Analysis of Risk Factors for Stunting Incidents in Posyandu, Hanopan Puskesmas Area, Arse District, South Tapanuli Regency, 2022

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Article Info	ABSTRACT
	Stunting is a chronic nutritional problem caused by insufficient nutritional intake over a long period of time due to providing food that is not in accordance with nutritional needs (Millennium Challenge Account – Indonesia, 2018). Prevalence of stunting in Indonesia, the aim of this research is to analyze risk factors for stunting, such as: LBW. Maternal Education, Family Income, Environmental Sanitation Hygiene, further research can identify methods for promoting stunting prevention in Arse District. This research was conducted from August 2022 to August 2023 at the Posyandu in the Hanopan Community Health Center, Arse District, South Tapanuli Regency. The research design used a cross-sectional approach. The population in this study was 130 people. The sampling technique uses total sampling. Data was collected using height and weight measurements as well as questionnaires and analyzed using chi square with a significant value of <0.05. The results of this research show that there is an influence of education, family income, LBW, provision of clean water and healthy latrines on the risk of stunting at the Posyandu in the Hanopan Community Health Center area. The most dominant risk factor is LBW in related agencies, it is necessary to increase education regarding nutrition in children's growth and development, provide training on processing nutritious foods and foods that are unique and attractive to children. *Keywords:* Stunting, Risk Factors, LBW
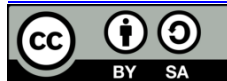
1. INTRODUCTION

Indonesia is a developing country with complex nutritional issues. It faces a double nutritional problem, with high rates of both malnutrition and overnutrition. This phenomenon is ironic. Undernutrition or malnutrition is a condition resulting from insufficient consumption of micronutrients and macronutrients, which can disrupt the balance of these nutrients. Malabsorption, such as that caused by cystic fibrosis, can be a contributing factor. Malnutrition can lead to diseases such as scurvy (caused by insufficient vitamin C intake) or obesity (caused by excessive energy intake) (Unicef, 2012).

Stunting is a chronic nutritional problem caused by insufficient intake of nutrients over a prolonged period of time due to inadequate food consumption that does not meet nutritional needs (Millennium Challenge Account - Indonesia, 2018). The prevalence of stunting in Indonesia has increased from 35.6% in 2010 to 37.2%, as recorded in 2018. This percentage is divided into two categories: very short (19.2%) and short (18.1%). It is estimated that over a third, or more than 8.9 million children under the age of 5 in Indonesia, experience growth that does not meet international height-for-age standards, according to the Ministry of Health of the Republic of Indonesia (2013). Stunting, as defined by the WHO Child Growth Standard, is based

on the body length index for age (PB/U) or height for age (TB/U) with a limit (z-score) of less than -2 SD (WHO, 2013).

In 2019, North Sumatra had a stunting prevalence rate of 30.11%. Although not classified as a serious problem in the riskesdas, this figure is quite high and needs to be addressed to reduce prevalence. Stunting in toddlers indicates a chronic poor health condition and can have dangerous impacts if left untreated. Nutritional problems during this period can have negative impacts in the short term, such as disrupting brain development, causing intelligence and physical growth disorders, and metabolic disorders in the body. Meanwhile, in the long term, excessive exposure to blue light can lead to decreased cognitive abilities and learning achievement, weakened immunity, and an increased risk of developing diabetes, obesity, heart disease, stroke, cancer, and disability in old age. Additionally, it can result in uncompetitive work quality and low economic productivity (Kompas.com, 20/7/2020).

The next generation of the nation should receive adequate nutrition to develop intelligence and cognitive abilities. In addition to improving nutrition, it is also important to focus on enhancing growth and development in children, which will contribute to the creation of a high-quality generation (Ministry of Health of the Republic of Indonesia, 2013). Stunting is a condition that affects children under the age of five, resulting from chronic malnutrition. This leads to the child being too short for their age. Malnutrition can occur during pregnancy and in the early days after birth. However, stunting only becomes apparent after the child reaches the age of two. Short and very short toddlers are defined as those whose body length or height, according to their age, falls below the 2006 WHO-MGRS standard. Stunting is defined by the Ministry of Health (Kemenkes) as a child under five with a z-score value of less than -2SD (stunted) or less than -3SD (severely stunted).

Stunting is a measure of shortness determined by the formula height-for-age (TB/U) and body length-for-age (PB/U). This can lead to stunted growth. It indicates chronic nutritional issues resulting from long-standing conditions such as poverty, unhealthy living habits, and poor feeding from birth. (Achadi LA. 2012). The TB/U index is advantageous in determining past malnutrition and is easy to carry. Parents rarely object to having their children measured. However, the weakness of the TB/U index is that height does not increase quickly and may not even decrease. Errors can occur, affecting the precision, accuracy, and validity of the measurement. Sources of error can come from untrained personnel, equipment errors, and the level of measurement difficulty. TB/U can be used as an indicator of population nutritional status because it estimates past or chronic nutritional conditions. A person classified as short for their age (PTSU) may have experienced poor nutritional status in the past, and under normal circumstances, their height should increase with age. The effect of malnutrition on height growth may only become visible after a considerable amount of time. (Department of Health of the Republic of Indonesia, 2011).

LBW is an important predictor for preterm dismaturity and small gestational age, defined as a gestational age of less than 37 weeks and a body weight of less than 2500 grams. The earlier the baby is born, the greater the risk of imperfect organ development, low birth weight, and dangerous complications. Low birth weight (LBW) is closely related to fetal mortality and can hinder growth and cognitive development, making individuals susceptible to chronic diseases later in life. LBW is an important predictor of newborn health and survival and is associated with a high risk of infant and child mortality (WHO, 2017). Low birth weight (LBW) can have further impacts such as failure to thrive (growth faltering), disrupted growth, wasting, and risk of malnutrition. According to Sirajudin et al's research in 2011, LBW babies have three times greater potential to become short compared to non-LBW babies.
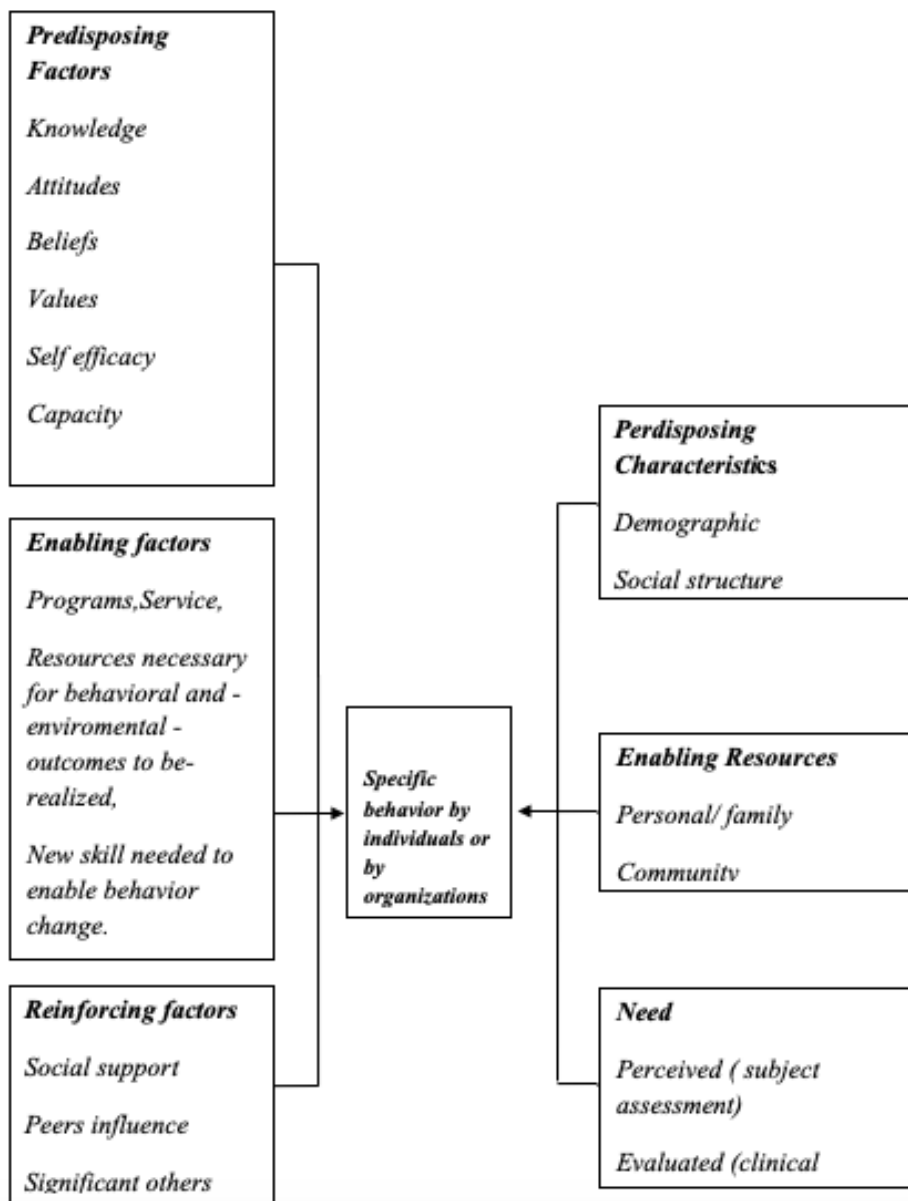
Graphic 1. Modification Scheme of Green and Kruiter's Theory in Glanz (2008), and Andersen's Theory (1995)

Based on the research objectives and theoretical basis put forward, the conceptual framework of this research can be described as follows:
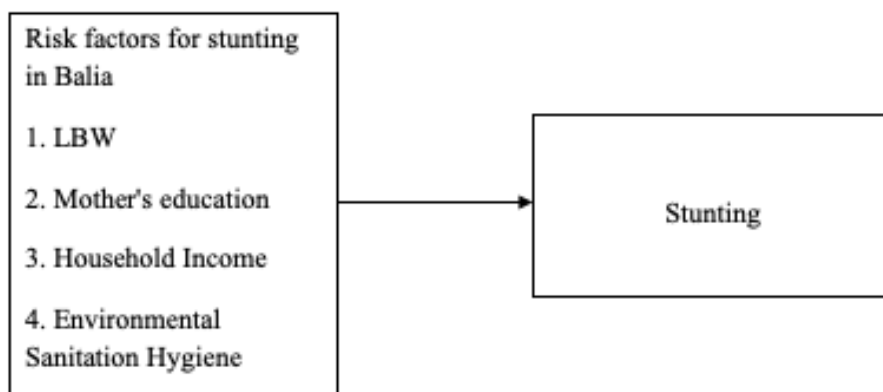
Graphic 2. Research Conceptual Framework

2. RESEARCH METHOD

This research is a cross-sectional survey, where measurements or observations are carried out at the same time on independent and dependent variable data. The study was conducted in Arse District, South Tapanuli Regency, over a period of 12 months, from August 2022 to August 2023, starting when the proposal was made.

Univariate analysis is a method of analyzing research variables, both independent and dependent, by presenting them in the form of a frequency distribution. Bivariate analysis, on the other hand, examines the relationship between independent and dependent variables using the chi-square test at a 95% confidence level ($p<0.05$). Multivariate analysis is a statistical method used to determine the influence of multiple independent variables on a dependent variable. The independent variable is included as a multivariate candidate if it has a p-value of less than 0.25. In this research, the enter method was used, which involves entering all independent variables simultaneously and removing them from the model based on statistical considerations (Yasril and Kasjono, 2009).

3. RESULT AND DISCUSSION

Tabel 1. **Age Distribution of Respondents in Posyandu in Hanopan Community Health Center Area, Arse District, South Tapanuli Regency**

Age	Frequency(f)	Percentage (%)
25-29 years	66	47,5
30-34 years	48	34,5
35-39 years	21	15,1
40-44 years	4	2,9
Total	**139**	**100,0**

Table 1 indicates that out of the 139 respondents studied, 66 were aged 25-29 years (47.5%), 48 were aged 30-34 years (34.5%), 21 were aged 35-39 years (34.5%), and 4 were aged 40-44 years (2.9%).

Tabel 2. **Education Distribution of Respondents in Posyandu at Hanopan Community Health Center Area, Arse District, South Tapanuli Regency**

Education	f	%
Low Education Level (Elementary – High School)	106	76,3
High Education Level (D3 - S2)	33	23,7
Total	**139**	**100,0**

Table 2 indicates that out of the 139 respondents studied, 106 people (76.3%) had low education (SD, SMP, SMA) while 33 people (23.7%) had higher education (D3, S1, S2).

Tabel 3. **Occupational Distribution of Respondents in Posyandu at Hanopan Community Health Center Area, Arse District, South Tapanuli Regency**

Occupation	f	%
Housewives	80	57,6
Entreprenuer	30	21,6
PNS	9	6,5
Employee	20	14,4
Total	**139**	**100,0**

Table 3 indicates that out of the 139 respondents studied, 57.6% (80) worked as housewives, 21.6% (30) worked as entrepreneurs, 6.5% (9) worked as civil servants, and 14.4% (20) worked as private employees.

Tabel 4. **Income Distribution of Respondents in Posyandu at Hanopan Community Health Center Area, Arse District, South Tapanuli Regency**

Income	f	%
Lower than ≤ Rp.2.500.000	113	81,3
More than Rp. 2.500.000	26	18,7
Total	**139**	**100,0**

Table 4 indicates that out of the 139 respondents studied, 113 people (81.3%) had a low income of ≤ Rp. 2,500,000, while 26 people (18.7%) had a high income of Rp. 2,500,000.

The results of the research on the analysis of risk factors for stunting incidents in Posyandu in the Hanopan Community Health Center area, Arse District, South Tapanuli Regency are as follows:

Tabel 5. **Education Distribution of Respondents in Posyandu at Hanopan Community Health Center Area, Arse District, South Tapanuli Regency**

Education	f	%
Low Education Level (Elementary – High School)	106	76,3
High Education Level (D3 - S2)	33	23,7
Total	**139**	**100,0**

Table 5 indicates that out of the 139 respondents studied, 106 people (76.3%) had low education (SD, SMP, SMA) while 33 people (23.7%) had higher education (D3, S1, S2).

Tabel 6. **Income Distribution of Respondents in Posyandu at Hanopan Community Health Center Area, Arse District, South Tapanuli Regency**

Income	f	%
Lower than ≤ Rp.2.500.000	113	81,3
Higher than Rp. 2.500.000	26	18,7
Total	**139**	**100,0**

Table 6 indicates that out of the 139 respondents studied, 113 people (81.3%) had a low income of ≤ Rp. 2,500,000, while 26 people (18.7%) had a high income of Rp. 2,500,000.

Tabel 7. **Distribution of low birth weight (LBW) respondents in Posyandu in the Hanopan Community Health Center area, Arse District, South Tapanuli Regency.**

LBW	f	%
Abnormal < 2.500 gr	107	77,0
Normal > 2.500 gr	32	23,0
Total	**139**	**100,0**

Table 7 shows that out of the 139 respondents studied, 107 people (77.0%) had abnormally low birth weight (< 2,500 gr) and 32 people (23.0%) had abnormally high birth weight (> 2,500 gr).

Tabel 8. **Distribution of Clean Water for Respondents in Posyandu in Hanopan Community Health Center Area, Arse District, South Tapanuli Regency**

Water Hygiene	f	%
Not Eligible	85	61,2
Eligible	54	38,8
Total	**139**	**100,0**

Table 8 indicates that out of the 139 respondents studied, 85 (61.2%) did not meet the requirements for clean water usage, while 54 (38.8%) did meet the requirements.

Tabel 9. **Distribution of Healthy Latrines for Respondents at Posyandu in the Hanopan Health Center Area, Arse District, South Tapanuli Regency**

Healthy Sanitair	f	%
Not Eligible	79	56,8
Eligible	60	43,2
Total	**139**	**100,0**

Table 9 indicates that out of the 139 respondents studied, 79 respondents with toilets did not meet the requirements (56.8%) while 60 respondents with toilets met the requirements (43.2%).

Tabel 10. **Risk of stunting incidents among respondents in Posyandu in the Hanopan Community Health Center Area, Arse District, South Tapanuli Regency**

Risk of Stunting Events	f	%
Stunting (< -2SD)	92	66,2
Not Stunting (> -2SD)	47	33,8
Total	**139**	**100,0**

Table 10 shows that out of the 139 respondents studied, 92 experienced a risk of stunting (< -2SD) while 47 did not experience such a risk (> -2SD) (33.8%).

Following univariate analysis, the researcher conducted bivariate analysis using the Chi-Square test to examine the relationship between the independent and dependent variables. The statistical significance limit was set at a p-value of 0.05. The results are as follows:

Tabel 11. **The Impact of Education on Stunting Incidents in Posyandu in the Hanopan Community Health Center Area, Arse District, South Tapanuli Regency**

Education	Risk Stunting Events						Nilai p
	Stunting (>-2SD)		Not Stunting (<-2SD)		Total		
	f	%	f	%	f	%	
Low Education Level (Elementary – High School)	82	59,0	24	17,3	106	76,3	
High Education Level (D3 - S2)	10	7,2	23	16,5	33	23,7	**0,000**
Total	**92**	**66,2**	**47**	**33,8**	**139**	**100,0**	

Table 11 shows that out of the 139 respondents studied, 82 individuals (59.0%) had low education (SD, SMP, SMA) and were at risk of stunting (>-2SD), while only 10 people had high education (D3, S1, S2) (7.2%). Additionally, 24 respondents with low education (SD, SMP, SMA) had no risk of stunting (<-2SD), while 23 individuals with high education (D3, S1, S2) were also included (16.5%).

Based on the results of the Chi-Square analysis test on the effect of education on the risk of stunting, it is evident that education has a significant influence on the risk of stunting (p-value = 0.000, α = 0.05).

The table below shows a cross-tabulation of family income and the risk of stunting.

Tabel 12. **The Impact of Family Income on Stunting Incidence in Posyandu at Hanopan Community Health Center Area, Arse District, South Tapanuli Regency**

Income	Risk Stunting Events						Nilai p
	Stunting (>-2SD)		Not Stunting (<-2SD)		Total		
	f	%	f	%	f	%	
Lower than ≤ Rp.2.500.000	89	64,0	24	17,3	113	81,3	
Higher than Rp. 2.500.000	3	2,2	23	16,5	26	18,7	**0,000**
Total	**92**	**66,2**	**47**	**33,8**	**139**	**100,0**	

Table 12 shows that out of the 139 respondents studied, 89 people (64.0%) with low family income of ≤ IDR 2,500,000 were at risk of stunting (>-2SD), while only 3 people (2.2%) with high family income of IDR 2,500,000 were at risk. On the other hand, 24 people (17.3%) with low family income of ≤ IDR 2,500,000 had no risk of stunting (<-2SD), while 23 people (16.5%) with high family income of IDR 2,500,000 did not have the risk.

Based on the results of the Chi-Square analysis test on the influence of family income on the risk of stunting, it is evident that family income has a significant impact on the risk of stunting (p-value = 0.000, α = 0.05). The table below shows a cross-tabulation of LBW against the risk of stunting.

Tabel 13. The Impact of Low Birth Weight on the Incidence of Stunting in Posyandu in the Hanopan Community Health Center Area, Arse District, South Tapanuli Regency

LBW	Stunting (>-2SD)		Not Stunting (<-2SD)		Total		Nilai p
	f	%	f	%	f	%	
Abnormal < 2.500 gr	88	63,3	19	13,7	107	77,0	
Normal > 2.500 gr	4	2,9	28	20,1	32	23,0	**0,000**
Total	**92**	**66,2**	**47**	**33,8**	**139**	**100,0**	

Table 13 shows that out of the 139 respondents studied, 88 people (63.3%) had abnormally low birth weight (<2,500 gr) with a risk of stunting (>-2SD), while only 4 people (2.9%) had normal low birth weight (>2,500 gr). Additionally, 19 people (13.7%) had abnormally low birth weight (<2,500 gr) with no risk of stunting (<-2SD), and 28 people (20.1%) had normal low birth weight (>2,500 gr).

According to the results of the Chi-Square analysis test, low birth weight has a significant influence on the risk of stunting (p-value = 0.000, α = 0.05). The table below shows a cross-tabulation of Clean Water on the risk of stunting.

Tabel 14. The Impact of Clean Water on Stunting Incidents in Posyandu at Hanopan Community Health Center Area, Arse District, South Tapanuli Regency

Water Hygiene	Stunting (>-2SD)		Not Stunting (<-2SD)		Total		Nilai p
	f	%	f	%	f	%	
Not Eligible	69	69,6	16	11,5	85	61,2	
Eligible	23	16,5	31	22,3	54	38,8	**0,000**
Total	**92**	**66,2**	**47**	**33,8**	**139**	**100,0**	

Table 14 shows that out of the 139 respondents studied, 69 people (69.6%) were at risk of stunting (>-2SD) due to unclean water, while only 23 people (16.5%) had access to clean water that met the requirements. Additionally, 16 people (11.5%) did not have access to clean water that met the requirements but were not at risk of stunting (<-2SD), and 31 people (22.3%) had access to clean water that met the requirements.

Based on the results of the Chi-Square analysis test on the effect of clean water on the risk of stunting, it is evident that clean water has a significant influence on the risk of stunting (p-value = 0.000, α = 0.05).

The table below shows a cross-tabulation of Healthy Latrines on the risk of stunting.

Tabel 15. The Impact of Improved Sanitation on Stunting Incidents in Posyandu at Hanopan Community Health Center Area, Arse District, South Tapanuli Regency

Healthy Sanitair	Stunting (>-2SD)		Not Stunting (<-2SD)		Total		Nilai p
	f	%	f	%	f	%	
Not Eligible	67	48,2	12	8,6	79	56,8	
Eligible	25	18,0	35	25,2	69	43,2	**0,000**
Total	**92**	**66,2**	**47**	**33,8**	**139**	**100,0**	

Table 15 shows that out of the 139 respondents studied, 67 people (48.2%) were at risk of stunting (>-2SD) due to latrines not meeting the requirements. On the other hand, 25 people (18.0%) had latrines that met the requirements, while 12 people (8.6%) did not meet the requirements but had no risk of stunting (<-2SD). On the other hand, 25 people (18.0%) had latrines that met the requirements, while 12 people (8.6%) did not meet the requirements but had no risk of stunting (<-2SD). On the other hand, 25 people (18.0%) had latrines that met the requirements, while 12 people (8.6%) did not meet the requirements but had no risk of stunting (<-2SD). Additionally, 35 people (25.2%) had latrines that met the requirements and were also not at risk of stunting.

Based on the results of the Chi-Square analysis test, it is known that healthy latrines have a significant influence on the risk of stunting (p-value = 0.000, α = 0.05).

Multivariate analysis aims to determine the significance of the influence between the independent and dependent variables simultaneously while identifying the risk factors for stunting. The Enter method is used to determine the effect of the independent variables on the dependent variable if the dependent variable has a p-value of less than 0.05. The variables education, family income, LBW, clean water, and healthy latrines were found to be significant based on the logistic regression test.

The table below shows the results of the multivariate analysis test using logistic regression.

Tabel 16. **Analysis of Risk Factors for Stunting Incidents in Posyandu in Hanopan Community Health Center Area, Arse District, South Tapanuli Regency: Results**

Variabel	B	S.E.	Wald	df	Sing	Exp(B)	95%CI
Education	1.782	1.038	2.949	1	.086	5.943	.777-45.437
Occupation	3.186	1.144	7.756	1	.005	24.189	2.570-227.696
LBW	4.195	1.080	15.093	1	.000	66.363	7.994-550.899
Water Hygiene	3.933	.983	15.995	1	.000	51.044	7.429-350.726
Healthy Sanitair	2.882	.787	13.400	1	.000	17.842	3.814-83.465

The results from table 16 indicate that the most dominant factor influencing the risk of stunting is the LBW variable (p = 0.000 < 0.05, OR = 66,363, 95% CI = 7,994-550,899) at the Posyandu in the Hanopan Community Health Center, Arse District, South Tapanuli Regency.

According to bivariate analysis, mothers who have completed primary or middle school are more likely to have stunted infants, while those who have completed high school or obtained a baccalaureate degree are less likely to have infants at risk of stunting. However, although the OR value of 1.219 is greater than 1, there is no statistically significant association, and according to Kusuma's research (2013), parental education, birth length, and parental height are not risk factors for stunting (23).

Parents, particularly mothers with higher education, are better equipped to care for their children than those with lower education. Families with lower socioeconomic levels tend to have parents with lower levels of education, so it is important for governments to increase access to education for these families.

According to research by Ramli et al. (2009) in Maluku City, the incidence of stunting in toddlers was not related to the father's education level, but was significantly related to the mother's education level. The reduced time that fathers spend with their children due to their work may explain why mothers tend to play a greater role in caring for their children. The statistical test resulted in a p-value of 0.235, indicating that education level is not a factor in the incidence of stunting in young children, regardless of whether mothers have high or low education.

Additionally, the multivariate analysis revealed that maternal education does not have an impact on stunting in toddlers. The statistical test resulted in a p-value of 0.235, indicating that educational background is not a factor in the incidence of stunting in toddlers, regardless of whether the mothers have high or low education. The statistical test resulted in a p-value of 0.235, indicating that educational background is not a factor in the incidence of stunting in toddlers, regardless of whether the mothers have high or low education. According to Nasution's (2014) research, socio-economic factors such as maternal education, family income, and number of family members do not guarantee the occurrence of stunting in toddlers aged 6-24 months in Yogyakarta City. However, there is a significant relationship between a history of low birth weight and maternal height with the incidence of stunting.

This may be because there is not a significant difference in the proportion of education categorized as high (high school graduate/graduate) and low (primary/junior high school graduate), resulting in stunting cases occurring in mothers with both high and low education. Additionally, having a high level of education does not guarantee that mothers have a good diet, which is an important factor in providing nutritional care for toddlers to avoid stunting. Nevertheless, a high level of education remains an important factor. Good and healthy habits are more likely to be adopted by individuals with higher levels of education. This is particularly important in preventing stunting in toddlers.

Individuals with higher income are more likely to have stunted infants, according to the bivariate analysis results. Although nanum does not show a statistically significant relationship, it can be considered a risk factor because the OR value is greater than 1. As explained by Paramashanti (2017), appropriate timing of MP-ASI administration acts as a protective factor (OR=0.32; 95% CI: 0.13-0.75) against the occurrence of stunting.

Household economic status is a confounding factor and effect modifier in the relationship between dietary diversity and stunting, and multivariate analysis showed no effect of family income on stunting in

young children. The statistical test resulted in a p-value of 0.000, indicating that the incidence of stunting in toddlers is influenced by family income levels above or below the minimum wage. The rise in individuals' standard of living, the impact of advertising promotions, and the ease of access to information can lead to changes in lifestyle and the emergence of new psychogenic needs among middle and upper economic communities. Individuals with high income but insufficient nutritional knowledge may become overly consumptive in their daily eating habits, prioritizing taste over nutrition. This is particularly concerning as it may lead to imbalanced diets.

It is worth noting that parents of stunted toddlers are often employed in low-wage occupations such as farming or manual labor. Assuming a family of two, it is difficult to prioritize proper care and nutrition when other expenses take precedence. It is important to address these issues to ensure the health and well-being of young children. This is supported by the informant's statement that toddlers often go without milk or fruit due to limited family income. Additionally, children's picky eating habits can lead to unfinished meals and increase the risk of stunting. There is a correlation between income and stunting. Data analysis shows that a similar proportion of stunted and non-stunted toddlers come from both low and high-income families. Specifically, 51.4% of stunted children under five come from low-income families, while 45.5% come from high-income families.

The chi-square test results indicate a significant relationship between birth weight and stunting incidence in toddlers at the Posyandu in the Hanopan Community Health Center area, Arse District, South Tapanuli Regency (P value = 0.000, <0.05). Adequate nutritional intake during pregnancy can prevent the birth of low birth weight babies, thereby reducing the risk of stunting in children. The incidence of stunting indicates that children are not receiving adequate nutrition and are susceptible to infections during the first 1000 days of life.

Birth weight can serve as an indicator of a child's likelihood of survival, growth, long-term health, and psychological development. Anthropometric assessment is a nutritional method for evaluating newborns by measuring weight, body length, upper arm circumference, and head circumference. This method greatly influences the morbidity and mortality of babies at a later age. Low birth weight requires serious treatment because babies in this condition are vulnerable to hypothermia and organ failure, which can lead to death. Low birth weight is associated with fetal and neonatal mortality, growth disorders, cognitive development disorders, and chronic diseases later in life. LBW babies in developing countries are more likely to experience intrauterine growth retardation due to poor maternal nutrition and increased infection rates compared to developed countries (Supriyanto, 2018).

Children born preterm are 3.84 times more likely to experience stunting than those born at term. Previous studies conducted on children aged between 12 and 36 months in Indonesia have shown similar results. Growth in preterm babies is delayed due to their short gestational age and linear growth retardation in the womb. Babies born at term may also experience growth disorders if their nutritional intake is insufficient, which can worsen with exposure to infectious diseases. Premature babies may experience growth disorders, but with adequate nutritional support, normal growth patterns can be achieved (Rajpal, 2020).

Low birth weight babies may experience digestive tract disorders due to the underdeveloped nature of their digestive system. This can result in an inability to absorb fat and digest protein, leading to a lack of nutritional reserves in the body. As a consequence, the growth of LBW babies may be disrupted. If this situation persists due to insufficient food, frequent infections, and inadequate healthcare, it can cause stunting in children.The study's findings align with research conducted in Vietnam, which indicates that a history of low birth weight is the primary risk factor for stunting in children under three years old. If not balanced with adequate nutritional improvements, the high prevalence of stunting in children under five will persist into their school years (Setiawan, 2018).

LBW babies are 1,665 times more likely to experience stunting than babies born at a normal weight. The study's findings align with Fitri's (2012) assertion that low birth weight is associated with stunting. The mother's nutritional status during pregnancy is a factor that can cause babies to be born with low birth weight. Malnourished mothers are more likely to give birth to LBW babies.

The research findings are consistent with Lidia's (2018) study, which reported that out of 22 low birth weight (LBW) toddlers, 16 (72.7%) experienced stunting. The chi-square test yielded a p-value of 0.000 < 0.05, indicating a significant association between LBW and stunting in toddlers at the Limapuluh Community Health Center. Clean water is essential for human life because 60% of our bodies require water, particularly during the growing years of toddlers.

The study's findings indicate that the availability of clean water is a contributing factor to stunting in children aged 0-59 months. According to the analysis, the p-value is 0.000, indicating a correlation between the availability of clean water and the incidence of stunting in the Posyandu at the Hanopan Community Health Center, Arse District, South Tapanuli Regency.Inadequate access to clean water increases the likelihood of

stunting in children by 6.021 times. This is due to the poor quality of water in many areas, where rainwater and well water are the primary sources. This is due to the poor quality of water in many areas, where rainwater and well water are the primary sources. This is due to the poor quality of water in many areas, where rainwater and well water are the primary sources. The water is often discolored and oily, likely due to the area's proximity to oil mining operations. Although some individuals use this water for consumption, it has been linked to causing diarrhea in children. If a child continues to experience diarrhea, it can lead to stunting.

This statement is in line with the research conducted by Feni Adriany et al (2020), which demonstrates a significant correlation between clean water and the incidence of stunting in children. The study found that families without access to clean water have an 0.088 higher risk of their children suffering from stunting compared to families with access to clean water (p=0.000). Many people lack access to clean water that meets physical health requirements for drinking (25). Research by Apriluana and Fikawati (2018) shows that toddlers with inadequate sanitation and water are 1.37 and 1.09 times more likely to experience stunting, respectively. Access to clean and adequate drinking water is a crucial health equity intervention. This differs from Mustika and Wahyuni's (2022) research, which found no correlation between clean water and stunting incidence (p = 1.000). Despite meeting the necessary requirements and having adequate physical quality, respondents in this classification had the highest incidence of stunting. Stunting can be caused by several factors. However, in this study, the source of clean water was not found to be the main cause of stunting.

The physical requirements for clean drinking water are crucial. The quality of drinking water can be affected by its source, pollution in the water sources, and the processing procedures. Poor drinking water quality can lead to nutritional problems in children. Access to clean, safe drinking water is essential for children's health, but parents' knowledge of how to properly care for and store water for consumption also plays an important role in choosing drinking water sources.

Research indicates that clean water availability has a significant impact on reducing stunting in children. Based on the observation results, the average respondent has access to clean water that is adequate for their needs and the use of alternative sources of clean water is recommended. On average, respondents obtain their water from wells and rainwater reservoirs. However, the physical condition of the water is unfit for consumption. The condition of the land in residential areas affects the quality of the water, which appears black and oily. It is important to note that the physical condition of the water is unfit for consumption, although the respondents claim that the water is fit for consumption after it is filtered and boiled. However, upon further observation, the procurement requirements for drinking water also fail to meet the necessary standards. The main factor contributing to potential stunting in children is a lack of knowledge about clean water and proper storage for consumption. Infants are particularly susceptible to infection, so if a mother gives her infant water that does not meet the required standards, it can hinder the child's growth and development, leading to stunting.

The study results indicate that the incidence of stunting in children aged 0-59 months is related to having a healthy toilet. This relationship is supported by a p value of 0.000. The study was conducted at the Posyandu in the Hanopan Community Health Center area, Arse District, South Tapanuli Regency, and found that ownership of a healthy latrine was associated with a lower incidence of stunting. According to the research results, respondents who owned latrines that did not meet the requirements experienced the most stunting (49.3%). Poor sanitation is also a contributing factor to stunting due to the increased risk of infectious diseases. It is worth noting that families without healthy toilets are more likely to experience stunting. However, it is not always the case that families without healthy latrines and whose feces flow directly into the river or do not have septic tanks will have children who experience stunting. Community water storage located near latrines is not intended for daily consumption. This can reduce the risk of bacterial contamination for individuals.

The results of this study are consistent with those of Sri Wahyuni et al. (2021), which found a p-value of 0.588, indicating no significant relationship between family latrine ownership and the incidence of stunting. In this study, the majority of respondents whose children under five were stunted had proper family latrines. However, it is important to note that decent latrines do not guarantee prevention of stunting.

Furthermore, there has been no analysis conducted on the relationship between latrine hygiene and behavior regarding latrine maintenance and the incidence of stunting. Furthermore, there has been no analysis conducted on the relationship between latrine hygiene and behavior regarding latrine maintenance and the incidence of stunting. Furthermore, there has been no analysis conducted on the relationship between latrine hygiene and behavior regarding latrine maintenance and the incidence of stunting. Sinatrya's (2018) research found no correlation between latrine ownership and stunting.

The lack of a waste disposal channel from the latrine causes waste to flow directly into the nearest river. According to the test results, there is no significant relationship between latrine ownership and the incidence of stunting. The challenge for the community is that the cost of construction of a healthy latrine is quite high,

so the community prefers not to repair the latrine construction in accordance with the latrine construction requirements.

This statement differs from the research conducted by Tedy et al (2020), which found a significant correlation between owning a healthy latrine and a reduced incidence of stunting, as evidenced by a p-value of 0.000. However, this is likely due to the limited number of respondents who reported having access to a healthy latrine. A latrine is a facility designed for the disposal of feces, and using an unhealthy latrine can lead to environmental pollution, including contamination of clean water sources and the spread of infections such as diarrhea.

According to Unicef's theory, as modified by Bappenas (2018), ownership of healthy latrines in residential areas is an indirect factor in children experiencing stunting. A healthy latrine can improve the health of the surrounding environment and individuals. A healthy latrine can improve the health of the surrounding environment and individuals. It can also keep the environment clean and odor-free, which is important for disease prevention. The presence of a healthy toilet is a crucial factor in determining a child's nutritional status. Children living in households with clean and hygienic latrines have a lower risk of nutritional problems, such as stunting.

However, the research results indicate that respondents with stunted children who do not have access to a healthy toilet are 13.7% more likely to experience stunting than those who do.   This is due to the fact that many of the latrines in the Simpang Pandan Community Health Center working area did not meet the requirements for healthy latrines, particularly in the construction of waste disposal channels.

Observations revealed that the distance between the source and reservoir of clean water was very close to the latrine. Additionally, the behavior of respondents towards maintenance was lacking. Unhealthy latrines that fail to meet these requirements can contaminate the land and surrounding environment, attracting animals or insects to the latrine drains.

4.   CONCLUSION

Research findings suggest that education affects the risk of stunting in Posyandu in Hanopan Community Health Center area, Arse District, South Tapanuli Regency. Research findings suggest that education affects the risk of stunting in Posyandu in Hanopan Community Health Center area, Arse District, South Tapanuli Regency. Additionally, family income was found to be a risk factor for stunting in Posyandu in the same area. LBW has an impact on the incidence of stunting in Posyandu in the Hanopan Community Health Center area, Arse District, South Tapanuli Regency. Clean water also has an impact on the incidence of stunting in Posyandu in the same area. Additionally, healthy latrines have been found to have an impact on the risk of stunting incidents in Posyandu in the Hanopan Community Health Center area, Arse District, South Tapanuli Regency. LBW is the most dominant factor in the risk of stunting at the Posyandu in the Hanopan Community Health Center area, Arse District, South Tapanuli Regency.

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