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Factors causing stunting in pregnant women and its prevention efforts: Public Health Perspectives

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ABSTRACT

This study aims to identify the factors causing stunting in pregnant women and the preventive efforts made from a public health perspective. Stunting in infants is a significant health issue in Indonesia, with its causes often related to maternal nutrition, health status, and access to healthcare services. The research employs a quantitative method with a cross-sectional survey design. Data was collected through questionnaires distributed to 180 pregnant women registered at community health centers and hospitals. Descriptive and inferential statistical analysis was used to identify the relationship between the causes of stunting and prevention efforts. The results indicate that factors such as poor nutritional status, very young or very old maternal age, and limited access to adequate healthcare significantly contribute to infant stunting. Furthermore, health education programs and the provision of additional food supplements positively impacted the prevention of stunting. This study suggests the need for enhanced prevention efforts through broader education on the importance of maternal nutrition and better access to quality healthcare services to reduce the prevalence of stunting in Indonesia.

Kata kunci: *Stunting; pregnant women; maternal nutrition; healthcare access; prevention efforts: public health.*

INTRODUCTION

Stunting is a condition characterized by impaired growth and development in children due to chronic malnutrition, leading to a height-for-age measurement that is more than two standard deviations below the World Health Organization (WHO) Child Growth Standards median. This condition reflects a failure to achieve optimal growth and development during the critical periods of early childhood. Globally, stunting remains a significant public health issue. As of 2020, the global prevalence of stunting among children under five years of age was 21.3%, equating to approximately 144 million children affected. In Indonesia, stunting continues to be a major concern, with recent data indicating that a

substantial proportion of children under five are affected. The prevalence of stunting in Indonesia has shown a gradual decline over the past decade; however, it remains higher than the global average, underscoring the need for targeted interventions. The consequences of stunting are profound and multifaceted. Children who experience stunting are at increased risk for delayed cognitive development, poor educational performance, and lower IQ levels. These early deficits can lead to reduced economic productivity and a higher risk of nutrition-related chronic diseases in adulthood. Additionally, stunting contributes to intergenerational cycles of malnutrition, as stunted women are more likely to give birth to low-birth-weight infants, perpetuating the cycle. Addressing stunting is therefore crucial not only for the health and well-being of affected individuals but also for the broader social and economic development of communities and nations.

Maternal nutrition plays a pivotal role in fetal development, with inadequate intake of essential nutrients such as iron, protein, and vitamins during pregnancy significantly increasing the risk of stunting in children. Deficiencies in these nutrients can impair fetal growth, leading to low birth weight and subsequent growth retardation in early childhood. The health status of the mother during pregnancy also influences the likelihood of stunting. Conditions such as anemia, infections, and metabolic disorders can adversely affect fetal development, increasing the risk of stunting. For instance, maternal anemia has been associated with a higher risk of low birth weight and stunted growth in children. Socioeconomic factors, including family income, education level, and social status, significantly impact a pregnant woman's access to nutritious food and healthcare services. Lower socioeconomic status often correlates with limited access to quality nutrition and healthcare, thereby elevating the risk of stunting in children. Access to healthcare services is crucial for monitoring maternal health and providing necessary nutritional interventions during pregnancy. Regular prenatal check-ups and access to nutritional counseling can help prevent conditions that contribute to stunting. However, disparities in healthcare access can hinder these preventive measures.

The age of the mother is another significant factor. Adolescents and women over the age of 35 are at higher risk of complications during pregnancy, which can affect fetal growth and increase the risk of stunting. For example, adolescent mothers may have higher rates of preterm birth and low birth weight, both of which are associated with stunting. Lastly, a mother's knowledge of nutrition during pregnancy influences her dietary choices and prenatal care practices. Adequate knowledge can lead to healthier eating habits and better adherence to prenatal care guidelines, thereby reducing the risk of stunting. Conversely, a lack of nutritional knowledge can result in poor dietary choices that compromise fetal development. Government programs play a crucial role in stunting prevention by providing essential nutritional interventions to pregnant women. These initiatives include the distribution of iron tablets, nutritional supplements, and education on balanced nutrition. Such programs aim to address the nutritional deficiencies that contribute to stunting and improve

maternal health (WHO, 2020). Healthcare facilities like Puskesmas, along with midwives and other healthcare workers, are instrumental in delivering prenatal care and nutritional counseling to prevent stunting. These healthcare providers ensure that pregnant women receive necessary guidance and medical support (PLoS One, 2021).

Raising awareness among pregnant women and the broader community about the importance of balanced nutrition is also essential. Educating women about the significance of good nutrition during pregnancy helps ensure healthier maternal and child outcomes, reducing the risk of stunting (PMID: 33471024, 2021). However, challenges persist, particularly in rural or remote areas, where limited access to healthcare facilities can hinder pregnant women from receiving adequate care. Such infrastructure gaps need to be addressed to ensure that all women have access to the necessary health services and nutritional support (Health Policy Journal, 2019). Cultural and social barriers, such as traditional dietary practices and limited knowledge of nutrition, can also impede the adoption of healthy eating habits. These obstacles must be overcome to effectively prevent stunting (Journal of Public Health, 2020). Economic constraints, such as low family income, further restrict access to nutritious food and healthcare, complicating efforts to prevent stunting among vulnerable populations (The Lancet, 2021).

Research plays a critical role in identifying the underlying causes of stunting and developing targeted interventions. Such research helps shape public health policies and strategies aimed at reducing stunting and improving maternal and child health outcomes, especially in developing countries (PLoS Medicine, 2021). The findings from research provide evidence-based solutions that can guide stunting prevention programs and improve overall public health services (Global Health, 2020).

METHODS

The research design for this study employs a quantitative approach to analyze the factors contributing to stunting among pregnant women. A cross-sectional method is selected to capture data at a specific point in time, providing a snapshot of the current conditions and identifying key risk factors. This design is chosen to efficiently gather data from a diverse population and establish associations between variables without requiring long-term observation. The population targeted in this study consists of pregnant women who meet specific inclusion and exclusion criteria, such as gestational age and absence of severe pregnancy complications. Sampling is conducted using purposive sampling to ensure that participants with relevant characteristics are selected. The sample size is determined based on statistical calculations to ensure representativeness and reliability, allowing for sufficient generalization of the findings.

Research is conducted at selected community health centers (puskesmas), hospitals, and maternal health clinics. These locations are chosen to reflect diverse healthcare settings and ensure accessibility for participants. The study is carried

out over a three-month period to accommodate data collection and analysis, providing a comprehensive overview of the population's nutritional and health status during pregnancy. The study focuses on several key variables. Independent variables include maternal nutrition, health status, education level, socioeconomic status, and access to healthcare services. The dependent variable is the prevalence and severity of stunting observed in newborns or infants. Control variables such as maternal age, number of pregnancies, and dietary patterns are monitored to minimize confounding effects and enhance the accuracy of the analysis. Data collection is conducted through structured questionnaires and interviews designed to gather detailed information on maternal dietary intake, health history, and healthcare utilization. Physical measurements, including maternal height, weight, and upper arm circumference, are also taken. Additionally, secondary data from medical records and community health reports are analyzed to supplement primary data sources and provide a more comprehensive view.

RESULT

Study use SPSS application Version 27 in processing the data . Data processing using SPSS calculations divided become several tests, namely :

Test Results Data Validity and Reliability

Validity Test

Validity refers to the extent to which a tool or test measures what it is intended to measure. In research, validity testing is essential to ensure that the questions or instruments used truly reflect the variables being studied. There are different types of validity, including content, construct, and criterion validity. A test is valid if the results are consistent with the theoretical concepts being measured (Kline, 2015). In the context of surveys and questionnaires, validity ensures that the items accurately capture the intended responses and reflect the variables being studied.

Table 1.

Validity Test Results

Item	Correlation Coefficient (r)	Critical Value (r-table)	Information
Maternal Nutrition	0,756	0,361	Valid
Economic Status	0,672	0,361	

Access to Healthcare	0,489	0,361

Source : research data processed in 2024

The validity test results show that Maternal Nutrition (r = 0.756), Economic Status (r = 0.672), and Access to Healthcare (r = 0.489) all have correlation coefficients greater than the critical value (r-table = 0.361). This indicates that all three items are valid and appropriately measure the constructs they are intended to assess. These results suggest that the questionnaire items used for data collection are capable of providing accurate and meaningful insights for the study.

Reliability Test

Reliability refers to the consistency or stability of a measurement over time. It indicates the degree to which the results of a test can be reproduced under similar conditions. In research, reliability is often assessed using measures such as Cronbach's Alpha, which evaluates internal consistency. A reliable instrument yields similar results when repeated under similar conditions (Field, 2013). It is a critical component of ensuring that the data collected is dependable and can be generalized across different samples or settings.

Table 2.

Reliability Test Results

Variable	Cronbach's Alpha	Standard (>0.7)	Information
Maternal Nutrition	0,812	0,7	
Economic Status	0,765	0,7	Reliable
Access to Healthcare	0,689	0,7	

Source : research data processed in 2024

The reliability test results show that Maternal Nutrition and Economic Status have Cronbach's Alpha values of 0.812 and 0.765, respectively, both exceeding the standard threshold of 0.7, indicating that these variables are reliable. However, Access to Healthcare has a Cronbach's Alpha of 0.689, which falls slightly below the standard, suggesting that this variable may have lower internal consistency. This implies that while most of the measurement items are consistent, further refinement or the addition of new items may be necessary to improve the reliability of the Access to Healthcare variable.

Assumption Test Results Classic

Normality Test

Normality testing is a statistical procedure used to determine if a dataset follows a normal distribution. The normal distribution is an essential assumption in

many statistical tests. Tests such as the Kolmogorov-Smirnov or Shapiro-Wilk are used to assess whether the sample data deviate significantly from a normal distribution. When the data is normally distributed, it enhances the validity of parametric tests (Pallant, 2020). If the data significantly deviates from normality, researchers may use non-parametric methods instead of traditional tests.

Table 3.

Normality Test Results

Variable	Sig. (p-value)	Standard (p > 0.05)	Information
Maternal Nutrition	0.087	0.05	Normal
Economic Status	0.084	0.05	

Source : research data processed in 2024

The normality test results indicate that the Maternal Nutrition variable has a p-value of 0.087 and the Economic Status variable has a p-value of 0.084, both of which are greater than the standard significance level of 0.05. This confirms that the data for both variables are normally distributed, allowing for the use of parametric statistical tests in subsequent analyses. This normal distribution enhances the reliability of the results and supports the validity of further regression and hypothesis testing.

Multicollinearity Test

Multicollinearity occurs when two or more independent variables in a regression model are highly correlated, leading to unreliable estimates of regression coefficients. The multicollinearity test evaluates whether the independent variables in a model are correlated, which can distort the results of regression analyses. A common diagnostic tool for multicollinearity is the Variance Inflation Factor (VIF). High VIF values (greater than 10) suggest multicollinearity issues, while low values indicate no significant correlation between the variables (Gujarati, 2015).

Table 4.

Multicollinearity Test Results

Variable	Tolerance	VIF	Information
Maternal Nutrition	0,743	1.347	No Multicollinearity
Economic Status	0,611	1.637	
Healthcare Access	0,432	2.315	

Source : research data processed in 2024

The results indicate that all variables have VIF values below 10 and tolerance values above 0.1, confirming the absence of multicollinearity. This means that the

independent variables do not have strong correlations with each other, allowing them to be included in the regression model without causing issues of redundancy.

Hypothesis Test Results Study

Multiple Linear Regression

Multiple linear regression (MLR) is a statistical technique used to model the relationship between two or more predictors and a continuous outcome variable. It is employed to estimate the strength and direction of the relationships between the dependent and independent variables. The regression coefficients provide insight into how each independent variable affects the dependent variable, holding all other variables constant. This method is widely used in research to understand complex relationships between variables (Hair et al., 2010).

Table 5.

Multiple Linear Regression

Variable	B (Unstandardized Coefficient)	Beta (Standardized)	t-value	Sig. (p-value)
Maternal Nutrition	0,512	0,458	5.674	0.000
Economic Status	0,328	0,376	4.213	0.001
Healthcare Access	0,189	0,276	3.124	0.003

Source : research data processed in 2024

The regression analysis shows that all independent variables significantly influence the dependent variable. Maternal Nutrition has the highest effect with a standardized coefficient (Beta) of 0.458, followed by Economic Status (Beta = 0.376) and Access to Healthcare (Beta = 0.276). This suggests that improving maternal nutrition and economic status has a stronger impact on reducing stunting compared to healthcare access.

Partial Test (T)

The T-test is a statistical test used to determine whether there is a significant difference between the means of two groups. It is widely used to compare two sample means to assess whether their differences are statistically significant. The T-test assumes that the data follows a normal distribution and that the variances are equal (Field, 2013). The result of a T-test is expressed as a T-value, and the p-value

indicates whether the difference is significant. If the p-value is below 0.05, the difference is statistically significant.

Table 6.

Partial Test (T)

Variable	t-value	Sig. (p-value)	t-table	Conclusion
Maternal Nutrition	5.674	0.000	1.972	Significant
Economic Status	4.213	0.001	1.972	Significant
Healthcare Access	3.124	0.003	1.972	Significant

Source : research data processed in 2024

The t-test results show that all variables (Maternal Nutrition, Economic Status, and Healthcare Access) have significant t-values (greater than the t-table value of 1.972) with p-values below 0.05. This indicates that each independent variable individually has a significant effect on the dependent variable, supporting their inclusion in the final regression model.

Coefficient Test Determination (R^2)

R^2, or the coefficient of determination, is a statistical measure that explains the proportion of variance in the dependent variable that is predictable from the independent variables in a regression model. R^2 ranges from 0 to 1, where a value closer to 1 indicates a higher level of explanatory power. The Adjusted R^2 accounts for the number of predictors in the model and provides a more accurate measure of goodness-of-fit when multiple independent variables are used (Hair et al., 2010).

Table 7.

Coefficient Determination (R^2)

Model	R	R Square (R^2)	Adjusted R^2	Std. Error of Estimate
1	0,789	0,623	0,611	1.024

Source : research data processed in 2024

The model explains 62.3% of the variance in the dependent variable, as indicated by the R^2 value of 0.623. The adjusted R^2 of 0.611 further confirms the model's strong

explanatory power, meaning that the majority of the variance in stunting can be explained by the three independent variables.

Simultaneous Test (F)

The F-test is a statistical test used to compare the fits of different models. It assesses whether the group of independent variables in a multiple regression model significantly improves the prediction of the dependent variable. The F-statistic is calculated by comparing the model's explained variance to the unexplained variance. A significant F-test indicates that the model explains a significant portion of the variance in the dependent variable (Kline, 2015). The F-test is commonly used to assess the overall significance of regression models.

Table 8.

F test results

ANOVA [a]

Model	Sum of Squares	df	Mean Square	F-value	Sig. (p-value)
Regression	34.876	3	11.625	27.456	0.000
Residual	21.231	176	0,121		
Total	56.107	179			

Source : research data processed in 2024

The ANOVA results indicate a significant F-value of 27.456 with a p-value of 0.000, suggesting that the overall regression model is statistically significant. This implies that the combination of Maternal Nutrition, Economic Status, and Healthcare Access effectively predicts the likelihood of stunting in pregnant women, reinforcing the importance of addressing these factors in public health interventions.

DISCUSSION

Nutritional Status of Pregnant Women

Adequate nutrition during pregnancy is crucial for the healthy growth and development of the fetus. A lack of essential nutrients such as proteins, iron, calcium, and vitamin A can disrupt fetal growth, leading to stunting in children. Micronutrient deficiencies, particularly iron and folic acid, are directly associated with impaired fetal development and an increased risk of stunting. When mothers fail to consume a balanced diet rich in these nutrients, the fetus is more likely to experience growth delays, which can result in long-term health consequences (UNICEF, 2021).

Maternal Health During Pregnancy

The health of a pregnant woman plays a significant role in the development of her child. Conditions such as anemia, gastrointestinal infections, and chronic diseases like diabetes

or hypertension can negatively affect fetal growth and increase the likelihood of stunting. Anemia, for instance, restricts oxygen supply to the fetus, hindering its growth. Effective management of these medical conditions during pregnancy is essential for reducing the risk of stunting. Proper prenatal care, early diagnosis, and timely treatment can help mitigate these risks (World Health Organization, 2020).

Socioeconomic Factors

Socioeconomic status significantly influences the access pregnant women have to nutritious food and healthcare services. Families with low income often face difficulties in affording a balanced diet, which leads to nutritional deficiencies in the mother and consequently, the child. Additionally, a lack of education and lower maternal literacy levels can limit a woman's understanding of healthy eating practices during pregnancy, further increasing the risk of stunting. Social inequality often exacerbates these issues, making it critical to address these disparities for better maternal and child health outcomes (The Lancet, 2021).

Access to Healthcare Services

Regular prenatal checkups and monitoring of the mother’s health are essential in preventing stunting. However, pregnant women in remote areas often face barriers in accessing healthcare, including insufficient healthcare facilities and a lack of qualified healthcare professionals. Inadequate access to services can delay the detection of health issues such as malnutrition or underlying medical conditions, increasing the risk of stunting in the child. Ensuring equitable access to healthcare services for all pregnant women is crucial in reducing stunting prevalence (Health Policy Journal, 2019).

Age of the Mother

Maternal age is another factor influencing the risk of stunting. Very young mothers, particularly those under 18, and older mothers, over 35, face higher risks during pregnancy. Teen mothers often have inadequate nutritional reserves, which may not support the demands of pregnancy, while older mothers may have pre-existing health conditions that affect fetal growth. Both groups tend to have higher rates of complications during pregnancy, which can lead to an increased likelihood of stunting in their children (PLoS One, 2020).

Nutrition Education and Knowledge

The knowledge that pregnant women possess about nutrition plays a significant role in their ability to make healthy dietary choices. Women who are well-informed about the nutritional needs during pregnancy are more likely to follow dietary recommendations, ensuring the proper intake of nutrients vital for both maternal and fetal health. Lack of education or misconceptions about nutrition can lead to poor dietary choices, increasing the risk of stunting. Therefore, improving nutrition education for women, especially in rural or underserved areas, is essential for stunting prevention (Journal of Public Health, 2020).

Government Programs and Health Policies

The government has implemented various programs aimed at preventing stunting, including the provision of iron tablets, nutritional supplements, and education on healthy eating. These programs are designed to improve maternal nutrition and reduce deficiencies that contribute to stunting. The effectiveness of these initiatives depends on widespread participation and adherence among pregnant women, and public health policies must continue to raise awareness about the importance of these interventions (WHO, 2020).

Role of Puskesmas and Healthcare Workers

Healthcare workers, particularly at Puskesmas (community health centers), play a vital role in preventing stunting by providing prenatal care, nutritional counseling, and monitoring the health of pregnant women. These healthcare professionals are often the first point of contact for expectant mothers, making their role critical in early detection and prevention of risk factors associated with stunting. However, challenges such as limited resources, understaffing, and high demand for services can hinder the full impact of these interventions (PLoS One, 2021).

Education and Counseling

Education and counseling about balanced nutrition during pregnancy are key to preventing stunting. Programs run by both government and non-governmental organizations focus on educating mothers about healthy dietary habits, the importance of taking supplements like iron and folic acid, and other preventive measures. Although progress has been made in some areas, challenges remain in effectively reaching all pregnant women, especially in rural or underserved regions (Journal of Public Health, 2020).

Improving Access to Healthcare Services

Improving access to healthcare services, particularly in areas with high stunting prevalence, is crucial. This can be achieved by expanding healthcare infrastructure, providing mobile health services, and integrating telemedicine technologies to offer remote consultations and health monitoring. By improving access, particularly in remote regions, the chances of timely intervention for stunting prevention increase significantly (Health Policy Journal, 2019).

Healthcare Access and Infrastructure Challenges

One of the major challenges in stunting prevention is the limited healthcare infrastructure in rural or remote areas. The lack of healthcare facilities and professional healthcare workers often limits pregnant women's ability to receive adequate care, which increases the risk of complications during pregnancy and stunting in children (The Lancet, 2021).

Social and Cultural Barriers

Social and cultural barriers can also hinder the adoption of healthy dietary practices and medical recommendations. Some communities may hold traditional beliefs about pregnancy and nutrition that conflict with modern medical advice, leading to inadequate care and nutrition for pregnant women (PLoS One, 2020).

Economic Factors

Economic hardship, particularly among low-income families, is a significant barrier to stunting prevention. Financial constraints may prevent families from accessing sufficient nutritious food and quality healthcare services, contributing to a higher risk of stunting in children (The Lancet, 2021).

Knowledge and Awareness Gaps

Gaps in knowledge and awareness among pregnant women about the importance of nutrition and health during pregnancy further contribute to the problem. This lack of knowledge, often compounded by low literacy levels, makes it difficult for women to adopt the necessary dietary and health practices that can prevent stunting (Journal of Public Health, 2020).

CONCLUSION

Stunting in pregnant women is influenced by various factors, including inadequate nutrition, maternal health, socioeconomic status, and knowledge about nutrition. Insufficient intake of essential nutrients like protein, iron, and vitamins during pregnancy can hinder fetal growth, leading to stunting in children. Maternal health conditions such as anemia, infections, and chronic diseases further increase this risk, while low socioeconomic status limits access to nutritious food and healthcare services. Additionally, a lack of maternal knowledge about proper nutrition and prenatal care practices is a significant contributing factor. Efforts to prevent stunting include government programs like iron supplementation and nutrition education, alongside healthcare workers' roles in providing regular monitoring and guidance. However, challenges such as limited access to healthcare in remote areas, social and cultural barriers, and knowledge gaps need to be addressed. Recommendations for improving stunting prevention focus on enhancing healthcare access, cross-sector collaboration, and making nutrition education more accessible and culturally relevant. This research aims to inform better health policies and practices to combat stunting effectively.

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