia was 21.5% [5-6]. This figure is close to the reduction target set by WHO, which is less than 20% but is still far away when compared to the target set by the Indonesian government in 2024, which is 14% [7]. The non-achievement of the stunting reduction target is due to variations in the reduction in stunting rates between provinces in Indonesia.

The prevalence of stunting in rural areas is higher than in urban areas. Data from the Riskesdas (2018) shows that the prevalence of stunting in villages reached 34.9%, while in urban areas it was only 27.3% [3]. Many factors contribute to the difference in prevalence between rural and urban areas, in addition to access to health services and environmental sanitation, parental characteristics also play a role in creating these differences. In South Sumatra Province, the highest stunting rate is in Musi Rawas Regency with a stunting incidence rate of 25.4% [4].This rate is above the national average and other regions in South Sumatra Province. Data from the Central Bureau of Statistics states that the number of poor people in Musi Rawas Regency in 2023 reached 59.75 thousand people. In 2021, the number of female populations aged more than 10 years who have married is 67.76% and as many as 156 babies with malnutrition. There are five areas with the highest prevalence in Musi Rawas Regency, one of which is Tuah Negeri Sub-district with a stunting prevalence in July of 28.45% [8]. Therefore, further research needs to be done to find out the factors that cause the high stunting rate. This study aims to analyze the determinants of stunting incidencein Tuah Negeri Sub-district, Musi Rawas Regency.

2. METHODS

This study is a descriptive correlation study with a cross-sectional design. The sample amounted to 109 children aged 6-59 months who were taken randomly from 3 villages in Tuah Negeri Sub-district. Children's nutritional status was measured as well as data collection on children and mother characteristics. Measurement of nutritional status was carried out through height/age measurements which were then analyzed using WHO anthro software, and grouped into stunting and normal. Data on children and

mother characteristics were obtained through questionnaires. Children characteristics include age categorized into 2, namely 0-23 months and 24-59 months, gender categorized into 2, namely male and female, breastfeeding categorized into 2, namely exclusive breastfeeding and not exclusive breastfeeding, history of chronic infectious diseases categorized into 2, namely presence and absence. Data on parental characteristics included maternal age categorized into 2, namely < 20 years and ≥ 20 years, maternal education categorized into 2, namely low and high, father's occupation categorized into 2, namely Civil Servant (PNS) and farmer/private and family income based on the Regional Minimum Wage of Musi Rawas Regency and categorized into 2, namely < UMR (3,564,993) and ≥ UMR (3,564,993). Data were analyzed univariately, bivariately and multivariately ($p<0.05$ and CI=95%).

Ethics

This research has received ethical approval from the Health Research Ethics Commission of the Faculty of Public Health with ethics certificate Number: 254/UN9.FKM/TU.KKE/2024.

Data analysis

Data were analyzed using IBM SPSS Statistics for Windows, Version 25. The chi-square test was used to assess the association between children and parent characteristics and children nutritional status. Logistic regression of the risk factor model was used to show how much influence the variables of children characteristics and parental characteristics have on children's nutritional status, as well as what factors are most dominant in determining children's nutritional status.

3. RESULTS

From the 109 respondents in this study, 60.6% (n=66) were children aged 0-23 months and 39.4% (n=43) were children aged 24-59 months. Male children accounted for 53.2% (n=58) and female children accounted for 46.8% (n=51). Most of the respondents were exclusively breastfed (56.9%). The majority of respondents had no history of infectious disease (71.6%) (Table 1).

Table 1. Frequency Distribution of Children Characteristics

Variables	N=109	Percentage (%)
1. Children's age		
0-23 months	66	60,6
24-59 months	43	39,4
2. Gender		
Male	58	53,2
Female	51	46,8
3. Breastfeeding		
Not exclusively breastfed	47	43,1
Exclusive breastfed	62	56,9
4. History of infectious disease		
Yes	31	28,4
No	78	71,6

Source: primary data

Table 2: Frequency Distribution of Parental Characteristics

Variables	N=109	Percentage (%)

1.	Mother's age		
	At risk (< 20 years dan >35 years)	27	24,8
	Not at risk (20-35 years)	82	75,2
2.	Mother's education	52	47,7
	Low (≤Middle school)	57	52,3
	High (≥High School)		
3.	Father's education	59	54,1
	Low (≤Middle school)	50	45,9
	High (≥High School)		
4.	Mother's employment status	87	79,8
	Unemployed	22	20,2
	Employed		
5.	Father's employment status	88	80,7
	Farmer/Employee	21	19,3
	Civil worker		
6.	Family income	93	85,3
	<Regional minimum wage (3.564.993)	16	14,7
	≥Regional minimum wage (3.564.993)		

Source: primary data

Data on parental characteristics (Table 2) showed that the majority of mothers (75.2%) were between 20-35 years old. About 47.7% of mothers had low education and 54.1% of fathers had low education. Most mothers did not work (79.8%). Most fathers occupations were farmer or private (80.7%). Most family incomes were below the minimum wage (85.3%).

Table 3. Frequency Distribution of Children Nutrition Status

Nutritional Status	N=109	Percentage (%)
Stunting	36	33,0
Normal	73	67,0

Source: primary data

The results of the nutritional status measurement (Table 3) based on height/age showed that 33% of children were stunted.

Table 4. Relationship Between Children Characteristics and Nutritional Status

Variables	Nutritional Status				Total		OR (95% CI)	p value
	Stunting		Normal					
	n	%	n	%	n	%		
1. Children's age								
0-23 months	19	28,8	47	71,2	66	100	0,618	0,338
24-59 months	17	39,5	26	60,5	43	100	0,275-1,391	
2. Gender								
Male	22	37,9	36	62,1	58	100	1,615	0,339
Female	14	27,5	37	72,5	51	100	0,717-3,638	
3. Breastfeeding								
Not exclusively breastfed	21	44,7	26	55,3	47	100	2,531	0,041
Exclusive breastfed	15	24,2	47	75,8	62	100	1,117-5,732	
4. History of infectious disease	14	45,2	17	54,8	31	100	2,096	0,141
Yes	22	28,2	56	71,8	78	100	0,885-4,965	
No								

Source: primary data

From the statistical test results (table 4), there was no significant relationship between age (p=0.338), gender (p=0.339) and history of infectious disease (p=0.141) with children's nutritional status. There was a significant association between breastfeeding and children's nutritional status (p=0.041).

Table 5. Relationship Between Parental Characteristics and Children's Nutritional Status

Variables	Nutritional Status				Total		OR (95% CI)	P value
	Stunting		Normal					
	n	%	n	%	n	**%**		
1. Mother's age								
At risk	15	55,6	12	44,4	27	100	3,631	0,008
Not at risk	21	27,1	61	54,9	43	100	1,466-8,991	
2. Mother's education								
Low	24	46,2	28	53,8	52	100	3,214	0,010
High	12	21,1	45	78,9	57	100	1,390-7,433	
3. Mother's employment status	30	34,5	57	65,5	87	100	1,404	0,697
Unemployed	6	27,3	16	72,7	22	100	0,497-3,960	
Employed								
4. Father's employment status	34	38,6	54	61,4	88	100	5,981	0,022
Farmer/Employee	2	9,5	19	90,5	21	100	1,310-27,318	
Civil worker	28	30,1	65	69,9	93	100	0,431	0,202
5. Family income	8	50,0	8	50,0	16	100	0,147-1,263	
<Regional minimum wage								
≥Regional minimum wage								

Source: primary data

From the statistical test results (table 5), there is no significant relationship (p≥0.05) between mother'soccupation (p=0.697) and family income (p=0.202) with children's nutritional status. There was a significant association between mother's age (p=0.008), mother's education (p=0.010) and father's occupation (0.022) with children's nutritional status.

Tabel 6. Variable Selection for Multivariate Models

Variables	Category	OR	95% CI	P-*Value*
Child's age	0- 23 months	0,6	0,2-1,3	0,245
	24-59 months			
Gender	Male	1,6	0,7-3,6	0,247
	Female			
Mother's age	< 20 years	3,6	1,4-8,9	0,005
	≥ 20 years			
Mother's education	Low (≤Middle school)	3,2	1,3-7,4	0,005
	High (≥High school)			
Mother's employment status	Unemployed	1,4	0,4-3,9	0,515
	Employed			
	Farmer/employee	5,9	1,3-27,3	0,006
Father's employment status	Civil worker			
Income	< Regional minimum wage (3.564.993)	0,4	0,1-1,2	0,127
	≥ Regional minimum wage (3.564.993)			
	Exclusive breastfed	2,5	1,1-5,7	0,024
Breastfeeding	Not exclusively breastfed			
	Yes	2,0	0,8-4,9	0,094
History of infectious disease	No			

Source: primary data

Tabel 7. Final Models

Variables	B	p value	OR	CI 95%
Mother's age	1,370	0,011	3,935	1,368-11,323
Mother's education	1,072	0,033	2,923	1,089-7,841
Father's	2,228	0,014	9,279	1,573-54,742
employment	-1,329	0,059	0,265	0,066-1,054
Family income	1,476	0,004	4,376	1,604-11,942
Breastfeeding	0,903	0,095	2,466	0,854-7,127
Infectious disease				

Source: primary data

From the final model of the logistic regression test, the variables that have a significant relationship with children's nutritional status are maternal age, maternal education, paternal employment, and breast milk. Family income and infectious diseases were the control variables. The most dominant variable associated with child nutritional status was maternal age. Mothers aged <20 years had a 3.935 times risk ofhaving stunted children (Table 6 and Table 7).

4. DISCUSSION

The incidence of stunting in children aged 0-23 months is a serious concern in Indonesia, given its impact on children growth and development. Riskesdas data (2018) shows that the prevalence of stunting in children aged 0-23 months in

Indonesia reached 29.9%. In some provinces, such as Bali and East Nusa Tenggara, the prevalence of stunting is even higher, reaching 35.9% and 45% respectively [3]. SSGI data (2022) shows that the prevalence of stunting in children aged 0-23 months in Indonesia is 21.6%. The results of this study found that 33% of children aged 0-23 months in Tuah Negeri Sub-district were stunted. Tuah Negeri Sub-district is located in Musi Rawas Regency. Based on data from the Indonesian Nutrition Status Survey (SSGI) in 2022, Musi Rawas Regency in South Sumatra Province recorded the highest stunting rate with a prevalence of 25.4% [4].

Many factors lead to high rates of stunting in children, including exclusive breastfeeding, infectious diseases, maternal education, maternal employment, paternal employment and family income. The results of this study (Tables 4 and 5) show that there is a significantrelationship ($p<0.05$) between exclusive breastfeeding ($p=0.041$), maternal age ($p=0.008$), maternal education ($p=0.010$) and father's job (0.022) with the incidence of stunting in children. The results of this study are in line with the results of previous studies which concluded that there is a significant relationship between exclusive breastfeeding and the incidence of stunting. Children who are exclusively breastfed have a lower risk of stunting compared to children who are not exclusively breastfed [8-10]. Exclusive breastfeeding has an important role in preventing stunting in children, because breast milk is beneficial for children's growth and development. Breast milk can meet the nutritional needs of babies in a complete and balanced manner, so that babies do not lack the intake needed for optimal growth and development. Breastfeeding provides nutrients for babies to grow and develop, as well as improving the immune system. Exclusive breastfeeding for 6 months provides protection against gastrointestinal infections and iron deficiency anemia that can impact the incidence of stunting [11].

In addition to exclusive breastfeeding, parental factors also play a role in the incidence of stunting in children. The age of mothers who are still in the adolescent age group and low maternal education increase the incidence of stunting in children. The results of this study (Table 5) show that mothers who are less than 20 years old have a higher risk of 3.631 times having stunted children and mothers with low education have higher risk of 3.214 times having stunted children. The results of this study are in line with the results of a study in Tangerang Sub-district which found that there was a significant association between teenage pregnancy and the incidence of stunting, with a p value of 0.016. Children of mothers who become pregnant at the age of <19 years have a 5 times greater risk of stunting compared to children of mothers who become pregnant at the age of more than 19 years. Mothers who become pregnant in their teens often have not reached the physical and psychological maturity needed to undergo pregnancy and childbirth. Younger mothers may also lack the psychological readiness required for parenting. This immaturity can lead to suboptimal parenting practices, such as inadequate breastfeeding or poor dietary choices for their children. The stress associated with early motherhood can further impair their ability to provide a nurturing environment, exacerbating the risk of stunting [12]. Research shows that pregnancy under the age of 20 increases the risk of complications such as preterm labor and low birth weight (LBW), both of which

contribute to stunting [13]. Teenage pregnant women tend to be more vulnerable to malnutrition, both due to unbalanced diets and lack of knowledge about good nutrition during pregnancy [14]. Several studies have found that pregnant women under the age of 20 have a higher risk of chronic energy deficiency (CED), which has a direct impact on fetal growth and stunting [15-17]. Younger mothers often have inadequate nutritional intake during pregnancy, which can adversely affect fetal growth. Studies show that adolescent mothers are less likely to consume sufficient nutrients necessary for both their own health and that of their developing child. This nutritional gap can lead to low birth weight and stunting in children, as the fetus competes for nutrients with the mother, who is still in a growth phase herself [12,18].

Low levels of maternal education also contribute to the incidence of stunting. Research shows that mothers with low education are less likely to understand the importance of nutrition during pregnancy and after childbirth, leading to a lack of proper care for their children [19]. The results of this study (Table 5) show that mothers with low education levels have a 3.214 times risk of having stunted children. The level of education affects the mother's ability to receive information. Mothers with a high level of education will more easily receive information than mothers with a low level of education. This information is used as a provision for mothers to take care of their toddlers and feeding in everyday life. The results of research by Atikah and Khairiyati (2014) also stated that mothers with low levels of education had a 5.1 times greater risk of having stunted children. This is caused by a lack of knowledge about adequate nutrition, so that mothers cannot provide balanced nutritional intake for their children [20]. Low maternal education is related to knowledge, childcare practices and child feeding. Low levels of maternal education tend to be at greater risk of having stunted toddlers [21].

Mothers with lower educational attainment often have limited knowledge about nutrition, which directly impacts their ability to provide adequate dietary intake for their children. Studies show that mothers with higher education levels are more likely to understand the importance of balanced diets, proper feeding practices, and the nutritional needs of their children. This knowledge gap can lead to inadequate nutrition during pregnancy and early childhood, contributing to stunting [22,23]. Maternal education is closely linked to socioeconomic status. Families with less educated mothers often face financial constraints that limit access to nutritious food, healthcare, and other resources essential for child development. Research indicates that children from low-income households, where mothers have lower educational levels, are at a higher risk of experiencing stunting due to insufficient food quality and quantity [24,25]. A meta-analysis found that children whose mothers had low educational levels were 3.01 times more likely to experience stunting compared to those whose mothers had higher education levels (aOR = 3.01; 95% CI = 1.92 to 4.73) 3. Additionally, a study in Indonesia indicated that children under two years old were significantly more likely to be stunted if their mothers had only primary or no formal education [22,23].

The results of this study (Table 5) also show that father's occupation is also significantly associated with the incidence of stunting in children. Fathers who

work as farmers or other private sector have a 5.981 times risk of having stunted children. The results of this study are in line with the results of a study by Sugianti, et al conducted in Jombang Regency, which found that father's work affects the incidence of stunting. Fathers with menial jobs such as farmers, laborers, or fishermen have a higher risk of stunting due to low and unstable income. In rural areas, the father's job is often the main source of income for the family [26]. Most stunted toddlers are found among fathers who work as farmers. This is because farmer jobs tend to have limited and uncertain income, affecting the family's ability to meet children's nutritional needs. Jobs that generate low wages can have an impact on malnutrition in toddlers because the income earned is inadequate to meet family food needs [20,21]. According to Sri et al, if the breadwinner in the family is only the husband, it will affect the level of family income, not to mention that if the number of children in the family is more than one, it will require more food reserves, so the family income must be sufficient for the number of children which will have an impact on the nutritional status of children [27].

The results of multivariate analysis in this study (Table 7) show that the most dominant factor associated with the incidence of stunting in Tuah Negeri Sub-district is maternal age (p=0.011, OR=3.935). Maternal age greatly affects the nutritional status of children. Younger mothers, especially those under the age of 20, have a higher risk of having stunted children. Mothers under the age of 20 usually do not have adequate nutritional knowledge, so it will affect the pattern of feeding the children [28-29]. According to Dahal et al, maternal age is related to the level of education and nutritional knowledge, which is very important for children development. Mothers older than 20 years of age often have higher levels of education and demonstrate better knowledge and practices regarding nutrition, resulting in better growth outcomes for their children. In contrast, younger mothers may lack the knowledge and resources necessary to provide adequate nutrition, contributing to a higher incidence of stunting. Younger mothers often face economic hardships that can affect their children's nutritional status . Mothers with low socioeconomic status are more at risk of having stunted children [30,31].

This is consistent with the results of this study (Table 2) which show that, 53.8% of mothers aged less than 20 years have low education and 69.9% with low family income. A systematic review found that mothers younger than 20 years have an odds ratio (OR) ranging from 1.37 to 7.56 for having stunted children compared to older mothers. This indicates a substantial increase in risk associated with younger maternal age [32]. Mothers with low education levels often have limited knowledge about proper nutrition. This lack of understanding can lead to inadequate child feeding practices, as well as low family income. Low income is a significant factor contributing to children's nutritional status. Families with limited financial resources often struggle to provide a balanced diet, which impacts the incidence of stunting in children [31]. Adolescent mothers come from lower socioeconomic backgrounds, which can limit access to healthcare, proper nutrition, and educational resources. This socioeconomic disadvantage contributes to a higher prevalence of stunting among their children. For instance, research highlights that young mothers are more likely to experience economic instability, which can affect their ability to provide adequate nutrition and care for their children [33].

5. CONCLUSION

Maternal age <20 years is the most dominant factor associated with the incidence of stunting in Tuah Negeri Sub-district, Musi Rawas Regency. It is necessary to conduct health education for mothers aged <20 years related to nutritional knowledge and parenting, so that the stunting rate in Musi Rawas Regency can be reduced. There are limitations to this study. This study did not measure the mother's height and nutritional status as well as the child's food intake, which could be related to the incidence of stunting. Therefore, further research is needed.

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Conflict of Interest

The authors declare no conflict of interest in this research.

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