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Factors Influencing the Incidence of Stunting at the Lumban Sinaga Community Health Center, Pangaribuan District, North Tapanuli Regency in 2023

Faktor-Faktor Yang Mempengaruhi Kejadian Stunting Di UPT Puskesmas Lumban Sinaga Kecamatan Pangaribuan Kabupaten Tapanuli Utara Tahun 2023

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Abstract

Stunting is one of the chronic nutritional problems that remains a global concern, particularly in developing countries such as Indonesia. This study aims to identify the factors influencing the incidence of stunting at UPT Puskesmas Lumban Sinaga, Pangaribuan District, North Tapanuli Regency while considering the local socio-economic context. This research employs an observational analytic design with a case-control approach, conducted from October 2023 to February 2024. The sample consists of 75 mothers with stunted children (cases) and 75 mothers with typical children (controls). Data were collected through questionnaires and analyzed using logistic regression tests. The results indicate that exclusive breastfeeding history (p=0.000), family income (p=0.013), maternal education (p=0.007), parity (p=0.000), and maternal height (p=0.000) are significantly associated with stunting incidence. The most influential dominant factor is maternal height, with an Odds Ratio (OR) of 5.921, suggesting that shorter mothers have a 5.921 times higher risk of having a stunted child. It is concluded that these factors play a crucial role in stunting incidence in this area. Recommendations include increasing education on the importance of exclusive breastfeeding for the first six months, complementary feeding up to two years of age, and specific nutritional interventions for mothers with short stature. This study highlights the need for a holistic approach and multi-stakeholder collaboration to reduce stunting prevalence.

***Keywords*: Exclusive breastfeeding history, family income, mother's education, parity, mother's height, stunting.**

Abstrak

Stunting merupakan salah satu masalah gizi kronis yang masih menjadi perhatian global, terutama di negara berkembang seperti Indonesia. Penelitian ini bertujuan untuk mengidentifikasi faktor-faktor yang memengaruhi kejadian stunting di UPT Puskesmas Lumban Sinaga, Kecamatan Pangaribuan, Kabupaten Tapanuli Utara, dengan mempertimbangkan konteks sosial-ekonomi lokal. Penelitian ini menggunakan desain analitik observasional dengan pendekatan Case-Control, dilakukan dari Oktober 2023 hingga Februari 2024. Sampel terdiri dari 75 ibu dengan balita stunting (kasus) dan 75 ibu dengan balita normal (kontrol). Data dikumpulkan melalui kuesioner dan dianalisis menggunakan uji regresi logistik. Hasil penelitian menunjukkan bahwa riwayat ASI eksklusif (p=0,000), pendapatan keluarga (p=0,013), pendidikan ibu (p=0,007), paritas (p=0,000), dan tinggi badan ibu (p=0,000) memiliki hubungan signifikan dengan kejadian stunting. Faktor dominan yang paling berpengaruh adalah tinggi badan ibu dengan Odds Ratio (OR) 5,921, menunjukkan bahwa ibu bertubuh pendek berisiko 5,921 kali lebih tinggi memiliki anak stunting. Disimpulkan bahwa faktor-faktor tersebut berperan penting dalam kejadian stunting di wilayah ini. Rekomendasi meliputi peningkatan edukasi tentang pentingnya ASI eksklusif selama 6 bulan pertama dan pemberian makanan pendamping hingga usia 2 tahun, serta intervensi gizi spesifik bagi ibu dengan tinggi

badan pendek. Penelitian ini menekankan perlunya pendekatan holistik dan kolaborasi multipihak untuk menurunkan prevalensi stunting.

Kata Kunci: Riwayat ASI Eksklusif, Pendapatan Keluarga, Pendidikan iIbu, Paritas, Tinggi Badan Ibu, Stunting

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Introduction

Stunting is a growth and development disorder experienced by children due to malnutrition, repeated infections, and inadequate psychosocial stimulation [1]. Factors causing stunting can be grouped into direct and indirect causes. The practice of providing colostrum and exclusive breastfeeding, children's consumption patterns, and infectious diseases suffered by children are direct factors that affect children's nutritional status and can impact stunting. At the same time, indirect causes are access and availability of food ingredients, sanitation, and environmental health [2].

Stunting has now become a very serious global problem throughout the world; according to WHO 2005, stunting is a short condition for age which is characterized by a height index or body length for age (TB/A) or PB/A) of less than -2 standard deviations, stunting is caused by chronic malnutrition and repeated infections during the first 1000 days of life [1].

Stunting is also caused by chronic malnutrition, which can lead to poverty and create a vicious cycle where malnutrition, especially stunting, can increase morbidity and mortality. The consequences can extend into adulthood, increasing the risk of low birth weight, cognitive disorders, increasing infectious diseases and non-communicable diseases such as obesity, hypertension and cardiovascular disease, as well as decreasing productivity and economic income [3].

Stunting is a measure of chronic malnutrition expressed in body length or height according to age (PB/U or TB/U). Stunting in the first 1000 days of life (HPK) is irreversible and closely related to functional failure which has an impact on high morbidity and mortality rates in children[4]. The condition of failure to thrive in toddlers who are at risk causes children to have difficulty in achieving optimal physical and cognitive development. Low height in childhood is used as a long-term indicator of malnutrition in children due to inadequate food quality and quantity and accompanied by infectious diseases experienced by children [5].

Changes in nutritional status to good or normal can be influenced by sufficient energy intake levels. In addition, intake levels can be influenced by economic conditions. Low or poor economic conditions can cause toddlers' nutritional needs from food intake to be insufficient. High income allows families to increase their purchasing power for food [6]. WHO data results in 2020 stated that globally there were 22% or 149.2 million children under 5 years old who experienced stunting [7]. Based on the 2021 Indonesian Nutritional Status Study (SSGI) results, the prevalence of Stunting in Indonesia decreased by 1.6% per year from 27.7% in 2019 to 24.4% in 2021 [8].

In addition, stunting has a suboptimal impact on children's cognitive, motor, and verbal development. Stunted children are at a higher risk of obesity and other diseases in the future. Children's learning capacity and performance, as well as productivity and work capacity, are also suboptimal. The negative impact of stunting also impacts reproductive health [9].

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Citing data from the 2022 Indonesian Nutritional Status Survey (SSGI), it is known that there has been a decrease in the prevalence of stunting in North Sumatra Province from 25.8% in 2021 to 21.1% in 2022. The prevalence rate of stunting in North Sumatra (Sumut) is now below the national percentage. Based on the 2022 Indonesian Nutritional Status Survey (SSGI), the prevalence rate in North Sumatra fell by 4.7% to 21.1%, from 25.8% in 2021. The stunting rate in North Tapanuli Regency according to the Indonesian Nutritional Status Survey (SSGI) tends to stagnate, namely 26.7 percent in 2021 to 27.4 percent in 2022. To handle it, specific interventions are needed that focus on the pre-natal period (ANC K4/4 visits to pregnant women) and the provision of iron tablets to pregnant women and children aged 6 to 11 months (Early initiation of breastfeeding, Exclusive breastfeeding and growth monitoring). This specific intervention plays a role of 70 percent in handling stunting [9].

From the initial survey conducted in the working area of the Lumban Sinaga Health Center UPT, Pangaribuan District, North Tapanuli Regency, data was found for 2023 from January to October 2023 from 14 villages that 15 children were suffering from malnutrition and 75 people suffering from stunting. From the results of interviews conducted by researchers with 12 mothers, data was obtained that mothers of toddlers who have stunted toddlers (75%) showed that on average they still have low levels of education, lack of knowledge about nutrition, low income levels, have more than three children and have a history of not providing exclusive breastfeeding.

Experimental Section

Research Design

The research design used is an observational study with a survey research method and a case-control approach, where the research is conducted by comparing two case groups and a control group.

Location and Time of Research

This research was conducted at the UPT Lumban Sinaga Health Center, Pangaribuan District, North Tapanuli Regency in 2023. The research was conducted from October 2023 to February 2024.

Research Sample

The study's samples were all mothers with stunted toddlers, totaling 75 people (total population). To obtain a comparison in this research object, a control sample was taken with a ratio of 1:1, so the number of control samples was 75 toddlers who did not suffer from stunting, and the total number of samples was 150.

Data Collection Techniques

1. Primary data were obtained from questionnaires filled out by respondents in the form of exclusive action history data, knowledge, education income, employment, parity, maternal height and parenting patterns
2. Secondary data were obtained from document/report searches of the Lumban Sinaga Health Center, Pangaribuan District, North Tapanuli Regency.
3. Tertiary data were obtained through literature studies, namely published journals, internet sources such as the Decree of the Minister of Health, and Government Regulations and Laws.

Validity and Reliability Test

The questionnaire used in this study was adopted from Zaidar et al., (2021) alpha test. The results of the questionnaire test obtained a Cronbach's alpha value ranging from 0.764 to 0.772, which indicates that the questionnaire is reliable.

Data Analysis Techniques

1. Univariate Analysis
   Descriptive data analysis describes each variable and tabulates the frequency distribution of respondent data.
2. Bivariate Analysis
   Bivariate analysis aims to determine the relationship between the variables studied. This analysis uses the Chi-Square test because the scale of the independent variable data is ordinal. The degree of confidence

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used is 95%, and decision-making is considered to have a relationship if the p-value <0.05 and Ho is rejected.

3. Multivariate Analysis
   Multivariate is how much influence there is between the independent variable and the dependent variable. The type of multivariate analysis that is often used is Logistic Regression. In this study, because the scale of the dependent and independent variables uses an ordinal scale, the analysis used is logistic regression [11].

Results and Discussion

General Description of Research Location

Lumban Sinaga Health Center is located in Lumban Sinaga Simatupang Village, Pangaribuan District, North Tapanuli Regency. The distance of Lumban Sinaga Health Center to the Capital of Pangaribuan District is ± 7 km. The distance of Lumban Sinaga Health Center to the Capital of North Tapanuli Regency is ± 52 km. The Working Area of Lumban Sinaga Health Center is 14 Villages. Lumban Sinaga Simatupang Village, Batunadua, Rahutbosi, Rautbosi Onan, Pansurnatolu, Batumanumpak, Sampagul, Parlombuan, Hutaraja, Parsorminan I, Silantom Julu, Silantom Tonga and Padang Parsadaan. The Farthest Village: Padang Parsadaan Village with a distance of ± 31 km and a travel time of 45 minutes, Area: 237.4 km2. Population: Male: 7,929 people, Female: 8,339 people, Total: 16,268 people. The population in the research area is mostly Batak, most of whom work as farmers.

Univariate Analysis

1. Respondent Characteristics
   The characteristics of respondents consist of the mother's age, occupation, and child's gender, as presented in Table 1.

Table 1. Frequency Distribution of Respondent Characteristics at Lumban Sinaga Health Center.

No	Respondent Characteristics	Stunting		Normal	
		f	%	f	%
1	**Mother's Age**				
	Early Adulthood (20-40 years)	71	94.7	67	89.3
	Middle Adult (≥ 40)	4	5.3	8	10.7
	Total	**75**	**100.0**	**75**	**100.0**
2	**Mother's Occupation**				
	Housewife	30	40.0	15	20.0
	Farmer	42	56.0	57	76.0
	Civil Servant	3	4.0	3	4.0
	Total	**75**	**100.0**	**75**	**100.0**
3	**Child Gender**				
	Boy	40	53.3	30	40.0
	Girl	35	46.7	45	60.0
	Total	**75**	**100.0**	**75**	**100.0**

Table 1 shows the majority of the characteristics of respondents in the case group, namely early adulthood as much as 94.7%, occupation as a farmer as much as 56%, and the child's gender as male, as much as 53.3%. The characteristics of respondents in the control group are early adulthood as much as 89.3%, occupation as farmers as much as 76%, and the gender of the child is female as much as 60%.

2. History of Exclusive Breastfeeding at Lumban Sinaga Health Center
   Table 2 shows the results of the study on the history of exclusive breastfeeding at Lumban Sinaga Health Center.

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Table 2. Frequency Distribution of Exclusive Breastfeeding History in Case and Control Groups at Lumban Sinaga Health Center.

Exclusive Breastfeeding	Stunting		Normal	
	f	%	f	%
Less	17	22.7	16	21.3
Enough	47	62.7	23	30.7
Good	11	14.7	36	48.0
Total	75	100	75	100

Table 2 shows that respondents with stunted children mostly have a history of sufficient exclusive breastfeeding, as much as 62.7%. In contrast, respondents with normal children mostly have a history of good exclusive breastfeeding, as much as 48%.

3. Family Income at Lumban Sinaga Health Center

The results of the family income study at Lumban Sinaga Health Center are seen in Table 3:

Table 3. Frequency Distribution of Family Income in Case and Control Groups at Lumban Sinaga Health Center.

Family Income	Stunting		Normal	
	f	%	f	%
Low	40	53,3	25	33,3
High	35	46,7	50	66,7
Total	75	100	75	100

Table 3 shows that respondents with stunted children mostly have low incomes of 53.3%, while respondents with normal children mostly have high incomes of 66.7%.

4. Maternal education at Lumban Sinaga Health Center

The results of the study on maternal education at Lumban Sinaga Health Center are seen in Table 4.

Table 4. Frequency Distribution of Maternal Education at Lumban Sinaga Health Center

Maternal education	Stunting		Normal	
	f	%	f	%
Low	39	52	20	26,7
High	36	48	55	73,3
Total	75	100.0	75	100.0

Table 4 shows that 52% of respondents with stunted children have low education, while 73.3% of respondents with normal children have high education.

5. Parity at Lumban Sinaga Health Center

The results of the parity study at Lumban Sinaga Health Center are seen in Table 5.

Table 5. Frequency Distribution of Maternal Parity at Lumban Sinaga Health Center

Parity	Stunting		Normal	
	f	%	f	%
≤ 3 children	32	42,7	73	97,3
>3 children	43	57,3	2	2,7
Total	75	100	75	100

Table 5 shows that respondents with stunted children mostly have a parity of>3 children, as many as 57.3%, while respondents with normal children mostly have a parity of ≤ 3 children, as many as 97.3%.

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6. Maternal Height at Lumban Sinaga Health Center

The results of the study on maternal height at Lumban Sinaga Health Center are seen in the following table 6:

Table 6. Frequency Distribution of Maternal Height at Lumban Sinaga Health Center

Maternal height	Stunting		Normal	
	f	%	f	%
Short	43	57,3	19	25,3
Normal	32	42,7	56	74,7
Total	75	100	75	100

Table 6 shows that 57.3% of respondents with stunted children are in the short height category, while 74.7% of respondents with normal children are in the tall height category.

Bivariate Analysis

1. The Influence of Exclusive Breastfeeding History on Stunting at Lumban Sinaga Health Center

Table 7 shows the study's results on the influence of Exclusive Breastfeeding history on stunting at Lumban Sinaga Health Center.

Table 7. The Influence of Exclusive Breastfeeding History on Stunting at Lumban Sinaga Health Center

Variable	History on Stunting				*p-value*
	Stunting		Normal		
	n	%	n	%	
Exclusive breastfeeding					0,000
Less	17	22,6	16	21,3	
Enough	47	62,7	23	30,7	
Good	11	14,7	36	48	
Total	75	100%	75	100	

Table 7 shows that of the 75 respondents with children who experienced stunting, most had a history of sufficient exclusive breastfeeding, as much as 62.7%, while of the 75 respondents with children who did not experience stunting, most had a history of good exclusive breastfeeding as much as 48%. Based on the chi-square analysis, the ϱ-value was 0.000 (α <0.05), and it can be concluded that there is a relationship between the history of exclusive breastfeeding and stunting at the Lumban Sinaga Health Center.

2. The Influence of Family Income on Stunting at the Lumban Sinaga Health Center

Table 8 shows the study results on family income and stunting at the Lumban Sinaga Health Center.

Table 8. The Influence of Family Income on Stunting at the Lumban Sinaga Health Center

Variable	Income				Total		*p-value*	*OR*	95%CI
	Low		High						
	n	%	n	%	N	%			
History on Stunting									
Stunting	40	53,3	35	46,7	75	100	0,013	2.286	1.181-4,425
Normal	25	33,3	50	66,7	75	100			

Table 8 shows that of the 75 respondents with children experiencing stunting, most have low incomes of 53.3%, while of the 75 respondents with normal children, most have high incomes of 66.7%. There is a significant effect between income and the incidence of stunting at the Lumban Sinaga Health Center (p 0.013

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<0.05) with an OR of 2.286 (95% CI: 1.181-4.425). This shows that respondents with low incomes are 2.286 times more likely to have children at risk of stunting than those with high incomes, with a confidence interval of 1.181-4.425.

3. The effect of maternal education on stunting at the Lumban Sinaga Health Center

The study results on maternal education and stunting at the Lumban Sinaga Health Center can be seen in Table 9.

Table 9. The Effect of Maternal Education on Stunting at the Lumban Sinaga Health Center

Variable	Education				Total		*p-value*	*OR*	95%CI
	Low		High						
	n	%	n	%	N	%			
History on Stunting									
Stunting	39	52	36	48	75	100	0,007	2,538	1,282-5,028
Normal	20	26,7	55	73,3	75	100			

Table 9 shows that of the 75 respondents with stunted children, the % had low education 52%, while the 75 respondents with normal children had high education, 73.3%. There is a significant influence between education and the incidence of stunting at the Lumban Sinaga Health Center. (p 0.007 <0.05) with OR 2.538 (95%CI: 1.282-5.028). This shows that respondents with low education are 2.538 times more at risk of having children with stunting compared to respondents with high education, with a confidence interval of 1.282-5.028.

4. The Effect of Parity on Stunting at the Lumban Sinaga Health Center

The results on the parity of stunting at the Lumban Sinaga Health Center can be seen in Table 10.

Table 10. The Effect of Parity on Stunting at the Lumban Sinaga Health Center

Variable	Parity				Total		*p-value*	*OR*	95%CI
	>3 children		≤ 3 children						
	n	%	n	%	N	%			
History on Stunting									
Stunting	43	57,3	32	42,7	75	100	0,000	4,047	1,194-10,902
Normal	2	2,7	73	97,3	75	100			

Table 10 shows that out of 75 respondents with stunted children, the majority have > three children (57.3%), while the majority of 75 respondents with normal children have ≤ 3 children (97.3%). There is a significant effect between parity and the incidence of stunting at the Lumban Sinaga Health Center. (p 0.000 <0.05) with OR 4.047 (95%CI: 1.194-10.902). This shows that respondents who have more than three children are 4.047 times more at risk of having children with stunting compared to respondents who have ≤ 3 children with a confidence interval of 1.194-10.902.

5. The Influence of Maternal Height on Stunting at Lumban Sinaga Health Center

Table 11 shows the results of the study on maternal height with stunting at Lumban Sinaga Health Center.

Table 11 shows that of the 75 respondents with stunted children, the majority had a short height category of 57.3%. In comparison, most of the 75 respondents with normal children had a normal height of 74.7%. There is a significant influence between maternal height and the incidence of stunting at the Lumban Sinaga Health Center. (p 0.000 <0.05) with OR 3.961 (95%CI: 1.981-7.919). This shows that respondents who have a short height category are 3.961 times more at risk of having children with stunting compared to respondents who have a normal height category with a confidence interval of 1.981-7.919.

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Table 11. The Influence of Maternal Height on Stunting at Lumban Sinaga Health Center

Variable	Maternal Height				Total		*p-value*	*OR*	95%CI
	Low		High						
	n	%	n	%	N	%			
History on Stunting									
Stunting	43	57,3	32	42,7	75	100	0,000	3,961	1,981-7,919
Normal	19	25,3	56	74,7	75	100			

6. Selection of candidate variables

The selection of candidates included in the multivariate analysis through selection in the bivariate analysis that has a p-value <0.25. Based on the logistic regression test, it is known that the feasibility of the model is presented in Table 12.

Table 12. Model Feasibility Test Results

No	Variables	P-value	Description
1	History of exclusive breastfeeding	0.000	Eligible for Logistic Regression Model
2	Income	0.013	Eligible for Logistic Regression Model
3	Maternal education	0.007	Eligible for Logistic Regression Model
4	Parity	0.000	Eligible for Logistic Regression Model
5	Maternal Height	0.000	Eligible for Logistic Regression Model

7. Logistic Regression

Table 13. Logistic Regression Test Results

	B	df	Sig.	OR	95% CI	
					Lower	Upper
exclusive breastfeeding	1,078	1	0,022	3,925	1,470	9,821
Parity	3,782	1	0,000	4,916	2,086	10,259
Maternal education	1, 196	1	0,019	3,307	1,218	8,982
Income	1,056	1	0,027	2,876	1,126	7,343
Maternal Height	1,779	1	0,000	5,921	2,248	15,596
Constant	2,602	1	0,000	0,074		

Based on Table 13, it is known that the variable of maternal height is the most dominant variable influencing the incidence of stunting at the Lumban Sinaga Health Center (p-value 0.005 <α = 0.05) with an Odds Ratio (Exp. B) of 5.921, which means that mothers with low height are 5.921 more at risk of having children with stunting compared to mothers who have standard height.

Table 14. Determinant Coefficient Table

Step	-2 Log likelihood	Cox & Snell R Square	Nagelkerke R Square
1	118.027[a]	0,451	0,601

The Negelkerke R Square value shows the determination coefficient value. The value obtained is 0.601, which means that the five independent variables (exclusive breastfeeding, parity, income, education, and maternal height) affect 60.1% of the incidence of stunting at the Lumban Sinaga Health Center. This shows that multiple factors cause stunting.

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The Influence of Exclusive Breastfeeding History on Stunting at Lumban Sinaga Health Center

In this study, the results showed an influence of Exclusive Breastfeeding history on stunting at Lumban Sinaga Health Center (ϱ-value = 0.000). This can be seen from the majority of mothers with stunted toddlers having a history of sufficient exclusive breastfeeding as much as 62.7% and mothers with typical toddlers having a history of good exclusive breastfeeding as much as 48%.

An increased risk of stunting can occur if minimal breast milk is given and replaced with early provision of formula milk, which can make babies more susceptible to disease and infection, which can generally cause disorders in the respiratory system and digestive tract [12].

The results of a study conducted by Khoirun et al. (2016) showed that there was a relationship between exclusive breastfeeding and the incidence of stunting (p-value = 0.025); this proves that toddlers who do not receive exclusive breastfeeding for the first 6 months will be at greater risk of experiencing stunting by 88.2% as well as a study conducted by Handayani et al. (2019) showed that there is a relationship between exclusive breastfeeding and the incidence of stunting in toddlers aged 24-36 months (ϱ-value = 0.000.

Efforts made to prevent stunting in toddlers are by providing attention and support to mothers to be able to provide exclusive breastfeeding. Pregnant women can give attention and support to mothers, and the exclusive breastfeeding program can provide precise information so that they can better understand. Family members are also given an explanation and understanding of the importance of exclusive breastfeeding for toddlers so that this program can be successful for the sake of children's health so that the exclusive breastfeeding program can run well so that babies can grow and develop [15].

Exclusive breastfeeding is a nutritional intake that is very much needed in the growth of toddlers and is a material that is very much needed in the process of growth and development of children, especially in terms of increasing height because in this breast milk, there is a better calcium content when compared to formula milk which is widely sold freely in the community. The process of calcium absorption from breast milk is more effective than that from formula milk. Likewise, the nutritional content of breast milk is excellent, so the dietary needs for growth and development can be adequately met.

The Influence of Family Income on Stunting Stunting at Lumban Sinaga Health Center

The study's results found that family income influenced stunting at Lumban Sinaga Health Center (ϱ-value = 0.013). This can be seen from the majority of mothers with stunted toddlers having low incomes, 53.3%, and mothers with typical toddlers having high incomes, 66.7%. Mothers with low incomes have 2.286 times more children at risk of experiencing stunting compared to mothers with high incomes.

This study's results align with a survey conducted by Nadhiroh (2023), which found a relationship between family income and the incidence of stunting (ϱ-value = 0.044) [16,17]. Likewise, a study conducted by Maulida et al. (2021) found a relationship between economic status and the incidence of stunting. This proves that families with low financial status are 4.8 times more likely to have stunted children compared to families with high economic status [18].

Families with high incomes are likely to meet food needs better, while families with limited incomes are less able to meet food needs, especially nutritional ones [19]. Therefore, family income affects the incidence of malnutrition in people with incomes less than the Minimum Wage.

This study can assume that family income influences the incidence of stunting. Low-income families are an obstacle that causes the family to be unable to buy food in the amount needed. So, the impact of low family income dramatically affects the family's purchasing power for food, which impacts the nutritional status of children, both stunted and routine, especially toddlers, because, at that time, much nutrition is needed for growth and development.

The Influence of Mother's Education on Stunting Stunting at Lumban Sinaga Health Center

The study found that the mother's education influenced the stunting at Lumban Sinaga Health Center (ϱ-value = 0.007). This can be seen from the majority of mothers with stunted toddlers having low education, as much as 52%, and the majority of mothers with typical toddlers having high education, as much as 73.3%. Mothers with low education are 2.538 times more at risk of having children with stunting compared to mothers with high education.

The results of this study are in line with the survey conducted by Susilawati et al. (2023) that a mother's education is a factor related to the incidence of stunting in toddlers (ϱ-value = 0.029), where more than half of

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mothers of stunted toddlers have low education levels (61.8%), while more than half of mothers in the regular toddler group have high education levels (67.6%) [21]. Research by Manggala et al. (2018) shows that a mother's education is a risk factor for stunting in children under five years of age [23].

Education level can affect a person's knowledge, attitudes, and actions. Low maternal education can affect child care and parenting patterns and the selection and presentation of food for children. Mothers with low education, among other things, will find it challenging to absorb nutritional information, so children are at risk of stunting [24].

Mothers with higher education have broader knowledge about childcare practices and can maintain and care for their environment to keep it clean [25]. They are also more likely to make decisions that will improve the nutrition and health of their children [26]. Maternal education level also determines the ease with which mothers can absorb and understand the nutritional knowledge they acquire. This can be used as a basis for distinguishing appropriate counseling methods. In the interest of family nutrition, education is needed so that someone, especially a mother, is more responsive to the family's nutritional problems and can take action immediately [26].

This study can assume that maternal education influences stunting, which affects the mother's knowledge in selecting and presenting food to be consumed by her child. Providing the right ingredients and menu for toddlers to improve nutritional status can be realized if the mother has good dietary knowledge. Mothers with low education, among others, will find it challenging to absorb nutritional information so that children can be at risk of stunting. A high level of education makes it easy for someone to absorb and practice information in everyday life.

The Effect of Parity on Stunting at Lumban Sinaga Health Center

Based on the results of the study, it was found that there was an effect of parity on stunting Stunting at Lumban Sinaga Health Center (ρ-value = 0.000). This can be seen in most mothers with stunted toddlers having parity > three children, as many as 57.3%, and mothers with typical toddlers having parity ≤ 3 children, as many as 97.3%. Mothers who have more than three children are 4.047 times more at risk of having children with stunting compared to mothers who have ≤ 3 children.

The results of this study are in line with the results of research conducted by Palino et al. (2017) that toddlers who have mothers with high parity have a 3.25 times greater risk of experiencing stunting compared to toddlers who have mothers with low parity (ρ-value = 0.0029). Research conducted by Rahayu et al. (2022) showed that mothers with primiparous and multiparous parties have a lower risk of having stunted toddlers compared to mothers with grand multiparous parities (OR = 0.4).

Parity is an indirect factor in stunting because parity is closely related to parenting patterns and the fulfillment of children's nutritional needs, mainly if supported by poor economic conditions. Children born to mothers with high parities have a greater chance of getting poor parenting patterns and inadequate fulfillment of nutritional needs during growth. Children who have a large number of siblings can cause growth retardation due to competition for limited nutritional sources available at home[29].

The number of children is too many, and apart from making it difficult to care for them, it is also less able to create a calm atmosphere in the home. A family environment of always fighting will affect peace of mind, directly reducing the appetite of other family members who are too sensitive to unpleasant atmospheres. Suppose there are many family members, and the family income is small. In that case, food distribution to the family members is less guaranteed because their nutritional needs are insufficient. Thus, they are susceptible to disease [30]. Children who grow, especially during rapid growth, such as at 1-2 years old, need attention and stimulation for their brain development and complete nutrients for their physical growth. Growth and development disorders tend to be experienced by children who are born later because the burden borne by parents increases with the increasing number of children they have [31].

This study can assume that mothers with high parity tend to have children who experience stunting. Families with many children, especially those with poor economic conditions, cannot provide enough attention and food to all their children.

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The Influence of Mother's Height on Stunting Stunting at Lumban Sinaga Health Center

The study's results found that mother height influences stunting at Lumban Sinaga Health Center (ϱ-value = 0.000). This can be seen from the majority of mothers with stunted toddlers having a low height category of 57.3% and mothers with normal toddlers having a high height category of 74.7%.

The results of this study align with Narsikhah's (2012) observation that short parental height is a risk factor for stunting in toddlers. Research conducted in Cambodia revealed a relationship between a mother's height and stunting.

Mothers who have a short height category are 3.961 times more at risk of having children with stunting compared to mothers who have a standard height category. This is caused by one or both parents being short due to pathological conditions, and having genes in the chromosomes that carry the trait of shortness can cause toddlers to inherit the gene and grow up short or stunted [32].

This study can mean that stunted toddlers are likelier to have mothers with short heights. The short height of the mother reflects the nutritional status of the mother. Mothers with short heights are at risk of having stunted children. This is caused by one or both parents being short due to pathological conditions, and having genes in the chromosomes that carry the trait of shortness can cause toddlers to inherit the gene and grow up short or stunted [33].

The Most Influential Variables on Stunting Incidents at Lumban Sinaga Health Center

The results of the multivariate analysis test showed that maternal height had the most significant influence on stunting incidents, with an OR value of 5.921. Other studies also found that maternal height had an OR value of 2.4 [27].

Likewise, Narsikhah (2012) stated that maternal height <150 cm is one of the most influential factors in stunting incidents in toddlers aged 24-36 months, with an OR value of 10.31 and a 95% confidence interval between 1.93-55.02. Najahah's research (2014) stated that maternal height is the factor that has the most significant influence on the incidence of stunting in toddlers aged 12-36 months in the Dasan Agung Health Center work area, with a ϱ value of 0.011 and a 95% confidence interval between 1.27 and 6.42.

One of the determinants of stunting is maternal height. Maternal height influences the genetic factor passed down from parents to their children. Genetic factors are essential in achieving the child's growth and development results. Genetic instructions in fertilized eggs can determine the quality and quantity of growth [20]. This is like Supariasa et al. (2023) stating that height is a form of genetic expression, a factor passed down to children and is related to the incidence of stunting. Children with short parents, either one or both, are at greater risk of stunting when compared to children who have parents with standard height [36].

Maternal height is the most influential factor in the incidence of stunting because 94.4% of short mothers have stunted children. Therefore, a specific nutritional intervention program tailored to the conditions of pregnant and breastfeeding mothers who are short is needed. This program can include dietary supplements, education, health monitoring, and counseling. Research by Christian et al. (2015) shows that an integrated nutritional intervention program tailored to individual needs can help improve the nutritional status of pregnant women and prevent stunting in children.

Research by Muhamad et al. (2023) shows that empowering pregnant women with short stature through assistance from health cadres can help pregnant women improve their knowledge, understanding, attitudes, behavior, and awareness to be able to access pregnancy services and consume nutritious foods that are beneficial for maternal and fetal health [37]. Assistance from health cadres can improve pregnant women's knowledge, attitudes, and actions in antenatal care (ANC) services. Pregnant women's knowledge of ANC (pregnancy) services has a significant effect on body length at birth. If the mother has good knowledge and understanding of the benefits of pregnancy services for maternal and fetal health, the mother will diligently check her pregnancy at the Posyandu; from the results of the examination, the mother can find out the growth and development of the fetus every month and can minimize the risk of pregnancy stunting. Knowledge of the nutritional intake of pregnant women significantly affects body length at birth. If the mother has knowledge and understanding in choosing and processing nutritious foods that are beneficial for pregnant women and fetal growth, it will minimize the occurrence of stunting [11].

Mother's height is one of the risk factors for stunting. Therefore, even though the mother's height is categorized as short, if the mother pays attention to nutrition before pregnancy, monitors fetal development during pregnancy, and provides sufficient nutrition, it will reduce the risk of stunting in children.

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Conclusions

This study identifies factors influencing stunting in the working area of Lumban Sinaga Community Health Center, North Tapanuli Regency. The analysis shows that exclusive breastfeeding history, family income, maternal education, parity, and maternal height are significantly associated with stunting. The dominant factor is maternal height, with an Odds Ratio (OR) of 5.921, indicating that shorter mothers have a 5.921 times higher risk of having stunted children. Recommendations include increasing education on exclusive breastfeeding and complementary feeding up to 2 years of age and specific nutritional interventions for shorter mothers. Programs to improve family income and maternal education also need to be strengthened. This study emphasizes that stunting is a multifactorial issue requiring a holistic approach and collaboration between the government, health workers, and the community to reduce its prevalence.

Conflict of Interest

The author affirms that this research was conducted independently, free from external influence or conflicts of interest. Every effort was made to uphold objectivity and credibility, ensuring the study's integrity. This commitment to transparency reinforces the reliability and validity of the findings.

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Supplementary Materials

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