ORIGINAL ARTICLE   JPS. 2025, 8(4), 3060-3072

Determinants of Stunting Incidence at the Sumbul Community Health Center UPT, Sumbul District, Dairi Regency in 2024

Determinan Kejadian *Stunting* di UPT Puskesmas Sumbul Kecamatan Sumbul Kabupaten Dairi Tahun 2024

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Abstract

Stunting is a condition of failure to thrive that occurs in children under five which is caused by chronic malnutrition so that the child is too short for his age. Stunting has an impact on children's cognitive decline and productivity in the future. So far, addressing malnutrition has focused on babies from birth to five years old. In fact, the golden period is when the child is still in the womb until the age of two years. Therefore, a paradigm shift in handling malnutrition is needed. Therefore, the government is implementing the Acceleration of Nutrition Improvement Program with the First 1000 Days of Life Movement. SKI data for 2023, Dairi district is in second place with a figure of 32.6% of stunted toddlers out of 439 toddlers and based on the entry of toddler data on the e-PPGBM application in December 2024, the prevalence of stunted toddlers in the Sumbul Community Health Center, Sumbul District is around 13.98% or 258 toddlers. The incidence of stunting is influenced by several factors, namely maternal height, maternal education, compliance with taking blood supplement tablets and smoking. The aim of this research is to determine the determinants of stunting incidents at the Sumbul Community Health Center UPT, Sumbul District, Dairi Regency in 2024. This type of research is cross sectional with research methods. The population in this study were all mothers with toddlers. The number of samples in this study was 70 mothers. Based on the research results, it was found that there was a relationship between height and stunting (p-value=0.004), there was a relationship between maternal education and stunting (p-value=0.004), there was a relationship between adherence to taking blood supplement tablets and stunting (p-value=0.000) and there was a relationship between smoking and stunting (p-value=0.000). Increasing health promotion to the community about the importance of parenting patterns and fulfilling nutrition in the First 1000 Days of Life, starting from pregnant women until children are 2 years old, as well as outreach about the health of young women and prospective brides.

Keywords: Stunting, height, education, compliance with taking blood supplement tablets, smoking.

Abstrak

Stunting merupakan kondisi gagal tumbuh yang terjadi pada anak balita yang disebabkan karena kekurangan gizi kronis sehingga anak terlalu pendek untuk usianya. Stunting berdampak pada penurunan kognitif dan produktivitas anak di masa depan. Selama ini mengatasi gizi buruk difokuskan pada bayi sejak dilahirkan hingga berusia lima tahun. Padahal, periode emas adalah saat anak masih dalam kandungan hingga usia dua tahun. Karena itu, perlu perubahan paradigma dalam penanganan gizi buruk. Oleh karena itu pemerintah melaksanakan Program Percepatan Perbaikan gizi dengan Gerakan 1000 Hari Pertama Kehidupan.Data SKI tahun 2023, kabupaten Dairi menjadi urutan kedua dengan angka 32.6% balita stunting dari 439 balita dan berdasarkan pengentrian data balitapada aplikasi e-PPGBM bulan desember 2024,

prevalensi balita stunting di Puskesmas Sumbul Kecamatan Sumbul sekitar 13.98% atau 258 balita. Kejadian Stunting dipengaruhi oleh beberapa faktor yaitu tinggi badan ibu, pendidikan ibu, Kepatuhan minum tablet tambah darah dan merokok. Tujuan dari penelitian ini adalah untuk mengetahui determinan kejadian stunting di UPT Puskesmas Sumbul Kecamatan Sumbul Kabupaten Dairi tahun 2024. Jenis penelitian ini adalah cross sectional dengan metode penelitian. Populasi pada penelitian ini adalah seluruh ibu yang memiliki balita. Jumlah sampel dalam penelitian ini adalah 70 ibu. Berdasarkan hasil penelitian diperoleh ahwa ada hubungan tinggi badan dengan stunting (*p-value*=0.004), ada hubungan pendidikan ibu dengan stunting (*p-value*=0.004), ada hubungan kepatuhan minum tablet tambah darah dengan stunting (*p-value*=0.000) dan ada hubungan merokok dengan stunting (*p-value*=0.000). Meningkatkan promosi kesehatan kepada masyarakat tentang pentingnya pola asuh dan pemenuhan gizi pada 1000 Hari Pertama Kehidupan, dimulai sejak ibu hamil sampai anak berusia 2 tahun, serta sosialisasi tentang kesehatan remaja putri dan calon pengantin.

Kata Kunci: Stunting, Tinggi badan, pendidikan, kepatuhan minum tablet tambah darah, merokok.

https://doi.org/10.36490/journal-jps.com.v8i4.1206

Introduction

Stunting is a condition of growth failure in toddlers (infants under five years old) caused by chronic malnutrition, making the child too short for their age. Stunted and severely stunted toddlers are those whose height (length/age) or height (height/age) is lower than the WHO-MGRS (Multicentre Growth Reference Study) standards [1]. Stunting is caused by the accumulation of long-term stress episodes, such as infections and poor dietary intake, which are then not compensated by catch-up growth. This results in decreased growth compared to children growing up in a supportive environment [2].

Stunting is a condition of growth failure in toddlers due to chronic malnutrition, especially during the first 1,000 days of life (HPK). Stunting in toddlers is caused by prolonged nutritional deficiencies and recurrent infections. Both of these factors are influenced by inadequate parenting, particularly during the first 1,000 days of life (HPK). A child is considered stunted if their height or length for their age is lower than the applicable national standard. Malnutrition occurs in the womb, in the early stages after birth, but stunting only becomes apparent after the baby is two years old. Stunting can put children at higher risk of developing non-communicable diseases in adulthood, such as diabetes mellitus, cancer, heart disease, hypertension, and others [3].

Nutritional issues remain a challenge in health development in Indonesia. One of the national priorities is stunting, a growth and development disorder in children caused by chronic malnutrition. If not addressed properly, stunting can impact cognitive decline and a child's future productivity [2].

Addressing malnutrition has traditionally focused on infants from birth to five years of age. However, the golden period is from the time a child is in the womb to the age of two. Therefore, a paradigm shift is needed in addressing malnutrition. Therefore, the government is implementing the Nutrition Improvement Acceleration Program with the First 1,000 Days of Life Movement. Furthermore, it is hoped that further research on stunting, taking into account regional situations and conditions, will be carried out continuously to prevent long-term negative impacts on the nation's future generations [3].

National stunting prevalence rates by age group. She revealed that stunting has occurred in newborns, in the age groups 0-6 months, 6-11 months, and 12-23 months. This condition is preventable, so there are two key points that need intervention to achieve significant leverage. The first point is the prenatal phase, namely

by implementing interventions to prevent anemia in adolescent girls and pregnant women. This is because the prevalence of stunting in newborns is 18.5% due to malnutrition during pregnancy. The second point is the postnatal phase, primarily in the age groups 6-11 months and 12-23 months. In this age group, there was a more than 1.6-fold increase in stunting, reaching 13.7% in children aged 6-11 months and 22.4% in children aged 12-24 months [4].

Stunting and wasting are interrelated nutritional problems, with both forms sharing similar risk factors and mutually exacerbating each other. In addition to the high risk of death, children with wasting who are not properly managed are three times more likely to develop stunting, and stunted children are 1.5 times more likely to develop wasting compared to well-nourished children. The risk of death increases if a child experiences both nutritional problems (wasting and stunting) simultaneously [5].

Nutritional support for pregnant women is crucial for preventing stunting, but it cannot be implemented in isolation. An integrated approach is necessary for stunting prevention. Pregnant women who experience infections, whether symptomatic or asymptomatic, can experience growth retardation. Exposure to these subclinical infectious agents can often impair growth. A combination of appropriate nutritional interventions can also impact the risk of infectious diseases in pregnant women. Adequate nutrition can strengthen the immune system. Providing additional nutrients to offset the effects of infection can also help accelerate growth, prevent poor appetite due to malnutrition, and support the growth of beneficial bacteria that improve gut function and maintain immunity [6].

Based on the 2023 Indonesian Health Survey in North Sumatra Province, the prevalence of nutritional status based on height divided by age (H/A) in children aged 0-59 months (toddlers) showed that of 19,298 toddlers weighed, 13.2% were stunted and 5.7% were severely stunted. Meanwhile, the prevalence of nutritional status, measured by weight divided by length or height (BW/PB), in children aged 0-59 months (toddlers) in North Sumatra showed that of the 19,298 toddlers measured, 5.5% were wasted and 2.4% were severely wasted [7].

Addressing malnutrition has previously focused on infants from birth to five years of age. However, the golden period is from conception to two years of age. Therefore, a paradigm shift in addressing malnutrition is needed. Therefore, the government is implementing the Nutrition Improvement Acceleration Program through the First 1,000 Days of Life Movement. Furthermore, it is hoped that further research on stunting, taking into account regional conditions, will be conducted continuously to prevent long-term negative impacts on the nation's future generations [3].

Research conducted by the Center for Social Security Studies at the University of Indonesia (UI) found that toddlers living with smoking parents grow 1.5 kg less than children living with non-smoking parents. The study also stated that 5.5% of toddlers living with smoking parents have a higher risk of stunting [8].

Pamela Kardea's research, "Factors Associated with Stunting in Children Aged 0-59 Months in the Simpang Pandan Community Health Center (Puskesmas) working area in 2022," identified maternal knowledge as one of the factors contributing to stunting. Poor knowledge had a 0.107 times greater risk of stunting compared to those with good knowledge. Field research indicated that respondents' poor knowledge stemmed from a lack of information, misperceptions, and education. These misperceptions were attributed to low knowledge of child health and limited information about stunting. However, field results also found that respondents with good knowledge had a higher rate of stunting compared to those with poor knowledge. This was because, despite their good knowledge, their attitudes toward parenting did not align with the theories about stunting they were familiar with. The main factor that influences respondents' knowledge is incomplete information, the term stunting is also considered by respondents as a foreign term and not easy to understand [9].

Several studies have shown that adherence to iron tablet consumption by pregnant women during pregnancy is a factor that can reduce the incidence of anemia. These studies indicate that consuming iron tablets obtained through antenatal care (ANC) can directly affect the incidence of anemia during pregnancy. During pregnancy, mothers should regularly take iron tablets (TTD), at least 1 tablet during pregnancy, consume a variety of foods such as staple foods, animal protein, nuts, fruits, and vegetables, drink 8-12 glasses of water per day (2-3 liters), and add one serving of main meal or snack to their usual daily intake [10].

The United States Agency for International Development (USAID) North Sumatra Province branch held a meeting with the Dairi Regency Government. USAID is a government partner focused on transforming the existing health care system to provide faster and more effective health services. USAID's momentum for Indonesia aims to support efforts to reduce maternal and child mortality through interventions in

government-owned and private sector facilities. Sumbul Community Health Center was selected as one of the Integrated Primary Care (ILP) health centers [11].

Data from the 2023 Indonesian Health Survey (2023) shows that Dairi Regency ranks second in the prevalence of stunted toddler nutritional status by district/city in North Sumatra province, with 32.6% of 439 toddlers weighed, after Deli Serdang, which ranks first with 33.8% of 2,401 toddlers weighed [7].

Based on the results of the initial survey conducted using toddler data entry in the e-PPGBM application in December 2024, the number of toddlers reached 1,846, with a prevalence of stunted toddlers (based on length or height and age) at Sumbul Community Health Center, Sumbul District, of approximately 13.98%, or 258 toddlers. The Sumbul Community Health Center's working area covers nine villages and one sub-district: Pegagan Julu I, Pegagan Julu III, Pangguruan, Huta Gugung, Pegagan Julu V, Pegagan Julu VI, Pegagan Julu VII, Pegagan Julu VIII, Pegagan Julu IX, and Pegagan Julu X.

A preliminary survey conducted by researchers as a starting point revealed that of the ten pregnant women, two had never heard of stunting and did not know what it was. Three had heard of stunting but could not explain it. Five had heard of it but understood the definition of stunting, specifically short children. Furthermore, researchers found that many mothers still did not understand how to address stunting, despite frequent counseling sessions from the community health center..

Experimental Section

Research Design

The type of research used is analytical with a cross-sectional design, namely research that studies the dynamics of correlation between phenomena or between risk factors and effect factors collected at the same time [12].

Location and Time of Research

This research was conducted at the Sumbul Community Health Center (UPT Puskesmas), Sumbul District, Dairi Regency. The research location was chosen because of the 1,846 toddlers, of which 258 were stunted, from October 2024 to February 2025..

Population and sample

The population in this study was all mothers with toddlers in the Sumbul Community Health Center (UPT) work area in 2024, a total of 1,846 mothers.

The sample in this study was mothers with toddlers in the Sumbul Community Health Center (UPT) work area in 2024. Based on the Lemeshow formula, a sample size of 91 was obtained.

The sampling technique used in this study was accidental sampling, a method of determining a sample by selecting respondents who happened to be present or available in a location appropriate to the research context [12].

Data Collection
a. Primary Data

The tool used to collect data was a structured questionnaire containing questions completed directly by respondents. The questionnaire included respondent identification information, including name, age, highest level of education, and height.

b. Secondary Data

Secondary data was obtained through the Community Health Center (Puskesmas), which provided an overview of the Sumbul Community Health Center and data on stunting in toddlers..

Data Validity and Reliability Test

A validity test is an indicator that demonstrates that the measuring instrument used can accurately measure what is being studied. To determine whether the questionnaire has been constructed correctly and to determine whether the correlation value for each question is effective, this can be determined by comparing the table r with the calculated r. A variable is considered valid if the calculated r is greater than the table r (calculated r > table r), and vice versa.

A reliability test is an indicator that demonstrates the effectiveness of a measuring instrument. Reliability was verified in this study using the Crombach Alpha test by entering previously validated variables..

Data Processing

Data processing in this study was conducted using a computer and carried out through several sequential stages. The first stage was editing, which involved selecting and rechecking the completeness, suitability, and clarity of the collected data to ensure it was ready for grouping and organization, thereby facilitating further processing. This was followed by coding, where numerical codes were assigned to data across different categories to simplify variable identification and support data analysis. The next stage was tabulating, in which the research data were entered into tables based on predetermined criteria. Subsequently, the processing stage was performed by subjecting the grouped data to computerized statistical analysis. Finally, cleaning was conducted to recheck the data entered into the computer system and ensure that no errors occurred during data entry or processing.

Data Analysis.

a. Univariate Analysis: Univariate analysis is conducted to explain or describe each research variable. Generally, this analysis only produces the distribution, frequency, and percentage of each variable (Notoatmodjo, 2010).

b. Bivariate Analysis: Bivariate analysis is conducted using the chi-square test with a 95% confidence level ($\alpha=0.05$) to determine a significant relationship between two variables suspected of being related. The basis for developing a research hypothesis is based on the level of significance (p-value), namely:

    1)   If the p-value is ≤ 0.05, the research hypothesis is accepted.

    2)   If the p-value is > 0.05, the research hypothesis is rejected.

Results and Discussion

Results

Univariate Analysis

The study, conducted from October 2024 to February 2025, collected data from 91 mothers with toddlers at the Sumbul Community Health Center (UPT) in Sumbul District, Dairi Regency.

a. Respondent characteristics

Respondent characteristics included toddler nutritional status, maternal age, and maternal occupation. The distribution of respondents is shown in the table 1:

Table 1. Frequency Distribution of Respondent Characteristics at the Sumbul Community Health Center (UPT)

Respondent Characteristics	f	%
Nutritional Status		
Normal	47	51.6
Stunting	44	48.4
Total	91	100.0
Maternal Age		
Early Adulthood (20-39 years)	83	91.2
Middle Adulthood (>40 years)	8	8.8
Total	91	100.0
Maternal Occupation		
Farmer	61	67.0
Civil Servant	16	17.6
Self-Employed	14	15.4
Total	91	100.0

Based on Table 1, the characteristics of the nutritional status of the respondents' children are as follows: 47 (51.6%) had normal nutritional status, and 44 (48.4%) had stunted nutritional status. The majority of

mothers were in the 20-39 age group 83 (91.2%) and 8 (8.8%) were aged 40 years and older. Respondents' occupational characteristics revealed that the majority of mothers were farmers were 61 (67%) followed by civil servants were 16 (17.6%) and self-employed were 14 (15.4%).

b. Maternal Height

Based on the results of the research, the frequency distribution of maternal height is as follows:

Table 2. Frequency Distribution of Maternal Height at the Sumbul Community Health Center (UPT)

Height	f	%
<150 cm	47	51.6
≥ 150 cm	44	48.4
Total	91	100.0

Based on Table 2, it is known that the majority of mothers' heights were <150 cm (47 women) (51.6%), and those with heights >150 cm were 44 women (48.4%).

c. Mother's Last Education

Based on the research results, the frequency distribution of mothers' last education was as follows:

Table 3. Frequency Distribution of Mother's Education at the Sumbul Community Health Center (UPT)

Mother's Last Education	f	%
Low (≤ Junior High School)	29	31.9
High (≥ High School)	62	68.1
Total	91	100.0

Based on Table 3, the frequency distribution of maternal education shows that the majority of mothers had higher education (higher than high school) were 62 women (68.1%), and lower education (middle school) were 29 women (31.9%).

d. Compliance with Iron Supplement Tablets

Based on the research results, the frequency distribution of adherence to iron supplement tablets is as follows:

Table 4. Frequency Distribution of Compliance with Iron Supplement Tablets at the Sumbul Community Health Center (UPT)

Compliance with Taking Blood Increasing Tablets	f	%
Not obey	51	56.0
Obedient	40	44.0
Total	91	100.0

Based on Table 4, the frequency distribution data shows that the majority respondents (51 respondents, 56.0%) were non-compliant with iron supplementation tablets, while 40 (44.0%) were compliant with iron supplementation tablets.

e. Smoking History

The study results show the following distribution of smoking frequency within the family:

Table 5. Distribution of Smoking Frequency at the Sumbul Community Health Center (UPT)

Smoking	f	%
Yes	58	63.7
No	33	36.3
Total	91	100.0

Based on Table 5, the frequency distribution data shows that the majority of respondents (58 respondents) smoked, while 33 (36.3%) did not smoke.

Bivariate Analysis

a. Relationship between Maternal Height and Stunting Incidence at the Sumbul Community Health Center (UPT)

The table below shows the relationship between height and stunting incidence:

Table 6. Relationship between Maternal Height and Stunting Incidence at the Sumbul Community Health Center (UPT)

Height	Stunting		Normal		Total		α	p-value
	f	%	f	%	f	%		
<150 cm	32	35.2	15	16.5	47	51.6	0.05	0.000
≥ 150 cm	12	13.2	32	35.2	44	48.4		
Total	44	48.4	47	51.6	91	100.0		

Based on Table 6, the results of the statistical test using Chi-Square showed a p-value of 0.000, which is less than α=0.05 (p<0.05), indicating a relationship between height and stunting at the Sumbul Community Health Center (UPT).

b. Relationship between Maternal Education and Stunting at the Sumbul Community Health Center (UPT).

The table below shows the relationship between maternal education and stunting at the Sumbul Community Health Center (UPT):

Table 7. Relationship between Maternal Education and Stunting at the Sumbul Community Health Center (UPT).

Mother's Last Education	Stunting		Normal		Total		α	p-value
	F	%	f	%	f	%		
Low (≤ Junior High School)	20	22.0	9	9.9	29	31.9	0.05	0.007
High (≥ High School)	24	26.4	38	41.8	62	68.1		
Total	44	48.4	47	51.6	91	100.0		

Based on Table 7, the results of the Chi-Square statistical test showed a p-value of 0.007, which is less than α = 0.05 (p<0.05), indicating a relationship between maternal education and stunting at the Sumbul Community Health Center (UPT).

c. Relationship between Compliance with Iron Supplement Tablets and Stunting at the Sumbul Community Health Center (UPT).

The table below shows the relationship between compliance with iron supplement tablets and stunting at the Sumbul Community Health Center (UPT):

Table 8. Relationship between Compliance with Iron Supplement Tablets and Stunting at the Sumbul Community Health Center (UPT).

Compliance with Taking Blood Increasing Tablets	Stunting		Normal		Total		α	p-value
	F	%	f	%	F	%		
Not obey	32	35.2	19	20.9	51	56.0	0.05	0.002
Obedient	12	13.2	28	30.8	28	44.0		
Total	44	48.4	47	51.6	47	100.0		

Based on Table 8, the results of the Chi-Square statistical test showed a p-value of 0.002, which is less than α = 0.05 (p<0.05), indicating a relationship between adherence to iron supplementation and stunting at the Sumbul Community Health Center (UPT).

d. Relationship between Smoking and Stunting at the Sumbul Community Health Center

The table below shows the relationship between smoking and stunting at the Sumbul Community Health Center (UPT):

Table 9. Relationship between Smoking and Stunting at the Sumbul Community Health Center (UPT)

Smoking	Stunting		Normal		Total		α	p-value
	F	%	f	%	f	%		
Yes	36	39.6	22	24.2	58	63.7	0.05	0.001
No	8	8.8	25	27.5	33	36.3		
Total	44	48.4	47	51.6	91	100.0		

Based on table 9, it can be seen that the results of the statistical test using Chi-Square, obtained a p-value = 0.001, which is smaller than α = 0.05 (p <0.05), meaning that there is a relationship between smoking and the incidence of stunting at the Sumbul Health Center UPT.

Discussion
Respondent Characteristics
Based on the research results, the majority of mothers are in the 20-39 age group. The ideal maternal age for pregnancy is 20-35, as this age group has a lower risk of pregnancy complications and promotes healthy reproduction. This is related to the biological and psychological conditions of pregnant women. In this age group, biological development, particularly reproduction, is not yet optimal, with emotions tending to be unstable and mental maturity making them susceptible to shocks, resulting in a lack of attention to meeting nutritional needs related to the decline and decline in immunity, as well as various diseases that often occur at this age. Furthermore, pregnancy in the age group over 35 is considered high-risk. Pregnant women over 35 are also susceptible to anemia. This causes the immune system to begin to decline and is susceptible to various infections during pregnancy [10].

Maternal age, whether too young or too old, is a direct factor that can influence the incidence of stunting. In addition to maternal age, the spacing and number of children also increase the risk of stunting. Mothers who have pregnancies spaced less than two years apart experience health, mental, and social issues that have not fully recovered. This is exacerbated by a lack of family support and inadequate economic resources. Such conditions can lead to adverse health and psychological complications, particularly for the development of the unborn child [1].

One indirect cause of stunting is a family's economic level, which is influenced by the parents' educational attainment. The higher the parents' education, the greater their chances of earning a high income and leading a healthy lifestyle. The current problem of malnutrition is caused by inadequate nutrient intake [1]. To improve mothers' knowledge regarding stunting prevention, knowledge is gained not only from formal education but also from non-formal education such as counseling, the media, and various information sources that can enhance mothers' knowledge, particularly regarding stunting prevention [13].

In general, the prevalence of stunting in toddlers is influenced by low parental education and income. Families with high incomes have quick access to education and health services, resulting in improved child nutritional status. This is because economic conditions are a key determinant of a family's food supply. Therefore, economic conditions also determine a family's nutritional level and influence, among other things, child growth and development [1]. Research has shown that maternal education is associated with stunting, while maternal age and occupation are not [13].

The Relationship Between Maternal Height and Stunting at the Sumbul Community Health Center (UPT Puskesmas)
The results of the Chi-Square statistical test yielded a p-value of 0.004, which is less than α=0.05 (p<0.05). This indicates a relationship between height and stunting at the Sumbul Community Health Center (UPT Puskesmas). The majority of mothers' heights were <150 cm (49 women (70%), and 21 women's heights were >150 cm (30%).

Maternal height reflects the mother's previous nutritional and socioeconomic status. Short stature can be caused by hereditary factors due to pathological conditions such as hormone deficiencies, which can lead to a genetic predisposition to short stature. It can also be due to maternal health factors such as nutritional

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deficiencies or illness. Maternal height is a body measurement measured using a microtoise from head to toe. It is considered short if it is <150 cm, and normal if it is >150 cm [14].

Research conducted by Sinaga (2023) explained that there was a relationship between maternal height and stunting in Dolok Tolong village, with a p-value of 0.000. The majority of mothers with normal toddlers (95.6%) had normal height, and 80.6% of mothers with stunted toddlers had normal height. Parental height is influenced by many factors, including internal and external factors. Internal factors include genetics, while external factors include disease and early nutritional intake. Genetic factors are unchangeable, while external factors are modifiable. This means that if parents are short due to genes in their chromosomes that carry the trait for shortness, and these genes are passed on to their offspring, stunting in their children or offspring is difficult to address. However, if parents are short due to disease or inadequate early nutritional intake, this should not affect their child's height. Children can still have a normal height as long as they are not exposed to other risk factors [15].

Research conducted by Baidho (2021) found a relationship between maternal height and stunting, with a p-value of 0.005. Shorter mothers also have a higher risk of obstructed labor, leading to assisted delivery, particularly cesarean delivery. Obstructed labor is associated with a shorter, narrower pelvis, where the baby's head (i.e., cephalopelvic disproportion) or shoulders are obstructed [14].

Research conducted by Safri (2022) found a relationship between height and stunting. Analysis using the Chi-square test yielded a p-value of 0.007, indicating a significant relationship between height and stunting. Short mothers (<150 cm) were 3.4 times more likely to give birth to stunted babies. This indicates that short mothers are at risk of giving birth to stunted babies. Maternal height influences stunting, and it is important to consider the height-risk group for stunting in children, namely mothers with short stature. Furthermore, efforts to address stunting from adolescence onward are crucial to mitigate the further impact of female height, which will affect the quality of the next generation [16].

These results align with research conducted by Soleha (2022), which also found a correlation between height and stunting. Twenty-one mothers with short stature (<150 cm) had stunted children. Based on the analysis using the Chi-square test, the p-value was $0.005 < \alpha = 0.05$, indicating a significant correlation between maternal height and stunting in children aged 24-59 months in Wonomerto District. Mothers of toddlers can increase their awareness of their own and their children's nutritional status by optimizing adequate nutritional intake during adolescence, preconception, pregnancy, and lactation to prevent malnutrition, which can also impact their children's nutritional status [17].

The Relationship Between Maternal Education and Stunting at the Sumbul Community Health Center

The study found a relationship between maternal education and stunting at the Sumbul Community Health Center (UPT Sumbul), with a p-value of 0.004. This is evident from the low education level (less than junior high school) of 16 (22.9%) mothers with stunted toddlers, and high education level (more than senior high school) of 19 (27.1%). Meanwhile, mothers with normal toddlers with low education (less than junior high school) numbered 5 (7.1%) and high education level (more than senior high school) of 30 (42.9%).

Research conducted by Sinaga (2023) found a relationship between maternal education and stunting with a p-value of 0.029. The majority of mothers with stunted toddlers (65.6%) had a high education, while 83.6% of normal toddlers had a high education. This study explains that maternal education influences mothers' knowledge of how to prepare food for their families. Providing appropriate food ingredients and menus for toddlers to improve nutritional status can be achieved if mothers have a good level of nutritional knowledge. Mothers with low levels of education, among other things, will have difficulty absorbing nutritional information, putting their children at risk of stunting. A high level of education makes it easier for someone to absorb information and apply it in their daily lives [15].

Stunting in children under five is often under-recognized because the differences between stunted children and normal children at that age are not clearly visible. The age under five is a golden age for determining the quality of human resources, as seen in terms of physical growth and intelligence, so this must be supported by good nutritional status. A child who experiences stunting during this period tends to struggle to achieve optimal height later in life. One factor influencing the incidence of stunting is the mother's education level. The study found that of the 134 respondents, 67 (50%) had an elementary school education and had children with stunting, while 67 (50%) had an elementary school education and had children without stunting. The chi-square analysis yielded a p-value of 0.005 (p < 0.05), thus concluding that there is a relationship between maternal education and stunting incidence in the Kandanghaur Indramayu Community Health Center (Puskesmas) work area. Therefore, maternal knowledge is a crucial factor [13].

Research conducted by Husnaniyah, D. et.al (2020) showed that among 20 mothers with primary education, 50% of their children were stunted and 50% were non-stunted. Meanwhile, among mothers with secondary education, all (100%) had non-stunted children. The Spearman rank correlation test yielded a p-value <0.001, indicating that maternal education is associated with stunting incidence in children aged 0-2 years. The correlation value of 0.577, within the range of 0.400-0.5999, demonstrates a strong relationship between maternal education and stunting incidence in children aged 0-2 years. Mothers with low levels of education are 1.76 times more likely to experience stunting in toddlers than mothers with higher levels of education. This is because highly educated mothers are better equipped to obtain information on feeding and choose the best foods for their children [13].

The Relationship between Iron Supplement Compliance and Stunting at the Sumbul Community Health Center (UPT)

The study found a relationship between iron supplement compliance and stunting at the Sumbul Community Health Center (UPT) (p-value = 0.000). 29 (41.4%) mothers with stunted toddlers were non-compliant, while 6 (8.6%) were compliant. Meanwhile, 7 (10.0%) mothers with normal toddlers were non-compliant, while 34 (40.0%) were compliant.

Pregnant women attending the integrated health post (Posyandu) received monthly pregnancy checks and iron supplements. For mothers of toddlers who did not receive iron supplements, the village midwife conducted home visits, conducted pregnancy checks, and administered iron supplements. During interviews, mothers of toddlers often forgot to take their iron supplements because the majority of mothers were farmers. Mothers who work as farmers often leave for the fields at 7 a.m. and return home at 6 p.m., often forgetting to take their iron supplements due to fatigue. Monitoring pregnant women's medication intake is crucial for ensuring they regularly take their iron supplements, just as monitoring TB medication intake is crucial for pregnant women. Monitoring pregnant women's medication intake can encourage them to take their iron supplements, attend health posts (Posyandu) regularly, and pay greater attention to the health of both mother and fetus.

Research conducted by Fentiana (2022) showed a significant relationship between the standard iron supplement consumption and stunting in children aged 0-23 months. Statistical tests also showed that 2,890 (39.3%) children of mothers who consumed 90 iron supplements were not stunted. Meanwhile, among mothers who consumed 90 iron supplements, 62,306 (62.8%) had stunted children. Therefore, it can be concluded that there is a difference in the proportion of mothers who consume iron supplement tablets (IBF) > 90 tablets compared to mothers who consume iron supplement tablets (IBF) < 90 tablets. The OR value of 1.05 indicates that mothers who consume iron supplement tablets (IBF) < 90 tablets have a 1.05 times greater chance of having a stunted child than mothers who consume iron supplement tablets (IBF) > 90 tablets [18].

This contrasts with research conducted by Munirah (2023), which found a p-value > 0.910, indicating no significant relationship between adherence to iron supplement tablet consumption and stunting. The study involved 1,755 respondents, of which 1,268 were non-compliant with iron supplementation, while only 487 were. This is likely due to other triggers that contribute to stunting [19].

This study observed a link between the reduction in stunting and the increased provision of iron supplementation tablets to pregnant women, at least 90 tablets, during pregnancy. However, informants still reported a high refusal to take iron supplements due to the side effect of nausea. The solution is to take iron supplements after meals or before bed to minimize nausea [20].

Primary Service Integration (ILP) has been implemented at the Sumbul Community Health Center (UPT). Primary Service Integration is an effort to organize and coordinate various primary health services based on the life cycle for individuals and communities. One of the activities of Primary Service Integration is education on stunting prevention. Integrated Primary Care Posyandu (Posyandu) is a health service program aimed at strengthening health services in rural communities. While Posyandu typically focuses only on infants and the elderly, Integrated Primary Care Posyandu covers all life cycles, from pregnant women to the elderly. Integrated Primary Care Posyandu (IPP) activities are conducted once a month, and home visits by health workers are conducted for those who do not attend Posyandu.

The Relationship Between Smoking and Stunting at the Sumbul Community Health Center

The results of the Chi-Square statistical test showed a p-value of 0.000, which is less than α = 0.05 (p<0.05), indicating a relationship between smoking and stunting at the Sumbul Community Health Center. The duration of cigarette smoke exposure in stunted toddlers in a study conducted by Nailussa'dah N. et al.

(2024) revealed that 40 (57.1%) respondents were exposed to cigarette smoke for ≥ 3 hours/day. The majority of respondents (41) smoked, while 29 (41.4%) did not [21].

The source of cigarette smoke exposure was the toddlers' fathers at home, with 61 (87.1%). On average, one person in each household of the 63 (90.0%) respondents in this study was exposed to cigarette smoke, namely the father. The type of cigarette most frequently consumed by those exposed to cigarette smoke in stunted toddlers at home was filtered cigarettes, with 68 (97.1%) respondents smoking more than 10 cigarettes per day, with 34 (48.6%) respondents. Thirdhand smoke was the most common cigarette smoke among stunted toddlers in this study, with 45 (64.3%). The locations where stunted toddlers were most exposed to cigarette smoke were at home and in public places, with 63 (90.0%) respondents. Public places frequently exposed to cigarette smoke were markets, restaurants, and coffee shops.

In a study conducted by Bawono Y. & Rosyidah R (2023), stunting not only takes into account genetic and environmental factors of the child, but also confirmed that there is strong and consistent statistical evidence that children whose parents are chronic smokers have a 5.5% greater chance of developing stunting than children who are non-smokers. Furthermore, stunting can lead to decreased intelligence/cognitive development in children [16]. Research conducted by Nailussa'dah, N., et al (2024) also explains that the duration or length of exposure to cigarette smoke in stunted toddlers in this study was mostly exposed to cigarette smoke ≥3 hours / day, namely 40 (57.1%) respondents. Exposure of more than 3 hours / day will increase the number of stunting incidents by 10,316 times because the dangerous substances in cigarettes will bind oxygen 30-40% so that the oxygen supply to other organs is disrupted and results in damage to many organs, exposure to cigarette smoke for too long will also interfere with the absorption of nutrients such as calcium, minerals, and vitamin C which are very important for the growth of children's height. Stunting toddlers who are thirdhand smoke or third smokers are 45 (64.3%) respondents. THS or thirdhand smoke is also one of the victims of cigarette smoke that must be protected, the residue that sticks to various furniture is invisible so it is difficult for us to keep toddlers from touching items that have been exposed to thirdhand smoke, therefore parents must really know about the dangers of thirdhand smoke [21].

The chi-square analysis findings in a study conducted by Wulandari F, et.al (2023) showed a p-value of 0.037 <0.05, indicating a relationship between cigarette smoke exposure and stunting in toddlers aged 2-5 years in Kalikuning Village, Kalikajar District, Wonosobo Regency in 2023. In this study, 17 (56.7%) toddlers were exposed to cigarette smoke, while 13 (43.3%) were not exposed. It can be concluded that many adults still smoke near toddlers, resulting in a significant proportion of toddlers being exposed to cigarette smoke. Most adults prioritize smoking indoors or while playing with their children rather than smoking outdoors away from children. When toddlers are at home, they are exposed to cigarette smoke from smoking family members. The carbon monoxide content in cigarette smoke exhaled by active smokers and ingested by toddlers is five times higher than tar and nicotine. Stunting occurs when toddlers inhale cigarette smoke. Other variables contributing to stunting include poor fetal development and premature birth, environmental factors, maternal nutritional status and infections, adolescent females, and short birth spacing (less than two years). Other contributing variables include parental nutritional adequacy, socioeconomic status, environmental hygiene and sanitation, and congenital diseases [22].

Smoking is one of 12 health indicators assessed by the PIS-PK (Healthy Indonesia Program with a Family Approach) program. In a self-awareness survey conducted by the Sumbul Community Health Center (Puskesmas), 768 of the 839 families interviewed smoked. Smoking has become a significant concern due to the current smoking trend. Currently, many young people are using e-cigarettes, often referred to as vapes. Vapes, or e-cigarettes, are an innovation that transforms conventional cigarettes into mod cigarettes.

Conclusion

Based on the results of the research conducted at the Sumbul Community Health Center (UPT Sumbul), Sumbul District, Dairi Regency, it can be concluded that there is a significant relationship between maternal height and the incidence of stunting, as indicated by a p-value of 0.000. In addition, maternal education level is also significantly associated with stunting, with a p-value of 0.007. Adherence to iron supplementation shows a statistically significant relationship with stunting, reflected by a p-value of 0.002. Furthermore, smoking behavior is significantly related to the occurrence of stunting at the Sumbul Community Health Center, with a p-value of 0.001.

Conflict of Interest

The author declares no competing interests and asserts that the research was conducted autonomously, safeguarding the impartiality and validity of the results.

Acknowledgement

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