VIVA MEDIKA
Jurnal Kesehatan, Kebidanan, dan Keperawatan

Homepage: http://ejournal.uhb.ac.id/index.php/vm
P-ISSN: 1979-2026 E-ISSN: 2656-1034
DOI: 10.35960/vm.v17i1.1347

Analysis of Risk Factors for Stunting at Semanding Public Health Center, Tuban, Indonesia

Valentino Christianto[1], Adji Prayitno[2,3*], Sylvi Irawati[2,3], April Nuraini[4]
[1]Master's Program in Pharmacy, Faculty of Pharmacy, University of Surabaya, Jalan Raya Kalirungkut Surabaya, 60293, Indonesia
[2]Drug Information and Pharmaceutical Care Center, Faculty of Pharmacy, University of Surabaya, Jalan Raya Kalirungkut Surabaya, 60293, Indonesia
[3]Department of Clinical and Community Pharmacy, Faculty of Pharmacy, University of Surabaya, Jalan Raya Kalirungkut Surabaya, 60293, Indonesia
[4]Clinical and Community Pharmacy Study Program, Stikes Ngudia Husada Madura, Jalan RE Martadinata 45 Bangkalan, 69116, Indonesia
[1]v.christhianto@gmail.com; [2,3]adji_ps@staff.ubaya.ac.id*; [2,3]syl@staff.ubaya.ac.id; [4]aprilnurainiok@gmail.com

ABSTRACT

Stunting is a health problem in all developing countries. Stunting causes low intellectual capacity in children, lowers competitiveness, and reduces the quality of human resources in the future. The purpose of this study was to determine the factors causing stunting that can be used as a measure for stunting prevention. A descriptive analysis was conducted using an observational method with a case-control design at the Semanding Community Health Center, Tuban Regency. Sampling was carried out using a total sampling technique with 130 respondents, divided into two groups: mothers with stunted toddlers (65 respondents) and mothers with non-stunted toddlers (65 respondents) from October to December 2023. Bivariate and multivariate data analyses were performed. Significant differences were found in the median maternal age at delivery (p=0.044), child's age when starting complementary foods in addition to breastfeeding (p=0.019), and timing of breastfeeding initiation after birth (p=0.025). The relationship between child characteristics that statistically significantly influenced the incidence of stunting was early initiation of breastfeeding (p=0.027). Early initiation of breastfeeding tended to influence the incidence of stunting.

Keywords: Breast Milk, Risk, Stunting

1. INTRODUCTION

Health is one of the fundamental transformative processes that play a role in human development. Successful health development serves to improve the quality and competitiveness of human resources. In microeconomic terms, human health is the basic capital for work productivity (Candra, 2020). Healthy people are certainly more productive, making it easier to carry out activities that ultimately generate high income. In macroeconomic terms, a population with good health is a valuable input for reducing poverty, increasing economic development, and long-term development in a country (Mediani, 2020).

Child nutritional status problems, such as malnutrition, are health issues in all developing countries, including Indonesia. The United Nations Children's Fund (UNICEF) reports that child malnutrition consists of three categories: underweight, which is low body weight for age; stunting, which is low height-for-age ratio; and wasting, which is low weight-for-height ratio. However, stunting has become a critical child

***Valentino Christianto**
Tel.: -
Email: v.christhianto@gmail.com

nutrition case in this era (Halimatunnisa et al., 2021). Stunting leads to low intellectual capacity in children, reduced competitiveness, and diminished quality of human resources in the future. Stunting is a condition of malnutrition in children that can be observed from the time the fetus is in the womb until birth, leading to growth and development problems that result in children having short stature for their age (Titaley et al., 2019).

Reducing the proportion of stunting in children is a goal of the Sustainable Development Goals (SDGs) program by 2030. The SDGs are a sustainable development program with 17 goals (Mediani, 2020). The SDGs concept is crucial as it can form a development framework that can accommodate future changes, especially in facing changing global situations after the Millennium Development Goals (MDGs) program. The MDGs were a program similar to the SDGs aimed at reducing poverty and hunger. Although it has ended, the MDGs did not succeed in resolving the problem of disparity in the number of poor households between rural and urban areas (Soliman et al., 2021). The SDGs aim to continue and complete the unfinished goals of the MDGs, including eliminating poverty and hunger. The SDGs are directly or indirectly related to malnutrition, especially the second goal of "zero hunger." Health is a top priority in the SDGs, including efforts to reduce the prevalence of stunting (Soekatri et al., 2020). By reducing stunting rates, children are expected to grow up healthy and intelligent, thereby actively participating in more sustainable development.

Health profile data in Indonesia show that the percentage of children aged 0-59 months who were very short and short in 2018 was 30.8%, decreasing to 27.7% in the same year (Laksono et al., 2022). Although it has decreased, this figure still exceeds the WHO national target limit of 20%. The incidence of stunting in Indonesia is 30.8%, while the prevalence of stunted toddlers in East Java province is 32.8%, consisting of 15.21% very short and 18.40% short (Kemenkes RI, 2020).

The prevalence of stunted toddlers in Tuban in 2019 was 16.8% (10,344 toddlers). Tuban consists of 20 sub-districts. One of the sub-districts in Tuban, namely Semanding, ranked 4th as the sub-district with the highest stunted toddler population in 2022 at 24.56% out of 2,866 toddlers spread across six villages in the area (Puspitasari et al., 2021). Although the prevalence of stunting in Semanding sub-district decreased to 17.3% in 2020, this figure is still above the national average prevalence of stunting in 2024 of 14.4%, compared to the 2024 national target of 14% (Rah et al., 2020).

According to the WHO, this failure-to-thrive condition occurs due to minimal nutritional intake over a long period and repeated infections, as well as challenges during the first 1,000 days of life, which includes 270 days during pregnancy and the first 730 days after the baby is born (Suprayoga, 2021). During this period, the baby's development and growth must be ensured. If nutritional problems are faced during this period, the child will experience delays in physical and cognitive development (Kemenkes RI, 2021).

The main factor causing stunting in toddlers is a history of low birth weight (LBW), which results in growth retardation. If this condition is not addressed with balanced nutritious food and the child experiences infectious diseases, it will accelerate the occurrence of stunting in children (Wardita et al., 2021). Breastfeeding that is not given for up to six months after birth will also be a risk factor for stunting. This is in line with the results of a study by Handayani et al. (2019), which showed that a history of LBW and non-exclusive breastfeeding were risk factors for stunting in Semanding, Tuban (Handayani et al., 2019). The next risk factor is parental income. Parental income influences the incidence of stunting because low income cannot be used to meet the child's nutritional needs. There is a significant relationship between household income or maternal or paternal income with the incidence of stunting (Mishra, 2019).

There are two studies on stunting risk factors in the Semanding work area, Tuban Regency. The first study was conducted by Rahayu et al. (2022) with a sample of 114 mothers who had stunted babies. The results showed that the biggest factors causing stunting in stunted toddlers in Penambangan Village, Semanding, Tuban, were maternal primary education, parental income below the Tuban Regional Minimum Wage, and non-exclusive breastfeeding. LBW was not one of the biggest factors in Penambangan Village (Rahayu et al., 2022). The second study, conducted by Puspitasari et al. (2021), showed that the height of the father and mother, low food variety, and low fish consumption contributed to the incidence of stunting in children aged 1 to 5 years (Puspitasari

et al., 2021). Both studies analyzed limited risk factors; the first study was only on mothers with stunted babies with a sample of 114, while the second study was conducted on 109 samples (less than 100 children aged 1-5 years). Several other stunting risk factors considered in this study include family socioeconomic conditions, access to health services, and environmental factors that can contribute to the incidence of stunting in children aged 6-24 months.

Based on this background, the researchers wanted to analyze the risk factors for stunting in children aged 1-5 years at the Semanding Public Health Center, Tuban Regency. The purpose of this study was to determine the factors causing stunting, which can be used as a measure for stunting prevention by the government, health workers, and the community so that the stunting rate continues to decrease in the future.

2. RESULTS METHODOLOGY

This study used an observational method with a case-control design conducted at the Semanding Public Health Center, Tuban Regency, from October to December 2023. Sampling was carried out using a total sampling technique with 130 respondents, divided into two groups: mothers with stunted toddlers (65 respondents) and mothers with non-stunted toddlers (65 respondents).

The inclusion criteria in this study were mothers with stunted children under 5 years old (0-59 months), mothers who were willing to be respondents and signed an informed consent form, and mothers who personally or whose family members could read and write. The exclusion criterion was mothers who did not reside in the study location. Instrumen pada penelitian ini adalah lembar kuesioner meliputi data ibu, data anak dan lingkungan. Analisis data yang digunakan dalam penelitian ini adalah analisis deskriptif dan analitik. Data-data yang berbentuk kategorikal ditampilkan dalam bentuk proporsi dan dianalisis perbedaannya antara kelompok *stunting* dan non *stunting* menggunakan *Chi Square*, sementara data berbentuk kontinu akan dianalisis menggunakan *t-test* atau *Mann Whitney U* berdasarkan distribusi data. Kebermaknaan secara statistik adalah pada p ≤ 0,05 (*two- sided*).

Faktor-faktor risiko *stunting* antara kelompok *stunting* dan non *stunting* akan dimasukkan ke dalam analisis multivariat menggunakan *binary logistic regression*. Pengaruh faktor-faktor tersebut terhadap risiko *stunting* dinyatakan dalam nilai adjusted odds ratio (aOR), p, dan interval keterpercayaan 95% (95% *confidence interval*, 95% CI). Semua analisis dilakukan menggunakan IBM SPSS Statistics versi 29.0. Penelitian ini telah memperoleh persetujuan dari Komite Etik Universitas Surabaya (No. 273/KE/X/2023) dan surat persetujuan penelitian oleh Dinas Pelayanan Terpadu Satu Pintu Kabupaten Tuban.

3. RESULTS AND DISCUSSION

The data collection process resulted in 65 mothers with stunted children as the control group and 65 mothers with non-stunted children. The basic characteristics of the mothers are presented in Table 1.

Table 1. Basic Characteristics of Mothers

Mather's Characteristics	*Stunting* (n=65)	Non *Stunting* (n=65)	Score *p*
Age at Delivery (years)			
Median	25	27	
Max. Value	42	42	0.044
Min. Value	17	17	
Height (cm)			
Median	155	165	
Max. Value	165	165	0.644
Min. Value	149	141	
Number of Antenatal Care Visits			
Median	9 times	9 times	
Max. Value	9 times	6 times	0.962
Min. Value	4 times	3 times	
Hemoglobin Level			
Median	12	12	
Max. Value	14	14	0.756
Min. Value	8.9	9.0	

Based on Table 1, the maternal characteristics or factors that were statistically significant in influencing the incidence of stunting with a p-value <0.05 was the maternal age at delivery (p=0.044). This study is in line with a study conducted in Ghana with a result of [adjusted odds ratio (aOR)=7.56; 95% confidence interval (CI) 4.20--13.63], where maternal age significantly influenced the incidence of stunting in toddlers born to teenage mothers, with an 8 times higher risk of experiencing stunting compared to mothers of sufficient age for pregnancy and childbirth (Haile et al., 2019).

For other variables such as maternal height, number of antenatal care visits, hemoglobin levels,

maternal education, maternal occupation, use of iron supplements, number of children born, and birth spacing, no statistically significant differences were found between the stunting and non-stunting groups (p>0.05).

Table 2. Frequencies of Mothers' Basic Characteristics

Mother's Characteristics	Category	Stunting		Non Stunting		*p* Value
		f	%	f	%	
Last Education	Elementary – Junior High School	7	10.8	5	7.7	0.545
	High School-Bachelor's Degree	58	89.2	60	92.3	
Occupation	Housewife	37	56.9	28	43.1	0.114
	Others	28	43.1	37	56.9	
Iron Supplementation	Reguler	19	29	16	25	0.396
	Irreguler	41	71	43	75	
Number of Children Born	1	38	58.5	37	56.9	0.860
	2	27	41.5	28	43.1	
Birth Spacing (years)	First Child	20	30.8	31	56.9	0.995
	1 year	8	12.3	4	6.2	
	2 years	9	13.8	8	12.3	
	3 years	18	27.7	10	15.4	
	4 years	7	10.8	5	7.7	
	5 years	2	3.1	-	-	
	6 years	1	1.5	1	1.5	

According to a previous study by Sani et al. (2020) on the relationship between maternal age during pregnancy and stunting in toddlers aged 24-59 months at the Citeras Public Health Center, it was found that maternal age during pregnancy was related to stunting in toddlers aged 24-59 months. The sample of pregnant women at risk age (<20 years and >35 years) with short and very short toddlers was 49 people. Pregnancy at risk age was more common in respondents with a history of early marriage and those with a history of basic education. The respondents were toddlers aged 24-59 months who were stunted, and 3 out of 76 respondents were stunted toddlers because they had short height-for-age, underweight, and severe malnutrition. The results showed a ρ-value=0.001, because the p-value <0.05, there was a relationship between maternal age and the dependent variable with a correlation coefficient of 0.361. The results of this study stated that most of the maternal age at risk during pregnancy (<42 years and >17 years) tended to have stunted toddlers (Sani et al., 2020). At this risk age, a lot of nutrition is needed both for the fetus and for the mother herself, making this age very susceptible to nutritional deficiencies. The frequencies of the mothers' basic characteristics are presented in Table 2.

Based on Table 2, in the stunting group, most mothers had a senior high school-bachelor's degree education (89.2%), were housewives (56.9%), did not regularly consume iron supplements (71%), and most of the birth spacing was with the first child (30.8%). In the non-stunting group, most mothers had a senior high school-bachelor's degree education (92.3%), occupations other than housewives (56.9%), did not regularly consume iron supplements (75%), and most of the birth spacing was with the first child (56.9%). The results of the multivariate analysis of maternal characteristics are presented in Table 3.

Table 3. Results of Multivariate Analysis of Maternal Characteristics Influencing Stunting

Mother's Characteristics	*adjusted Odds Ratio* (aOR)	*P Value*	95% *Confidence Intervals* (CI)	
			Lower	*Upper*
Age at Delivery	0.966	0.616	0.846	1.104
Height	1.011	0.856	0.895	1.143
	1.315	0.105	0.944	1.832
HB Level	1.198	0.507	0.758	2.303
Occupation	0.966	0.973	0.278	3.412
Last Education	2.861	0.107	0.796	10.291
Iron Supplement	0.799	0.059	0.634	1.008
Number of Children Born	0.699	0.985	0.321	2.579
Birth Spacing (years)	1.070	0.825	0.588	1.946

Table 3 shows that the results of the multivariate analysis of maternal characteristics did not reveal any variables that statistically significantly influenced the incidence of stunting. This is not in line with a previous study by Sri &

Lusi (2020) in the city of Yogyakarta, which found that maternal education level had a significant relationship with the incidence of stunting. Mothers with low levels of knowledge had a 2.22 times greater risk of having stunted children compared to highly educated mothers. Maternal education level greatly influenced the formation of children's eating habits, including menu planning, shopping, cooking, and preparing food (Sundari & Yunita, 2021).

Table 4. Basic Characteristics of Children

Child Characteristics	*Stunting*	Non *Stunting*	*p*
Birth Order			
Median	1	1	
Maximum Value	2	2	0.860
Minimum Value	1	1	
Child's Age (Months)			
Median	24	28	
Maximum Value	55	59	0.743
Minimum Value	8	8	
Body Weight (Grams)			
Median	3000	3000	
Maximum Value	3900	4000	0.745
Minimum Value	2300	2500	
Age When Child Stopped Breastfeeding (Months)			
Median	5	8	
Maximum Value	32	36	0.940
Minimum Value	0	0	
Child's Age at Complementary Feeding (Months)			
Median	6	6	
Maximum Value	6	7	0.019
Minimum Value	3	3	
Early Initiation of Breastfeeding (Hours)			
Median	3	2	
Maximum Value	8	8	0.025
Minimum Value	0	0	

Based on Table 4, the results of the bivariate analysis of children's basic characteristics showed statistically significant differences in the median age of children when starting complementary foods in addition to breastfeeding and the median time of mothers initiating early breastfeeding after the child's birth (p-value for both variables <0.05). The median age of children when starting complementary foods in addition to breastfeeding in the stunting and non-stunting groups was 6 months vs. 6 months (p=0.019). The median time for mothers initiating breastfeeding after the child's birth in the stunting group was statistically significantly longer than that in the non-stunting group (3 hours vs. 2 hours, p=0.025).

If complementary foods are given before 6 months or after 6 months, it can cause malnutrition, iron deficiency, and delayed growth and development in infants (Rah et al., 2020). Most stunting sufferers at the Semanding Public Health Center did not receive complementary foods on time. Poor infant growth is caused by malnutrition since infancy, providing complementary foods too early or too late, resulting in complementary foods that do not meet the nutritional needs of infants or have poor feeding patterns according to age. This is in line with a study conducted by Khasanah et al., which showed that providing complementary foods according to the needs of children under 5 years old could reduce the risk of stunting (Khasanah et al., 2019). This is because if children under 5 years old are given complementary foods in sufficient quantities and frequency, their nutritional needs are met, which can reduce the risk of stunting (Khasanah et al., 2019).

Previous research by Lintang et al. on the relationship between Early Initiation of Breastfeeding (EIB) and the incidence of stunting in infants aged 0-24 months at the Kramatwatu Health Center in 2021 stated that the proportion of stunting was higher in toddlers who did not do EIB compared to toddlers who did EIB. Statistical test results using Chi-Square obtained a p-value of 0.019 (p<0.05), which means that statistically, there was a significant relationship between EIB and the incidence of stunting, and an odds ratio of 11.11 was obtained, meaning that mothers who did not do early breastfeeding initiation had an 11 times greater chance of causing toddlers to experience stunting compared to mothers who did early breastfeeding initiation (Lintang et al., 2022).

Previous research conducted by Suhartiningsing in 2020 at the Gunungsari Health Center, Bojonegoro Regency, on toddlers aged 12 to 24 months, obtained research results showing that most toddlers had early breastfeeding initiation, as many as 47 toddlers (70.1%), and most toddlers did not experience stunting, as many as 45 toddlers (67.2%) with a significant value of ρ (0.000) < α (0.05) (Sunartiningsih et al., 2021).

Table 5. Results of Multivariate Analysis of Child Characteristics Affecting Stunting

Child Characteristics	adjusted Odds Ratio (aOR)	*p* Value	95% Confidence Intervals (CI)	
			Lower	Upper

Child's age	1.014	0.413	0.981	1.047
Birt Order	1.157	0.708	0.540	1.100
Body Weight	1,000	0.993	0.999	1.001
Child's Height at Birth	1.028	0.426	0.960	1.100
Sex	0.775	0.506	0.365	1.644
Immunization	0.947	0.952	0.404	2.347
Age When Child Stopped Breastfeeding	1.004	0.851	0.961	1.049
Child's Age at Complementary Feeding	1.235	0.442	0.721	2.115
Early Initiation of Breastfeeding (EIB)	0.814	**0.027**	0.678	0.977
History of Taking Deworming Medication	0.896	0,823	0.342	2.347
Number of Children Born	-	-	-	-
Birth Spacingyang dilahirkan	1.100	0,756	0.603	2.005
Has the Child Ever Been Sick (in the last 6 months)?	1.096	0,916	0.202	5.933
How Many Times Has the Child Been Sick?	1.773	0,532	0.294	10.680
Does the Child Often Have Diarrhea?	0.497	0.430	0.110	2.249

Based on Table 5, the results of the multivariate analysis of child characteristics show that early breastfeeding initiation (EIB) is the only child characteristic that statistically significantly affects the occurrence of stunting. For every hour the mother starts breastfeeding early after giving birth, there is a decrease in the risk of stunting by 0.814 times (aOR 0.814; 95% CI 0.678-0.977; p=0.027). This is in line with the study by Manggala et al. using a correlative analytical observational research design with a case-control study design. With a sample of 44 people using purposive sampling technique, the results showed that there was a relationship between complementary feeding and the incidence of stunting at the Kampung Dalam Public Health Center [Odds Ratio (OR)=2.867; 95% confidence interval (CI) 1.453-5.665] and p-value=0.002 (Manggala et al., 2019).

For other variables, such as birth order, child's age, birth weight, birth length, age when the child stopped breastfeeding, sex, immunization, history of taking deworming medication, history of illness, history of diarrhea, no statistically significant differences were found between the stunting and non-stunting groups (p>0.05).

Table 6. Basic Environmental Characteristics

Environmental Characteristics	Category	Stunting		Non Stunting		*p* Value
		f	%	f	%	
Number of people living in the same house	3 people	24	36.9	17	26,2	0.186
	≤ 3 people	48	73.8	41	63,1	
Source of drinking water	PDAM (Local Water Company)	3	4.6	1	1.5	0.310
	Refill Water	62	95.4	64	98.5	
Defecation (BAB)	Private toilet	65	100	65	100	-
	Public toilet	0	0	0	0	
Occupation of the head of the household	Working	65	100	65	100	-
	Not Working	0	0	0	0	
Husband's last education	Elementary-Junior High School	62	95.4	59	90.8	0.300
	High School-Bachelor's Degree	3	4.6	6	9.2	
Household income	Below Regional Minimum Wage	62	95.4	64	98.5	0.310
	≥ Regional Minimum Wage	3	4.6	1	1.5	

Table 6 shows that the results of the bivariate analysis of basic environmental characteristics statistically did not reveal significant differences between the stunting and non-stunting groups for variables such as the number of people living in the same house, source of drinking water, defecation habits, occupation of the head of the family/husband, husband's education, and family income (p>0.05). The characteristics of children's environmental factors affecting stunting are presented in Table 7.

Table 7. Characteristics of Children's Environmental Factors Affecting Stunting

Environmental Characteristics	adjusted Odds Ratio (aOR)	*p* Value	95% Confidence Intervals (CI)	
			Lower	Upper
Number of people living in the same house	0.608	0.203	0.283	1.307
Source of drinking water	2.795	0.383	0.278	28.130
Defecation (BAB)	-	-	-	-
Education level of the head of the household	0.467	0.304	0.109	1.994
Husband's occupation	-	-	-	-
Household income	2.795	0.383	0.278	28.130
Number of people living in the same house	0.608	0.203	0.283	1.307
Source of drinking water	2.795	0.383	0.278	28.130

Table 7 shows that the results of the multivariate analysis of environmental characteristics did not reveal any variables that statistically significantly influenced the incidence of stunting. This is not in line with previous research by Maliga et al. (2022), which stated that environmental factors significantly influenced the incidence of child stunting (Maliga et al., 2022). Hygiene factors and access to clean water, including cleanliness and access to clean water, make children more aware of the risk of infectious diseases. For this reason, it is best to get used to washing hands with soap and running water. The cleanliness of the home environment affects the development of stunting in children under five years of age.

Table 8. Relationship between Maternal Characteristics, Child Characteristics, and Environmental Characteristics

Characteristics	adjusted Odds Ratio (aOR)	*p* Value	95% Confidence Intervals (CI)	
			Lower	Upper
Maternal Age at Delivery	0.960	0.203	0.903	1.022
Complementary Feeding	0.766	0.280	0.472	1.243
Early Initiation of Breastfeeding (EIB)	1.190	0.054	0.997	1.422

Table 8 shows that the multivariate test results did not find a statistically significant relationship between maternal, child, and environmental characteristics influencing the incidence of stunting. Overall, the risk factors for stunting found in this study were, for maternal factors, the mother's age at delivery, and for child factors, Early Initiation of Breastfeeding (EIB). The results of the multivariate test of maternal and child characteristics or risk factors showed that Early Initiation of Breastfeeding (EIB) tended to influence the incidence of stunting, although the results were (aOR 1.190, 95% 0.997-1.422, p<0.004).

For characteristics or risk factors that were not statistically related, namely the environment, this is different from the research conducted by Julianti et al., which showed that children who experience stunting are born from an unclean environment and incomplete immunization. Stunting in children is caused by natural factors passed down by their mothers to their children through the short genotype found in the mother (Julianti et al., 2023). Another different study by Black et al. in 2021, which aimed to determine the relationship between environmental sanitation factors and the incidence of stunting in toddlers, used an observational survey with a cross-sectional approach with a sample of 68 toddlers. The study found that there was a relationship between water quality p=0.016, family latrine conditions p=0.028, waste disposal facilities p=0.020 with the incidence of stunting (Black et al., 2019).

Similarly, the results of the current study's statistical tests state that the p-value <0.05, which

is 0.025, means that statistically, there is a significant relationship between EIB and the incidence of stunting, and an OR of 0.814 (0.678-0.977) is obtained, which means that for every hour the mother starts breastfeeding early after giving birth, there is a decrease in the risk of stunting by 0.814 times.

The strength of this study is that the sample group also includes a control group for comparison, and the characteristics or risk factors for stunting studied have a total of 27 variables. The limitation of this study is the insufficient sample size, allowing characteristics or risk factors that should statistically influence to become insignificant, so a larger sample is needed. Suggestions for further researchers are to examine other factors that cause stunting, including maternal mental health, sanitation, stimulation, and children's activities

CONCLUSION

The maternal characteristic that influenced the incidence of stunting in stunted toddlers at the Semanding Public Health Center, Tuban, was the mother's age during pregnancy, while the child characteristics that influenced the incidence of stunting in stunted toddlers at the Semanding Public Health Center, Tuban, were the child's age when receiving complementary foods in addition to breastfeeding and the time of the mother's early breastfeeding initiation after the child's birth. No environmental factors were found to affect the incidence of stunting at the Semanding Public Health Center, Tuban, and no relationship was found between maternal, child, and environmental characteristics influencing the incidence of stunting at the Semanding Public Health Center, Tuban.

RECOMMENDATION

The suggestions obtained from the results of this study for the Semanding Public Health Center, Tuban, are that medical personnel are expected to work better together to socialize stunting prevention programs so that the acceleration of reducing stunting rates can be realized. For further researchers, it is suggested to examine maternal mental health, sanitation, stimulation, and children's activities.

REFERENCES

Black, R. E., Allen, L. H., Bhutta, Z. A., Caulfield, L. E., de Onis, M., Ezzati, M., … Rivera, J. (2019). Maternal and child undernutrition: global and regional exposures and health consequences. *The Lancet*, *371*(9608), 243–260. https://doi.org/10.1016/S0140-6736(07)61690-0

Candra MKes(Epid), D. A. (2020). Pencegahan dan Penanggulangan Stunting. In *Epidemiologi Stunting*. Retrieved from https://r.search.yahoo.com/_ylt=Awrxw_53QaJhPmUA3w_LQwx.;_ylu=Y29sbwNzZzMEcG9zAzQEdnRpZAMEc2VjA3Ny/RV=2/RE=1638052344/RO=10/RU=http%3A%2F%2Feprints.undip.ac.id%2F80670%2F1%2FBuku_EPIDEMIOLOGI_STUNTING_KOMPLIT.pdf/RK=2/RS=BFSY8aq0Lx1bha7MtII8PgwQwYU-

Dr. Ir.Hadi Suprayoga, M. (2021). Capaian, Tantangan dan Peluang Pelaksanaan Strategi Nasional Percepatan Pencegahan Stunting Tahun 2018-2024. *TNP2K Sekretariat Wakil Presiden Republik Indonesia*, 1–24.

Haile, D., Azage, M., Mola, T., & Rainey, R. (2019). Exploring spatial variations and factors associated with childhood stunting in Ethiopia: Spatial and multilevel analysis. *BMC Pediatrics*, *16*(1), 1–14. https://doi.org/10.1186/s12887-016-0587-9

Halimatunnisa, M., Ubudiyah, M., Indarwati, R., Ketut Putri Martha Sari, N., & Suhardin, S. (2021). Family Determinants of Stunting in Indonesia: A Systematic Review. *International Journal of Psychosocial Rehabilitation*, *24*(January 2021), 815–822. https://doi.org/10.37200/IJPR/V24I9/PR290099

Handayani, S., Kapota, W. N., & Oktavianto, E. (2019). The Relationship Of Exclusive Asi Status With The Stunting Events In Ages 24-36 Months In The Watugajah Village, Gunungkidul District. *Medika Respati : Jurnal Ilmiah Kesehatan*, *14*(4), 287.

Julianti, M., Fahrizal, F., Marniayati, L., & Oktarina, R. (2023). *Analisis Spasial Pemberian TTD pada Ibu Hamil dan Rematri Serta Stunting pada Balita : Studi Perbandingan Dua Daerah di Sumatera*

Selatan Spatial Analysis of TTD Giving to Pregnant Woman and Teenage Girls and Stunting in Toddlers : A Comparative Study of T. *15*(4), 202–211.

Kemenkes RI. (2020). Buletin Stunting. *Kementerian Kesehatan RI*, *301*(5), 1163–1178.

Kementerian Kesehatan Republik Indonesia. (2021). Laporan Kinerja Kementrian Kesehatan Tahun 2020. *Kementerian Kesehatan Republik Indonesia Tahun 2021*, 1–224.

Khasanah, D. P., Hadi, H., & Paramashanti, B. A. (2019). Waktu pemberian makanan pendamping ASI (MP-ASI) berhubungan dengan kejadian stunting anak usia 6-23 bulan di Kecamatan Sedayu. *Jurnal Gizi Dan Dietetik Indonesia (Indonesian Journal of Nutrition and Dietetics)*, *4*(2), 105. https://doi.org/10.21927/ijnd.2016.4(2).105-111

Laksono, A. D., Sukoco, N. E. W., Rachmawati, T., & Wulandari, R. D. (2022). Factors Related to Stunting Incidence in Toddlers with Working Mothers in Indonesia. *International Journal of Environmental Research and Public Health*, *19*(17). https://doi.org/10.3390/ijerph191710654

Lintang, Santi Sundhari, F. (2022). Hubungan Inisiasi Menyusu Dini (Imd) Dengan Kejadian Stunting Pada Bayi Usia 0-24 Bulan Di Puskesmas Kramatwatu Tahun 2021. *Journal Of Midwifery*, *10*(2), 155–160. https://doi.org/10.37676/jm.v10i2.3274

Maliga, I., Hasifah, H., Antari, G. Y., Rafi'ah, R., & Lestari, A. (2022). Pengaruh Indeks Risiko Sanitasi Terhadap Kejadian Stunting di Kecamatan Moyo Utara. *Jurnal Kesehatan Lingkungan Indonesia*, *21*(1), 50–58. https://doi.org/10.14710/jkli.21.1.50-58

Manggala, A. K., Kenwa, K. W. M., Kenwa, M. M. L., Sakti, A. A. G. D. P. J., & Sawitri, A. A. S. (2019). Risk factors of stunting in children aged 24-59 months. *Paediatrica Indonesiana*, *58*(5), 205–212. https://doi.org/10.14238/pi58.5.2018.205-12

Mediani, H. S. (2020). Predictors of Stunting Among Children Under Five Year of Age in Indonesia: A Scoping Review. *Global Journal of Health Science*, *12*(8), 83. https://doi.org/10.5539/gjhs.v12n8p83

Mishra, P. K. (2019). *Environmental Education as a Driver for Sustainable Development Goals*. (January 2018), 5–10.

Puspitasari, P. N., Irwanto, I., & Adi, A. C. (2021). Risk Factors of Stunting in Children Aged 1-5 Years at Wire Primary Health Care, Tuban Regency, East Java. *Journal of Maternal and Child Health*, *5*(4), 387–395. https://doi.org/10.26911/thejmch.2020.05.04.05

Rah, J. H., Sukotjo, S., Badgaiyan, N., Cronin, A. A., & Torlesse, H. (2020). Improved sanitation is associated with reduced child stunting amongst Indonesian children under 3 years of age. *Maternal and Child Nutrition*, *16*(S2), 1–8. https://doi.org/10.1111/mcn.12741

Rahayu, Y. D., Yunariyah, B., & Jannah, R. (2022). Gambaran Faktor Penyebab Kejadian Stunting Pada Balita Di Wilayah Kerja Puskesmas Semanding Tuban. *Jurnal Kesehatan Masyarakat (Undip)*, *10*(2), 156–162. https://doi.org/10.14710/jkm.v10i2.32271

Sani, M., Solehati, T., & Hendarwati, S. (2020). Hubungan usia ibu saat hamil dengan stunted pada balita 24-59 bulan. *Holistik Jurnal Kesehatan*, *13*(4), 284–291. https://doi.org/10.33024/hjk.v13i4.2016

Soekatri, M. Y. E., Sandjaja, S., & Syauqy, A. (2020). Stunting was associated with reported morbidity, parental education and socioeconomic status in 0.5–12-year-old Indonesian children. *International Journal of Environmental Research and Public Health*, *17*(17), 1–9. https://doi.org/10.3390/ijerph17176204

Soliman, A., De Sanctis, V., Alaaraj, N., Ahmed, S., Alyafei, F., Hamed, N., & Soliman, N. (2021). Early and long-term consequences of nutritional stunting: From childhood to adulthood. *Acta Biomedica*, *92*(1).

https://doi.org/10.23750/abm.v92i1.11346

Sunartiningsih, S., Fatoni, I., & Ningrum, N. M. (2021). Hubungan Inisiasi Menyusu Dini Dengan Kejadian Stunting Pada Balita Usia 12-24 Bulan. *Jurnal Kebidanan*, *10*(2), 66–79. https://doi.org/10.35874/jib.v10i2.786

Sundari, S., & Yunita, L. H. (2021). Faktor-Faktor Yang Mempengaruhi Kejadian Balita Stunting Di Desa Canden, Jetis Ii Yogyakarta. *Jurnal Ilmu Kebidanan*, *7*(1), 17–28. https://doi.org/10.48092/jik.v7i1.115

Titaley, C. R., Ariawan, I., Hapsari, D., Muasyaroh, A., & Dibley, M. J. (2019). Determinants of the stunting of children under two years old in Indonesia: A multilevel analysis of the 2013 Indonesia basic health survey. *Nutrients*, *11*(5). https://doi.org/10.3390/nu11051106

Wardita, Y., Suprayitno, E., & Kurniyati, E. M. (2021). Determinan Kejadian Stunting pada Balita. *Journal Of Health Science (Jurnal Ilmu Kesehatan)*, *6*(1), 7–12. https://doi.org/10.24929/jik.v6i1.1347