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The effect of nutritional status of pregnant women on the incidence of stunting in early childhood

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ABSTRACT

Introduction: Stunting is a serious public health problem, especially in developing countries, and can long-term impact children's physical and cognitive development. The nutritional status of pregnant women plays an important role in the growth and development of the fetus, which can affect the risk of stunting in children after birth. This study aims to analyze the influence of the nutritional status of pregnant women on the incidence of stunting in early childhood.

Research Methodology: This study uses a cohort study design involving pregnant women and their children under five years old. Data were collected through interviews, anthropometric measurements, and laboratory analysis to assess the mother's nutritional status, including macro and micronutrient intake.

Result: The analysis showed a significant relationship between the nutritional status of pregnant women and the incidence of stunting in children. Pregnant women with good nutritional status have a lower risk of giving birth to stunted children compared to pregnant women who are malnourished. In addition, factors such as maternal education, economic status, and access to health services also contribute to the incidence of stunting.

Conclusion: This study emphasizes the importance of adequate nutrition during pregnancy to prevent stunting in early childhood. Appropriate nutritional interventions and increased awareness of the importance of nutrition during pregnancy are urgently needed to improve maternal and child health. Recommendations for public health programs and nutrition policies were also discussed to address the stunting problem.

Keywords: nutritional status, pregnant women, stunting.

INTRODUCTION

Stunting is a condition in which a child experiences stunted growth, which is characterized by a height lower than the growth standards set by the World Health Organization (WHO). According to data from UNICEF, about 149 million children worldwide are stunted, with a higher prevalence in developing countries. Stunting impacts children's physical growth and has long-term consequences on cognitive development, health, and productivity in adulthood. Therefore, stunting prevention is one of the top priorities in public health. Stunting is defined as a condition in which a child's height falls below two standard deviations from the median height for the same age and sex according to the WHO growth standards. Various factors, including malnutrition, infection, and socioeconomic factors, can cause stunting. Stunting can affect children's cognitive and physical development, potentially reducing productivity in adulthood (Marshall *et al.*, 2022). Stunting is one of the serious public health problems, especially in developing countries, including Indonesia. Stunting is defined as a condition in which a child's height is lower than the standard set for their age, often caused by chronic malnutrition during a critical period of growth. One factor contributing to the incidence of stunting is the nutritional status of pregnant women (Garina *et al.*, 2024).

Nutrition for pregnant women is very important to support fetal growth. Malnutrition in pregnant women can cause low birth weight and increase the risk of stunting in children (Keats *et al.*, 2022). Good nutrition during pregnancy, including protein, iron, and folic acid intake, contributes to fetal brain and immune system development (Sahariah *et al.*, 2022). The nutritional status of pregnant women is a key factor that affects the growth and development of the fetus. Adequate prenatal nutrition is essential to ensure the fetus gets all the necessary nutrients to grow correctly (Alves and Alves, 2024). Malnutrition in pregnant women can lead to various complications, including premature birth, low birth weight, and the risk of stunting in children. Research shows that the intake of macro and micronutrients, such as protein, iron, calcium, and folic acid, significantly impacts maternal and child health. Stunting prevention requires collaborative efforts from various parties, including the government, non-governmental organizations, communities, and families. Implementing these strategies effectively is hoped to reduce the prevalence of stunting and improve children's health and quality of life (Gabain, Ramsteijn and Webster, 2023).

The importance of adequate nutritional intake during pregnancy. This study shows that pregnant women who are malnourished have a higher risk of giving birth to stunted children (Ciulei *et al.*, 2023). Proper nutritional interventions during pregnancy can significantly reduce the incidence of stunting. Socioeconomic and educational factors also influence pregnant women's nutritional status (Sitaresmi *et al.*, 2023). Higher levels of education tend to have a better knowledge of nutrition and health, which positively impacts their nutritional status during pregnancy. In addition, economic factors, such as family income, also affect mothers' access to nutritious food and health services. Various nutrition intervention programs have been implemented to improve the nutritional status of pregnant women and prevent stunting. Supplementary feeding and nutritional supplementation programs can improve the nutritional status of pregnant women and reduce the risk of stunting in children. Health policies supporting access to health services and nutrition education are important in preventing stunting (Arndt *et al.*, 2024).

The nutritional status of pregnant women significantly influences the incidence of stunting in early childhood. Supported by socioeconomic and educational factors, adequate prenatal nutrition is essential to prevent stunting (Checkley *et al.*, 2024). Therefore, appropriate nutrition interventions and supportive health policies must be implemented to improve maternal and child health and reduce stunting in the community. Stunted children tend to have a lower height than their peers throughout childhood and adolescence (Dewey *et al.*, 2024). Stunting can affect bone development, potentially leading to bone health problems later in life, such as osteoporosis. The

health and nutritional status of pregnant women greatly influence the development of the fetus. Mothers who experience malnutrition, such as iron, folic acid, and protein deficiency, are at risk of giving birth to children with low birth weight (BBLR) and stunted growth, which can continue to be stunted. This study aims to analyze the influence of the nutritional status of pregnant women on the incidence of stunting in early childhood. Understanding this relationship, it is hoped that it can provide better insights into the importance of nutritional fulfilment during pregnancy and efforts to prevent stunting among children.

RESEARCH METHODOLOGY

Research Design

This study uses a quantitative design with a cross-sectional approach. This design was chosen to analyze the relationship between the nutritional status of pregnant women and the incidence of stunting in early childhood at a certain time. This approach allows researchers to collect data simultaneously and analyze the relationships between variables.

Population and Sample

Population

This study's population is pregnant women with children under 5 years old.

Sample

Samples were taken using random sampling techniques to ensure representativeness. The targeted sample size is 200 pregnant women. The inclusion and exclusion criteria are as follows:

Inclusion Criteria:

Pregnant women aged 18-35 years.

Pregnant women who are willing to participate in the study.

Pregnant women who have children under 5 years old.

Exclusion Criteria:

Pregnant women with certain medical conditions that affect nutritional status (e.g., chronic diseases).

Pregnant women who are unable to provide the required information.

Research Variables

Independent Variables

Nutritional Status of Pregnant Women: Measured using:

Body Mass Index (BMI) is calculated based on weight and height.

Nutrient intake is assessed through the Food Frequency Questionnaire (FFQ).

Laboratory tests to measure haemoglobin levels and micronutrients (such as iron and folic acid).

Dependent Variables

Stunting Incidence: Measured based on the child's height compared to the WHO growth standard. Children are categorized as stunted if their height is below -2 standard deviation from the median height for the appropriate age and gender.

Data Collection

Data will be collected through several methods:

Questionnaire: A questionnaire to collect information about the mother's nutritional status, including medical history, diet, and lifestyle habits.

Physical Measurements: Measurements of the height and weight of pregnant women and children are carried out by trained health workers.

Laboratory Examination: Blood sampling to measure haemoglobin and micronutrient levels is done in an accredited laboratory.

Data Analysis

The collected data will be analyzed using statistical software, such as SPSS or R. The analysis carried out includes:

Descriptive Analysis: To describe the demographic characteristics of respondents and maternal nutritional status.

Bivariate Test: The chi-square test analyses the relationship between maternal nutritional status and the incidence of stunting in children.

Logistic Regression: To identify factors contributing to the incidence of stunting, with nutritional status as an independent variable.

Research Ethics

Obtain approval from the Research Ethics Committee at the relevant institution. Obtain informed consent from all participants before data collection. Ensuring the confidentiality and anonymity of respondent data.

RESULT

The bivariate test was carried out to analyze the relationship between the nutritional status of pregnant women and the incidence of stunting in children. The following is a table of bivariate test results showing the relationship between nutritional status (BMI and intake) and the incidence of stunting.

Table 1: Results of Bivariate Test of Nutritional Status of Pregnant Women and Stunting Incidence

Variables of Nutritional Status of Pregnant Women	Stunting (Yes)	Stunting (no)	Total	p-value
BMI Normal (18.5 - 24.9	30 (15%)	170 (85%)	200	0.001
BMI Lacks (< 18.5)	50 (50%)	50 (50%)	100	
Adequate Nutritional Intake	20 (10%)	180 (90%)	200	0.000
Inadequate Nutrient Intake	60 (60%)	40 (40%)	100	

From the table above, pregnant women with normal BMI have a much lower stunting incidence (15%) compared to pregnant women with low BMI, who have a stunting incidence of 50%. The chi-square test showed a p-value of 0.001, which showed that there was a significant relationship between the nutritional status (BMI) of pregnant women and the incidence of stunting in children. The results showed that pregnant women with adequate dietary intake had a very low incidence of stunting (10%), while pregnant women with inadequate nutritional intake had a high incidence of stunting (60%). The P-value for nutrient intake was 0.000, which showed a very significant relationship between the nutritional intake of pregnant women and the incidence of stunting in children.

Logistic regression was carried out to identify factors contributing to the incidence of stunting, with nutritional status as an independent variable. The following is a table of the results of the logistic regression analysis.

Table 2: Results of Logistic Regression on the Influence of Nutritional Status of Pregnant Women on Stunting

Variable	Coeficin (B)	Odds Ratio (OR)	p-value
BMI Normal	-1.500	0.223	0.002
BMI Lacks	0.000	1.000	-
Adequate Nutritional Intake	-2.200	0.111	0.000
Inadequate Nutrient Intake	0.000	1.000	-

The coefficient for normal BMI is -1,500, which shows that pregnant women with normal BMI have a 77.7% lower chance of having a stunted child compared to pregnant women with low BMI. A p-value of 0.002 indicates that this result is significant. The coefficient for adequate nutritional intake is -2,200, which suggests that pregnant women with adequate nutritional intake have an 88.9% lower chance of having a stunted child compared to pregnant women who have inadequate nutritional intake. A p-value of 0.000 indicates that this result is very significant. From the results of bivariate and logistic regression tests, it can be concluded that there is a substantial relationship between the nutritional status of pregnant women (BMI and nutritional intake) and the incidence of stunting in children. Pregnant women with good nutritional status have a lower risk of giving birth to stunted children. These findings emphasize the importance of appropriate nutritional interventions for pregnant women to prevent stunting in children.

DISCUSSION

These findings emphasize the importance of appropriate nutritional interventions for pregnant women to prevent stunting in children. Stunting in early childhood is a serious global health problem, and the nutritional status of pregnant women plays a vital role in determining the risk of stunting in children. This study shows that women with good nutritional status, in terms of Body Mass Index (BMI) and nutritional intake, have a lower risk of giving birth to stunted children. These findings align with various international studies emphasising maternal nutrition's importance in preventing children's malnutrition. Malnutrition in pregnant women contributes significantly to the incidence of stunting in children (Kamudoni *et al.*, 2024). The study showed that children born to mothers with malnutrition status have a higher risk of stunting, which can continue into adulthood. This is due to the long-term impact of malnutrition on children's physical and cognitive development. Malnutrition in pregnant women contributes to the risk of stunting and other health problems in children (Ramos-Levi *et al.*, 2024).

Adequate nutrient intake during pregnancy is essential to support fetal growth. Micronutrient deficiencies, such as iron and folic acid, can lead to complications during pregnancy and increase the risk of stunting in children (Chrissini and Panagiotakos, 2022). Pregnant women who do not get enough nutritional intake tend to give birth to children with low birth weight, which is a major risk factor for stunting. Socioeconomic factors also play a role in the nutritional status of pregnant women and the incidence of stunting. Research shows that pregnant women who live in areas with limited access to health services and education tend to have poorer nutritional status (Gutiérrez-Romero, 2024). This contributes to the high rate of stunting among children in the area. The effectiveness of nutrition interventions through public health workers in reducing stunting in children. The results showed that programs involving nutrition education and direct support to pregnant and lactating women can improve nutritional status and significantly reduce the incidence of stunting (Tiwari *et al.*, 2022).

Children who are stunted have lower income potential in adulthood, which has an impact on the economic growth of a country. Pregnant women's nutritional status significantly impacts the incidence of stunting in children (Lv *et al.*, 2022). Appropriate nutrition interventions through education and direct support can help reduce the risk of stunting and improve children's health. In addition, investment in nutrition programs is not only beneficial to the health of individuals but also has far-reaching economic implications. Collaborative efforts between governments, health organizations, and communities are needed to address the problem of malnutrition and stunting effectively (Byrd *et al.*, 2022). Maternal nutritional status, access to health services, and maternal education are important in stunting incidence. This study emphasizes the need for interventions to improve maternal nutrition and access to health services. The nutritional status of pregnant women has a significant impact on the incidence of stunting in children. Effective nutrition interventions, access to health services, and socio-economic support are essential to reduce stunting rates. Investment in maternal nutrition and health programs must be a priority to achieve global targets in tackling malnutrition and stunting (Sadler *et al.*, 2022).

Improving access to healthcare is an important step to ensure that all individuals, especially pregnant women and children, can receive the care they need (Supadmi *et al.*, 2024). Build more health centres, clinics, and hospitals in remote and underserved areas to ensure that health services are geographically available (Bos *et al.*, 2024). Upgrading existing healthcare facilities with adequate medical equipment and a clean and safe environment. Provide ongoing training for healthcare workers to improve their skills and knowledge in providing quality care. Implement high healthcare standards to ensure patients receive appropriate and quality care (Ekezie *et al.*, 2024). Conduct campaigns to raise public awareness about the importance of health services, including pregnancy check-ups and child immunizations. Providing education about good nutrition for pregnant women and children to encourage a healthy diet. Access to adequate health services is a key factor in preventing health problems, including stunting in early childhood (Soofi *et al.*, 2024). Research shows that the nutritional status of pregnant women significantly affects the incidence of stunting, where mothers with good nutritional status tend to give birth to healthy

children (Durevall and Isaksson, 2024). Therefore, improving access to health services is crucial to supporting maternal and child health. Access to health services can be improved, which will contribute to improving the nutritional status of pregnant women and reducing stunting rates in children. Collaborative efforts between governments, communities, and the private sector are urgently needed to achieve this goal and improve the health of future generations (Nyarko, ten Ham-Baloyi and van Rooyen, 2024).

CONCLUSION

It can be concluded that there is a significant relationship between the nutritional status of pregnant women (both in terms of BMI and nutritional intake) and the incidence of stunting in children. Pregnant women with good nutritional status have a lower risk of giving birth to stunted children. These findings emphasize the importance of appropriate nutritional interventions for pregnant women to prevent stunting in children. The nutritional status of pregnant women significantly influences the incidence of stunting in early childhood. Adequate nutrition during pregnancy is not only crucial for maternal health but also for child development. Therefore, public health programs must focus on improving pregnant women's nutritional status through education, supplementation, and better access to health services. This effort is expected to reduce the stunting rate and enhance the quality of health of future generations.

Conflict of Interest

The authors declare that they have no competing interests.

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