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Factors associated with the incidence of stunting in toddlers aged 12-59 months

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Abstract

Background: Stunting is a nutritional issue that has been a major focus of the Indonesian government. Stunting is caused by chronic malnutrition. Stunting can have both short-term and long-term impacts.

Purpose: This study aims to determine the factors associated with stunting in toddlers aged 12-59 months.

Method: This research is a quantitative study with a case-control design. Data analysis was performed using the chi-square test. The case samples of this study were toddlers aged 12–59 months who experienced stunting and the control samples were toddlers aged 12–59 months who did not experience stunting, with a total sample of 60 consisting of 20 cases and 40 controls from a total population of 134. Data collection was carried out by measuring the height/height of toddlers and interviews using questionnaires. This study took place in Betara Kiri Village, within the working area of the Parit Deli Community Health Center, from July 16, 2024 to September 8, 2025.

Results: Most toddlers were exclusively breastfed (75.0%) and had no history of infection (85.0%). More than half of the mothers had low education (51.7%) and were short in stature (51.7%), while the majority attended ANC visits (81.7%), had a low-risk gestational age (75.0%), normal birth spacing (90.0%), low parity (93.3%), and family income above the minimum wage (63.3%). This study found that exclusive breastfeeding ($p=0.027$), history of ANC visits ($p=0.031$), family income ($p=0.004$), history of infectious diseases ($p=0.464$), maternal education level ($p=0.083$), maternal age during pregnancy ($p=0.114$), birth spacing ($p=0.089$), parity ($p=0.595$) and maternal height ($p=0.089$) were related to the results.

Conclusion: It can be concluded that exclusive breastfeeding, history of ANC visits, and family income are associated with stunting. It is hoped that community health centers can improve the quality of exclusive breastfeeding, monitor regular ANC visits, and provide education to low-income families about the importance of balanced nutrition.

Keywords: ANC; Exclusive Breastfeeding; Family Income; Stunting.

INTRODUCTION

(SDGs) in public health and nutrition is to eliminate all forms of malnutrition. Stunting, a nutritional issue that has been a primary focus of the Indonesian government, stunting is a growth disorder in toddlers caused by chronic malnutrition, resulting in shorter height compared to other children of the same age. This nutritional problem begins during pregnancy and continues through the early stages of a baby's life after birth (Adriani, Aisyah, Wirawan, Hasanah, & Idris, Yulistianingsih, & Siswati, 2022).

The First 1000 Days of Life (1000 HPK) is a crucial phase from early pregnancy to 24 months of age. During this period, children experience rapid growth and development. Lack of adequate nutrition can lead to stunting, which can have long-term and recurring impacts throughout life. Malnutrition is a direct cause of stunting, as the body does not receive sufficient nutrients to support optimal growth and development (Badan Kependudukan dan Keluarga Berencana Nasional, 2017).

Stunting can have both short-term and long-term impacts. Short-term impacts include an increased risk of disease and mortality, impaired cognitive and motor development, and increased healthcare costs (Akbar & Huriah, 2022). Long-term impacts include less than optimal posture as adults (shorter than peers), a higher risk of degenerative diseases, decreased reproductive health, and reduced work capacity (Archda & Tumangger, 2019).

Stunting is influenced by several factors, both direct and indirect. Exclusive breastfeeding is a direct factor that causes stunting. Exclusive breastfeeding is providing breast milk (ASI) entirely to infants for 6 months without any other liquids, including water, tea, orange juice, honey, or formula, and without solid foods such as porridge, biscuits, bananas, papaya, or porridge. Exclusive breastfeeding can prevent stunting because it is the best food for infants before 6 months of age. Proper breastfeeding can help meet nutritional needs, thus supporting optimal growth. Breast milk is very important during a baby's growth period to ensure their nutritional needs are met (Safitri, Lail, & Indrayani, 2021). Based on previous research explaining that children who do not receive exclusive breastfeeding have a 2.97 times greater risk of experiencing stunting (Falmuariat, Febrianti, & Mustakim, 2022).

A history of infectious diseases is also a direct factor causing stunting. Common infectious diseases in toddlers include diarrhea and acute respiratory infections (ARI). Toddlers with poor nutritional status tend to have low immunity, making them more susceptible to illness and limited ability to fight disease. These infections are often manifested by poor appetite and vomiting, resulting in inadequate nutritional intake. This condition negatively impacts toddler growth (Rohmania, Lina, & Novianti, 2024). According to other research there is a relationship between a history of infectious diseases and the incidence of stunting in toddlers. Toddlers who have experienced diarrhea have a 2.8 times greater risk of experiencing stunting compared to toddlers without a history of diarrhea. Toddlers who have suffered from acute respiratory infections (ARI) have a 3.4 times greater risk of experiencing stunting compared to toddlers without a history of acute respiratory infections (ARI) (Eldrian, Karinda, Setianto, Dewi, & Guzmira, 2023).

Spacing babies too closely together often impacts a child's growth and development, including increasing the risk of stunting. This occurs because babies born closer than ideal often have to be weaned early from breast milk, which is an essential source of nutrients for optimal growth. Furthermore, mothers with closely spaced births lack the time to prepare nutritious meals for their children and the care and affection necessary to support their development. The recommended spacing of pregnancies is at least 24 months, so that mothers can have a safe pregnancy and delivery. This helps mothers stay healthy, deliver healthy babies, and supports their children's growth and development into quality individuals (Ministry of Health of the Republic of Indonesia, 2021). Children with a birth gap of less than 2 years are 5.2 times more likely to experience stunting than children with a birth gap of more than 2 years (Pradini, Ariani, & Fetriyah, 2024).

Parity is an indirect factor contributing to stunting, as it is strongly linked to appropriate parenting and nutrition, especially when combined with limited economic conditions. Mothers with a large number of children are more likely to have children with stunting. High parity is considered when a mother has more than three children, and low parity is considered when a mother has fewer than three children (Badan Kependudukan dan Keluarga Berencana Nasional, 2021). According to other research this study found a value ($p=0.046$), which means there is a significant relationship between parity and the incidence of stunting (Wartin, Darmapatni, & Tedjasulaksana, 2025).

The age at which a pregnancy occurs also needs to be planned and considered. Maternal age also influences fetal development, as good nutritional intake will positively impact fetal development. Pregnant women under 20 are still growing, both in height and weight. This situation is not conducive to pregnancy, as they are in a period of physical growth that also supports the growth of their fetus. Women over 35 are considered incapable of pregnancy due to their physical age and the weakness of supporting the burden. The ideal, or low-risk, age for pregnancy is 20-35 (Sarman, 2021). According to research other this study obtained significant results ($p=0.045$), indicating a significant relationship between maternal age during pregnancy and the incidence of stunting (Al-Aluf, Arjita, & Mathar, 2024).

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A mother's height is also a factor influencing stunting, as the family plays a significant role in a child's growth and development. This is due to a genetic predisposition within the family, whether tall or short. Mothers with short stature due to growth hormone deficiency tend to pass on the chromosome gene that carries the trait for short stature, putting their children at risk for stunting (Wu, Ma, Yang, & Xi, 2021). previous research shows that results were obtained ($p=0.038$) which meant that there was a significant relationship between maternal height and the incidence of stunting (Dainy, Kusumaningati, Ashari, & Kushargina, 2024).

A mother's education level is in line with her level of knowledge. The role of parents, especially mothers, is crucial in maintaining a child's health. A mother's lack of knowledge, often responsible for household chores or caring for family members, can result in a child not receiving a balanced diet, leading to stunting (Juniarty, Lestari, & Mandasari, 2024). According to research by Tina Sari, et al. (2021), this study found a significant relationship ($p=0.03$) between maternal education level and the incidence of stunting in toddlers (Sari, Renityas, & Sari, 2021).

Antenatal care (ANC) checkups are essential for maintaining the physical and mental health of both mother and baby. ANC helps mothers prepare for childbirth, the postpartum period, breastfeeding, and reproductive health recovery. The standard ANC visit during pregnancy is two in the first trimester (0-12 weeks), one in the second trimester (12 to 24 weeks), and three in the third trimester (24 weeks until delivery) (Ministry of Health of the Republic of Indonesia, 2020). According to research other mothers with incomplete antenatal care history have a 2.3 times greater risk of stunting in their children compared to mothers with complete antenatal care history (Rahayu & Sholehawati, 2021).

Family income influences a household's ability to meet daily needs. High income supports meeting these needs, while low income can make it difficult and affect the quality and quantity of food consumed. This increases the risk of stunting in toddlers (Hapsari & Ichsan, 2021). According to research other this study obtained results ($p=0.008$) which can be concluded that there is a close relationship between

family income and the incidence of stunting (Sutarto, Azqinar, & Puspita Sari, 2020).

RESEARCH METHOD

This study used a quantitative approach with an analytical observational design. The research study design applied in this study was a case-control design, namely an observational study that analyzes the relationship between an exposure and a specific disease condition. The case population in this study was all toddlers aged 12–59 months who experienced stunting and were registered at the Parit Deli Community Health Center, Betara Kiri Village in 2024, with a total of 20 toddlers. Meanwhile, the control population included all toddlers aged 12–59 months who did not experience stunting or had normal nutritional status in the same area, with a total of 134 toddlers.

The case sample in this study covers the entire population. Control samples were taken using a matching method, so the number of control samples was adjusted to the number of case samples. In this study, the case sample consisted of 20 people, while the control sample consisted of 40 people (a ratio of 1:2). Thus, the total case and control samples were 60 people. This research instrument used the Indonesian Health Survey (SKI) questionnaire and the KIA book to obtain data. The KIA book contains records of maternal and child health from early pregnancy until the child is 6 years old. In addition, a stadiometer was used to measure the height of children aged 24 months and above with an accuracy of 0.1 cm and an infantometer to measure the length of children aged 0-24 months with an accuracy of 0.1 cm.

This study used univariate analysis to describe the frequency distribution and percentage of each variable studied. Furthermore, bivariate analysis was performed with the Chi-square test at a 95% confidence level ($\alpha=0.05$). A significant relationship was considered if $p<0.05$, while $p\geq 0.05$ indicated no significant relationship. Furthermore, the Odds Ratio (OR) was used to determine the closeness of the relationship between risk factors and events, where $OR>1$ indicates a risk factor, $OR=1$ or including the number 1 means not a risk factor, and $OR<1$ indicates a protective factor.

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RESEARCH RESULTS

Table 1. Frequency Distribution of Respondents (N=60)

Variable	Results	<i>p-value</i>	OR 95% C.I (Lower -Upper)
Age (Mean±SD) (Range) (Month)	(38.10±10.681) (12-59)		
12-24	4/6.7		
25-47	41/68.3		
48-59	15/25.0		
Gender (n/%)			
Man	36/60.0		
Woman	24/40.0		
Exclusive Breastfeeding (n/%)		0.027	4.636 (1.346-15.968)
Yes	45/75.0		
No	15/25.0		
History of Infectious Diseases (n/%)		0.464	1.750 (0.414-7.399)
Yes	9/15.0		
No	51/85.0		
Mother's Level of Education (N/%)		0.083	3.157(1.006-9.906)
Low	31/51.7		
High	29/48.3		
History of ANC Visits (n/%)		0.031	4.846 (1.216-19.311)
Yes	11/18.3		
No	49/81.7		
Mother's Age During Pregnancy (n/%)		0.114	3.143 (0.937-10.546)
Risk	15/25.0		
Risk-Free	45/75.0		
Birth Intervals (n/%)		0.089	4.750 (0.789-28.595)
Normal	54/90.0		
Tidak Normal	6/10.0		
Parity (n/%)		0.595	2.111 (0.275- 16.213)
Ideal ≤ 2	56/93.3		
Not Ideal > 2	4/6.7		
Family Income (n/%)		0.029	0.195 (0.049- 0.772)
<Minimum Wage	38/63.3		
> Minimum Wage	22/36.7		
Mother's Height (n/%)		0.089	4.750 (0.789- 28.595)
Normal >145	54/90.0		
Abnormal ≤145	6/10.0		

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The table above shows that the average age of respondents and standard deviation is (38.10±10.681) with an age range of 12-59 months, with the majority of respondents being male, namely 38 (60.0%). The majority of respondents were exclusively breastfed, namely 45 (75%), with no history of infection in 51 respondents (85.0%). The majority of mothers had a low level of education, namely 31 respondents (51.7%). Based on ANC visit history, the majority of respondents did not have a history of regular ANC visits, namely 49 (81.7%), with the majority of mothers not in the at-risk age range. Based on birth spacing, the majority had normal spacing, namely 54 (90.%) with ideal parity, namely 56 (93.3), and based on family income, the majority were <Minimum Wage, with a total of 38/63.3%).

The results of the study showed that several factors were significantly associated with the incidence of stunting in children aged 12–59 months in Betara Kiri Village. These factors were exclusive breastfeeding, history of ANC visits, and family income level. Toddlers who were not exclusively breastfed were at 4.636 times greater risk of stunting than those who received exclusive breastfeeding ($p=0.027$). Similarly, mothers with a history of incomplete ANC visits were at 4.846 times greater risk of stunting than mothers with complete ANC visits ($p=0.031$). Furthermore, families with incomes below the minimum wage had a higher risk of stunting, while families with incomes above the actually reduced the risk by 0.195 times ($p=0.029$).

Meanwhile, several other factors such as history of infectious diseases, maternal education level, maternal age during pregnancy, birth spacing, parity, and maternal height did not show a significant relationship with the incidence of stunting ($p>0.05$). Although not statistically significant, the results of the odds ratio calculation showed a tendency for an increased risk of stunting in children with certain conditions, such as mothers with low education (OR=3.157), mothers with a risky gestational age (OR=3.143), close birth spacing (OR=4.750), and mothers with short height (OR=4.750).

DISCUSSION

The analysis results showed that toddlers who did not receive exclusive breastfeeding were more likely to experience stunting (60.0%) than those who did not (40.0%). In contrast, only 24.4% of toddlers who

received exclusive breastfeeding experienced stunting. The Chi-Square test obtained $p = 0.027$ ($p < 0.05$), indicating a significant relationship between exclusive breastfeeding and the incidence of stunting. The OR value = 4.636 (95% CI= 1.346–15.968) indicates that toddlers without exclusive breastfeeding are at 4.6 times greater risk of experiencing stunting than those who are exclusively breastfed.

This study is in line with previous research showing that stunting is closely related to exclusive breastfeeding ($p=0.047$). Children who are not exclusively breastfed have a 1.97 times higher risk of stunting. Breast milk is very important for toddlers because it provides the best nutrition. The low rate of exclusive breastfeeding among toddlers is likely due to mothers' lack of knowledge about the importance of exclusive breastfeeding (Sahdani, Isaura, & Sumarmi, 2021). This is in line with other studies, which found that exclusive breastfeeding is associated with stunting ($p=0.000$). Children who do not receive exclusive breastfeeding will experience poor nutrition and malnutrition. As a determining factor of stunting, exclusive breastfeeding has been proven to support child growth, especially in promoting optimal height because calcium from breast milk is more efficient than from formula or other substitutes (Podungge, Yulianingsih, Porouw, Saraswati, Tompunuh, Claudia, & Labatjo, 2021).

However, this study differs from previous studies that found a p -value of 0.536, indicating no significant relationship between exclusive breastfeeding and stunting. This is because the production, composition, and quality of breast milk are influenced by physical conditions, both before and during pregnancy, as well as during breastfeeding, including the adequacy of the mother's nutritional intake (Novayanti, Armini, & Mauliku, 2021). Similarly, another study found a p -value of 0.058, indicating no relationship between exclusive breastfeeding and stunting in toddlers. However, a PR value of 3.913 shows that respondents who exclusively breastfeed their children can reduce the risk of stunting (Lanita, Al Nabila, Hidayati, Siregar, & Kasyani, 2023).

The study results show that even if a child is exclusively breastfed, there is still a risk of stunting. Based on in-depth interviews with respondents, it was discovered that some mothers do not fully provide exclusive breastfeeding because in the early postpartum period, breast milk production has not yet

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come in or is not smooth, so the baby is given additional formula milk. In addition, it was found that approximately 12% of toddlers were given additional honey and rice water when they were still under six months old, so the practice of exclusive breastfeeding is not fully fulfilled because the baby has received food or drink other than breast milk during the first six months of life. This condition indicates that some mothers do not fully understand the importance of exclusive breastfeeding for the first six months to support optimal growth and development of children.

44.4% of toddlers with a history of infectious diseases experienced stunting, while 31.4% of those without a history of infection experienced stunting. The chi-square test showed $p = 0.464$ ($p > 0.05$), indicating no significant association between a history of infectious diseases and stunting. However, the OR value = 1.750 (95% CI = 0.414–7.399) indicates that toddlers with a history of infectious diseases had a 1.75 times greater risk of experiencing stunting than those without a history of infection.

This study is in line with previous research which revealed that this study did not find a significant relationship ($p=0.228$) between a history of infectious diseases and the incidence of stunting. This means that a history of infectious diseases does not determine the incidence of stunting in toddlers (Khairani & Effendi, 2020). In line with previous research, it also obtained a value of ($p = 0.082$), which means that there is no significant relationship between infectious diseases (diarrhea and ARI) and the incidence of stunting. This is because stunting is not only influenced by infectious diseases but can also occur due to other factors such as nutritional adequacy before, during, and after experiencing illness (Putri, Irawan, Mukono, & Whitney, 2021).

Previous research shows that the results showed a significant relationship between a history of infectious diseases and the incidence of stunting in toddlers ($p=0.012$). Infectious diseases are caused by several factors, such as poor environmental conditions and sanitation, and they are factors that directly affect nutritional status in addition to nutritional adequacy. Infectious diseases interfere with nutrient absorption, cause direct nutrient loss, increase metabolic needs or catabolic losses of nutrients, and disrupt nutrient transport to target tissues, including food intake (Abri, Thaha, & Jafar, 2022).

The study's findings disagree with the theory that infectious diseases, particularly recurrent infections such as diarrhea and acute respiratory infections, contribute to stunting through impaired nutrient absorption, decreased appetite, and increased metabolic needs. This discrepancy is likely due to the limited availability of other infectious disease variables not studied, such as worm infestations, which can also potentially impact a child's nutritional status. Furthermore, most mothers continued to breastfeed exclusively, which can help strengthen a child's immune system and reduce the risk of stunting, even if they had previously experienced an infectious disease. 45.2% of toddlers with low-educated mothers experienced stunting, while only 20.7% of those with highly educated mothers experienced stunting. The chi-square test showed $p = 0.083$ ($p > 0.05$), indicating no significant association between maternal education and stunting. However, the OR = 3.157 (95% CI = 1.006–9.906) indicates that children of low-educated mothers are 3.2 times more likely to experience stunting than children of highly educated mothers.

However, this differs from previous studies, which found a significant correlation ($p=0.03$) between mothers' educational attainment and stunting in toddlers. Maternal education significantly affects family nutritional status, which impacts family health, especially for children, because mothers are the primary supervisors of food management and play a crucial role in improving children's nutritional status (Sari et al., 2021).

This study shows that mothers who have not attended school or have a low level of education do not always have stunted toddlers, and conversely, mothers with a high level of education do not always have toddlers who are not stunted, indicating a discrepancy between the theory that states that the lower the mother's education level, the greater the chance of stunting in toddlers. This difference in results is likely due to mothers' practical knowledge not only obtained through formal education, but also from various other sources such as personal experience, information from the media, and guidance from health workers. With this knowledge, many mothers are still able to implement good parenting patterns and provide appropriate nutrition for their children, thereby minimizing the risk of stunting in

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toddlers even though their formal education level is relatively low.

Children of mothers with incomplete ANC visits experienced stunting by 63.6%, while those with complete ANC visits only experienced stunting. The Chi-Square test results showed $p = 0.031$ ($p < 0.05$), indicating a significant relationship between ANC visits and stunting. The OR value = 4.846 (95% CI= 1.216–19.311) indicates that children of mothers with incomplete ANC visits were at almost 5 times greater risk of experiencing stunting compared to children of mothers with complete ANC visits.

This study is in line with previous findings, showing that the history of ANC visits has a significant relationship with the incidence of stunting, as evidenced by the value ($p=0.045$). During ANC visits, pregnant women receive comprehensive pregnancy checkups, nutritional counseling, folic acid and iron supplements, and appropriate health education. This can prevent babies from not getting enough nutrition during pregnancy, thereby preventing stunting in toddlers (Septiani, Litasari, Ariani, Fauzi, & Risyani, 2023). In line with other studies, there is also a relationship between the history of ANC visits and the incidence of stunting ($p=0.000$). Pregnant women should not miss ANC visits due to the importance of the first 1000 days of life for toddler growth (Hamid, Pakhri, Mustamin, & Adam, 2021).

However, this study differs from previous studies that obtained a p -value of 0.325. Based on these results, it can be concluded that there is no significant relationship between ANC visits and stunting. Incomplete ANC visits are likely due to the location of the examination, examination equipment, and health workers, which affect pregnant women's interest in attending visits (Ramadhini, Sulastri, & Irfandi, 2021).

Field research indicates that incomplete ANC visits are caused by various interrelated factors. One of the main factors is the low level of knowledge of mothers regarding the importance of regular ANC check-ups. Many mothers do not understand that ANC not only functions to monitor fetal development, but also to detect early pregnancy complications, ensure adequate nutrition for pregnant women, and provide education regarding care during pregnancy, childbirth, and the postpartum period. Limited family economic conditions and mothers' busy household chores also pose additional obstacles that cause some mothers to delay or even skip scheduled check-

ups. In fact, interviews found that some mothers only receive one prenatal check-up during their pregnancy, thus not receiving optimal health monitoring and putting their fetus at risk for growth and development, including an increased risk of stunting in children.

Children of mothers who were pregnant at-risk ages experienced stunting by 53.3%, while at non-risk ages only 26.7%. The Chi-Square test showed $p = 0.114$ ($p>0.05$), so there was no significant relationship between maternal age during pregnancy and stunting. However, the OR value = 3.143 (95% CI = 0.937–10.546) showed that mothers who were pregnant at-risk ages had a 3.1 times greater chance of their children experiencing stunting compared to mothers who were pregnant at non-risk ages. In this study, maternal age during pregnancy was divided into 2 categories, at-risk age (age <20 years or >35 years) and non-risk age (age 20-35 years).

This study is in line with previous studies that found a value of $p=0.368$. Data analysis shows that pregnant women under the age of 20 or over the age of 35 are not associated with stunting (Nurhidayati, Rosiana, & Rozikhan, 2020). In accordance with other studies that found results ($p=0.419$), this shows that the mother's age is not associated with stunting in toddlers. According to the researchers, maternal age is an indirect factor that influences stunting, and other factors also have a greater influence on nutritional status (Trisyani, Fara, & Mayasari, 2020).

However, this differs from previous studies. This study obtained significant results ($p=0.045$), indicating a significant relationship between the mother's age during pregnancy and the incidence of stunting. Mothers under the age of 20 and over the age of 35 are at higher risk of experiencing maternal and fetal health problems during pregnancy, childbirth, and postpartum (Al-Aluf et al., 2024). In line with this study, a significant correlation ($p=0.013$) was found between maternal age during pregnancy and stunting. Mothers who are too young lack the experience and knowledge to care for and provide adequate nutritional support for their toddlers (Fadlil, Pangestuti, Pane, & Diba, 2025).

The results of the study indicate that these findings are inconsistent with the theory that maternal age is at risk for stunting. This discrepancy is likely due to other, more dominant factors, such as mothers at risk continuing to undergo routine and complete antenatal care (ANC) checkups and providing exclusive

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breastfeeding to their children, thus ensuring their nutritional needs are met. However, this study found that mothers who became pregnant at age 16 are included in the at-risk age category because at that age their physical condition and reproductive organs are not yet fully mature and the body's nutritional reserves are still limited. Pregnancy at age 16 can increase the risk of complications such as anemia, low birth weight (LBW), premature delivery, and fetal growth disorders due to lack of optimal nutritional intake. This demonstrates the importance of preventing pregnancy at too young an age to reduce risks to the health of both mother and child.

Toddlers with close birth spacing experienced stunting by 66.7%, while those with normal birth spacing only 29.6%. The Chi-Square test showed $p = 0.089$ ($p > 0.05$) so there was no significant relationship between birth spacing and stunting. However, the OR value = 4.750 (95% CI = 0.789–28.595) indicates that toddlers with close birth spacing have a risk of almost 5 times greater than toddlers with normal birth spacing. In this study, birth spacing was divided into 2 categories, namely close birth spacing (childbirth spacing < 2 years) and normal birth spacing (childbirth spacing ≥ 2 years).

This study is in line with other studies that found a significant correlation ($p=0.667$) between birth spacing and stunting. Stunting can be prevented if mothers receive full support from their husbands and families, especially in terms of parenting and nutritional intake, even if the birth spacing between children is relatively close (Wahyu, Ginting, & Sinaga, 2022). In line with other studies, this study obtained a value of ($p=0.216$), which means that there is no significant relationship between birth spacing and the incidence of stunting (Handayani, Gunarmi, & Agusman, 2022).

However, this study differs from the study by Andri Tenri et al. (2024). The results of this study obtained a value ($P = 0.031$), which means there is a significant relationship between birth spacing and the incidence of stunting. The birth spacing of previous children is a risk factor for a child's nutritional status. Children whose birth spacing is less than 24 months have a higher risk of experiencing stunting compared to children whose birth spacing is more than 24 months. This is because short birth spacing can cause problems sharing food among siblings (Awani, Wahyuni, Yusuf, & Rahmani, 2025).

The research results indicate that these findings are inconsistent with theory. This discrepancy is likely influenced by other, more dominant factors, such as the family's socioeconomic status, which determines access to nutritious food, the mother's level of compliance with antenatal care (ANC) check-ups as recommended by health workers, and the support of family members in caring for and meeting the child's nutritional needs. These factors can directly help prevent stunting.

Toddlers from mothers with high parity experienced stunting by 50.0%, while those from mothers with low parity experienced stunting by 32.1%. The Chi-Square test showed $p = 0.595$ ($p > 0.05$), so there was no significant relationship between parity and stunting. However, the OR value = 2.111 (95% CI = 0.275–16.213) showed that children from mothers with high parity had a 2.1 times greater chance of experiencing stunting than children from mothers with low parity. In this study, parity was divided into 2 categories, namely high parity (mothers who have > 3 children) and low parity (mothers who have ≤ 3 children).

This research aligns with the research of Eka Sri Purwandari, et al. (2021). This study found a significant correlation ($p=0.587$) between the number of children (parity) and the incidence of stunting. Mothers with higher parity levels are more likely to have extensive experience in caring for and providing nutritional support for their children (Purwandari, Estiningtyas Sakilah Adnani, & Yuli Astutik, 2021). In line with research by Artika Ardella et al. (2024), this study found no significant association ($p=0.118$) between parity and stunting. This indicates the involvement of other family members in supporting mothers in childcare, which contributes to optimally meeting children's nutritional needs, thus addressing nutritional issues and preventing stunting (Pada, Di, Muara, & Kabupaten, 2024).

However, this differs from previous studies. This study found a significant relationship ($p=0.004$) between parity and stunting. Imbalances in food distribution among family members can cause malnutrition in toddlers (Kusumawardhani, Nurruhyuliawati, & Garna, 2020). In line with other studies, this study found a significant correlation ($p=0.046$) between parity and stunting. Families with many children, especially those in low-income families, tend to have difficulty meeting the needs and

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food intake of all their children (Sarman & Darmin, 2021).

The results of this study indicate that field findings are inconsistent with the theory that a large number of children is associated with an increased risk of stunting. This discrepancy is likely caused by several factors, including mothers' ability to effectively manage their time and allocate attention to their children, as well as the utilization of health services such as integrated health posts (Posyandu) and good nutrition counseling so that children's nutritional needs are met. Furthermore, approximately 50% of mothers with large numbers of children continue to exclusively breastfeed their children, which plays a crucial role in maintaining children's nutritional status. These factors may explain why there was no statistically significant relationship between the number of children and the incidence of stunting in this study.

50.0% of toddlers from families with incomes below the minimum wage experienced stunting, while only 11.5% of those from families with incomes above the minimum wage experienced stunting. The Chi-Square test showed $p=0.029$ ($p<0.05$), indicating a significant relationship between family income and stunting. The $OR=0.195$ (95% $CI=0.049-0.772$) indicates that families with incomes above the minimum wage have a much lower risk (0.2 times) of their children experiencing stunting compared to families with incomes below the minimum wage.

This study is in line with previous research that found low family per capita income to be a risk factor for stunting ($p=0.001$; $OR=13.222$; $CI=2.790-62.670$). Toddlers with low family per capita income are 13.222 times more likely to experience stunting than toddlers with sufficient family per capita income (Tanzil & Hafriani, 2021). In line with other studies, this study found results ($p=0.008$) that concluded a close relationship between family income and the incidence of stunting. Family income plays a crucial role in determining the availability of food in the household, because the fulfillment of food needs is highly dependent on the purchasing power of the family (Sutarto et al., 2020).

However, this study differs from previous studies in that the results show a value ($p = 0.131$) which can be interpreted as meaning that family economic income is not related to the occurrence of stunting. This is because they are able to manage nutritious

food with simple and inexpensive ingredients, and the economic income received is not entirely used for staple foods, but also to meet other needs (Sari & Zelharsandy, 2022).

Field research results indicate that the majority of respondent families still have incomes below the District Minimum Wage () set by the government. This situation illustrates that many households face quite serious economic limitations, impacting their ability to meet basic needs such as access to education, health services, and nutritious food consumption. These limited incomes result in low family purchasing power for quality food, resulting in children's nutritional intake not being optimally met, both in terms of macro and micronutrients. This nutritional deficiency has the potential to hinder children's growth and development, which ultimately can increase the risk of stunting.

Toddlers born to mothers with short stature experienced stunting by 66.7%, while those born to mothers with normal stature only experienced stunting by 29.6%. The Chi-Square test results showed $p = 0.089$ ($p>0.05$), so there was no significant relationship between maternal height and stunting. However, the OR value = 4.750 (95% $CI = 0.789-28.595$) showed that mothers with short stature had almost 5 times greater chance of their children experiencing stunting compared to mothers with normal stature. In this study, maternal height was divided into 2 categories, namely mothers with short stature (<150 cm) and mothers with normal stature (≥ 150 cm).

This study is in line with previous research, which found a significant correlation ($p=0.610$) between maternal height and stunting. If a mother's short stature is caused by nutritional or pathological problems, this short stature will not be passed on to her child (Noviyanti, 2023). In line with previous researchers who revealed the results of this study, the results ($p = 1.000$) show that there is no significant relationship between maternal height and the incidence of stunting (Widiyarti, Nurzihan, & Muhlshoh, 2023).

However, this differs from previous studies, as this study found a significant correlation ($p=0.038$) between maternal height and stunting. Low maternal height can affect the genetic makeup of children, which can potentially cause children to inherit stunting traits (Dainy, Kusumaningati, Ashari, & Kushargina, 2024). In line with other previous studies, this study

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found a significant relationship ($p=0.004$) between maternal height and stunting. Short mothers have genes in their chromosomes that carry the trait of short stature, increasing the likelihood that their children will inherit these genes and experience stunting (Banudi, Santoso, Leksono, Rantesalu, & Palutturi, 2020).

Field research findings indicate that these findings are inconsistent with the theory that mothers with short stature are at higher risk of giving birth to stunted children. This discrepancy is likely due to the dominant environmental factors influencing child growth. These factors include good parenting, providing a balanced, nutritious diet, access to healthcare, and the active role of parents in maintaining children's hygiene and health. A positive and supportive parenting environment can minimize the impact of biological factors such as maternal stature, allowing children to continue to grow and develop optimally even if they are born to mothers with short stature.

CONCLUSION

There is a relationship between exclusive breastfeeding and the incidence of stunting in toddlers, there is no relationship between history of infectious diseases and the incidence of stunting in toddlers aged 12-59 months, there is no relationship between birth spacing and the incidence of stunting in toddlers aged 12-59 months, there is no relationship between parity and the incidence of stunting in toddlers aged 12-59 months, there is no relationship between the mother's age during pregnancy and the incidence of stunting in toddlers aged 12-59 months, there is no relationship between the mother's height and the incidence of stunting in toddlers aged 12-59 months, there is no relationship between the mother's level of education and the incidence of stunting in toddlers aged 12-59 months, there is a relationship between history of visits to the Mother and Child Health Center and the incidence of stunting in children aged 12-59 months, and there is a relationship between family income and the incidence of stunting in children aged 12-59 months.

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