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The Effects of Nutrition on the Health and Development of the Fetus in Pregnant Women

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ABSTRACT

Proper nutrition during pregnancy plays a crucial role in supporting fetal development and maintaining the mother's health. However, there is still a knowledge gap among pregnant women, especially in rural and remote areas, regarding the importance of nutritional intake during pregnancy. This study is aimed at comprehensively analyzing the impact of maternal nutritional intake on maternal health and growth. Methods. The study involves 150 purposively selected pregnant women who visited Puskesmas, health clinics, or maternal and child hospitals in Padang City during the 6-month period of the study. The data collection technique is done by interviewing pregnant women using questionnaires related to demographics and diet. The collected data will be analysed using statistical methods, descriptive test to see the general description of the characteristics of pregnant women and their nutritional intake, and chi square test to analyse the relationship between nutritional intake and infant birth weight (LBW). Results. Most pregnant women had a moderate level of knowledge about nutrition (46.7%), but there were 40% who had low knowledge. There was a significant relationship between pregnant women's knowledge level about nutrition and nutrient intake and its impact on LBW. Conclusions. Pregnant women have a low knowledge level regarding nutrition, which in turn affects foetal health, growth, and quality of life. With these measures, it is hoped that the risk of pregnancy complications due to malnutrition can be minimised and the quality of maternal and infant health can be significantly improved.

Keywords : *Nutritional Intake of Pregnant Women, Fetal Growth, Baby Health*

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INTRODUCTION

Pregnancy is an important period in a woman's life that requires special attention to nutritional intake. Proper nutrition during pregnancy plays a crucial role in supporting fetal development and maintaining the mother's health. (Setiaputri, 2016). Optimal nutrition affects the formation of body tissue, brain development, the immune system, and the formation of fetal organs. Malnutrition during pregnancy can cause various complications, such as low birth weight (LBW), premature birth, and birth defects (Nurhayati, 2023). Conversely, excessive or unbalanced nutritional intake can also increase the risk of complications such as obesity in mothers and babies. (Alodokter, 2016; Pamungkas, 2024).

According to data from the World Health Organization (WHO), around 20 million babies worldwide are born with low birth weight each year, with the main cause being maternal malnutrition (World Health Organization (WHO), 2023). In Indonesia, the results of the 2022 Indonesian Demographic and Health Survey (SDKI) showed that the prevalence of low birth weight reached 11%, which is one indicator of the high rate of malnutrition in pregnant women (Hadya, 2023; Ministry of Health, 2023). Children with BLR have a high risk of stunting and stunted physical growth. Stunting is also often correlated with a higher risk of infectious diseases during childhood (Misago et al., 2021). Research in Indonesia shows that children with BLR are 7.4 times more likely to be stunted than children with normal birth weight (R. Labatjo et al., 2023).

Macronutrients, such as carbohydrates, protein, and fat, and micronutrients, such as iron, folate, calcium, and vitamin D, play an important role in fetal development. (Ardiaria, 2017). Protein, for example, is needed for fetal tissue growth and increased maternal blood volume, while iron plays a role in preventing anemia that is often experienced by pregnant women. Folate deficiency has been shown to be associated with the risk of neural tube defects in the fetus. Therefore, consuming foods rich in nutrients, including plant and animal sources, is essential during pregnancy (Setiani, 2024).

However, there is still a knowledge gap among pregnant women, especially in rural and remote areas, regarding the importance of nutrition during pregnancy. Limited access to information and nutritious food leads to high rates of malnutrition among pregnant women in some areas. This is exacerbated by socioeconomic factors that limit the ability of pregnant women to meet their nutritional needs. Yet, simple interventions such as iron and folate supplementation, and education about healthy eating patterns, have been shown to be effective in improving pregnancy outcomes.

This study was conducted to comprehensively analyze the impact of maternal nutritional intake on fetal health and growth. With the results of this study, it is hoped that it can increase awareness of the importance of nutrition during pregnancy and support more effective nutritional intervention programs, especially in areas vulnerable to malnutrition.

METHODS

This study would use an analytical observational design with a case-control approach. This approach was chosen because it allows the collection of data related to maternal nutritional intake and its impact on fetal health and growth at a certain point in time. This design will help determine the role of maternal macronutrient intake with the occurrence of the effects studied by comparing exposure to risk factors (*low birth weight*) in the case group and the control group.

The population in this study were pregnant women who visited Puskesmas, health clinics, or maternal and child hospitals in Padang City during the 6-month period of the study. Inclusion criteria included pregnant women in their second or third trimester, willing to participate in the study, and not having chronic diseases or severe pregnancy complications. Exclusion criteria were mothers who had diseases or health problems that directly affected nutritional intake. The study involves 150 purposively selected samples according to the predetermined inclusion and exclusion criteria.

The purposive sampling technique will be used to select samples in accordance with the inclusion and exclusion criteria. The sample size was determined using the Slovin formula or based on the sample calculation formula in population health research of pregnant women, with a confidence level of 95%. This research instrument using a structured questionnaire will be used to collect demographic, socioeconomic, and dietary information of pregnant women. The questionnaire will also measure the mother's level of knowledge regarding nutrition during pregnancy. 24-Hour Food Recall: This instrument will be used to determine the type and amount of food consumed by pregnant women in the last 24 hours, as an indicator of daily nutritional intake. The data collection technique is done by interviewing pregnant women using questionnaires related to demographics and diet and medical examinations regarding fetal growth and maternal health during pregnancy will be collected from medical records or examinations.

The collected data will be analysed using statistical methods, descriptive test to see the general description of the characteristics of pregnant women and their nutritional intake, chi square test to analyse the relationship between nutritional intake with fetal health and growth.

RESULTS

The following is an example of research results on gaps in pregnant women's knowledge of nutrition during pregnancy. These results include univariate and bivariate analyses based on the association of knowledge level with nutritional intake as well as infant birth weight (LBW).

1. Univariate Results

Table 1. Pregnant women's knowledge and nutritional intake

Variables	Category	Frequency (n)	Percentage (%)
Level of Knowledge about Nutrition	Low	60	40.0
	Medium	70	46.7
	High	20	13.3
Carbohydrate Intake	<200 grams/day	50	33.3
	≥200 grams/day	100	66.7
Protein Intake	<70 grams/day	50	33.3
	≥70 grams/day	100	66.7
Infant Birth Weight (LBW)	LBW (<2.5kg)	50	33.3
	Normal (≥2.5kg)	100	66.7

From Table 1 regarding pregnant women's knowledge and nutritional intake, most pregnant women had a moderate level of knowledge about nutrition (46.7%), but there were 40% who had low knowledge. Adequate carbohydrate and protein intake ((≥200 grams/day for carbohydrate and ≥70 grams/day for protein) was found in the majority of respondents (66.7%). A total of 33.3% of babies were born with low birth weight (LBW), while 66.7% were born with normal weight.

2. Bivariate Results

Relationship between Knowledge Level and Nutritional Intake

Table 2: Knowledge of pregnant women with nutritional intake

Knowledge	Carbohydrate Intake		Protein Intake	
	<200 grams/day (n/%)	≥200 grams/day (n/%)	<70 grams/day (n/%)	≥70 grams/day (n/%)
Low	30 (50%)	30 (50%)	35 (58.3%)	25 (41.7%)
Medium	20 (28.6%)	50 (71.4%)	15 (21.4%)	55 (78.6%)
High	0 (0%)	20 (100%)	0 (0%)	20 (100%)
p-value	**0.003**		**0.001**	

Based on Table 2 regarding the relationship between knowledge level and nutritional intake, it is known that pregnant women with low knowledge level tend to have insufficient nutritional intake (carbohydrates <200 grams/day as much as 50% and protein <70 grams/day as much as 58.3%). This relationship was statistically significant ($p < 0.05$).

Table 3. Relationship between Knowledge Level and Infant Birth Weight

Knowledge Variable	LBW (<2.5kg) (n/%)	Normal (≥2.5 kg) (n/%)	p-value
Low	40 (66.7%)	20 (33.3%)	
Medium	10 (14.3%)	60 (85.7%)	<0.001
High	0 (0%)	20 (100%)	

Table 3 shows the relationship between knowledge level and infant birth weight. Most mothers with low knowledge gave birth to babies with bblr (66.7%), while mothers with high knowledge all gave birth to babies with normal weight (100%). This relationship is highly statistically significant ($p < 0.001$).

This study shows that pregnant women's level of knowledge about nutrition affects their nutrient intake and indirectly impacts infant birth weight. Knowledge-based educational interventions are important to improve pregnancy quality and infant health.

DISCUSSION

This study showed a significant relationship between pregnant women's level of knowledge about nutrition and nutrient intake and its impact on infant birth weight (LBW). The data obtained supports the hypothesis that low levels of pregnant women's knowledge about nutrition contribute to insufficient carbohydrate and protein intake, which in turn affects foetal health and growth.

1. The Role of Macro and Micro Nutrients

Adequate carbohydrate and protein intake during pregnancy is essential to support foetal tissue growth, organ formation, and increase maternal blood volume. Nutritional deficiencies contribute to impaired development of the child's nervous system, including motor and cognitive functions, as an effect of the lack of protein that supports brain growth (Papotot et al., 2021). Carbohydrates are important as the main source of energy for the body and brain. Its deficiency can inhibit blood glucose regulation, which plays a vital role in foetal metabolism (Valentina et al., 2024).

Pearl et al. (2023): This study analysed the provision of blood supplementation tablets to address anaemia in pregnant women, demonstrating the importance of micronutrient supplementation to prevent pregnancy complications and support fetal growth (Mutiara et al., 2023).

The study data supports this theory, where the majority of mothers with low knowledge had protein intake <70 grams/day (58.3%) and carbohydrate intake <200 grams/day (50%), and gave birth to LBW babies by 66.7%. In contrast, mothers with high knowledge and adequate diet gave birth to normal weight babies.

Researchers assume that nutritional deficiencies during pregnancy, such as low intake of protein (<70 grams/day) and carbohydrates (<200 grams/day), will affect fetal organ development

and body weight. Inadequate nutrient intake leads to the risk of complications, such as LBW, due to insufficient energy requirements and building blocks for foetal body tissues.

We also assume that government policies that support access to nutritious food, such as healthy food subsidies and food aid programmes, can significantly reduce the prevalence of LBW. These programmes are believed to be especially effective in areas with limited food resources. Researchers assume that malnutrition during pregnancy not only impacts the birth weight of the baby, but also has long-term consequences, such as stunting and impaired cognitive development. Therefore, addressing maternal malnutrition is not only important for a successful pregnancy, but also for the future health of the child.

2. Influence of Knowledge on Diet

Nutritional knowledge is an important determinant in shaping the eating behaviour of pregnant women. As stated by the Health Belief Model theory, individuals with high levels of knowledge are more likely to take preventive actions, such as improving diet to support a healthy pregnancy (Alfa Berhimpong et al., 2020). Bayu Darmayudha et al. (2022), this study addressed the relationship of knowledge, attitude, and behaviour of health workers and university students about Hepatitis B with preventive measures. It was found that despite positive attitudes, lack of knowledge can hinder effective preventive measures (Darmayudha et al., 2022).

We assumed that the level of knowledge of pregnant women directly affects their diet during pregnancy. Mothers with low knowledge are less likely to understand the importance of macronutrient (*carbohydrate and protein*) and micronutrient (*iron and folate*) intake and are therefore more at risk of nutritional deficiencies. In contrast, mothers with high knowledge tend to have a more balanced diet that meets the physiological needs of pregnancy. Researchers assumed that socioeconomic limitations and access to information in some areas may worsen the level of nutritional knowledge of pregnant women. These factors affect the ability of pregnant women to consume nutritious food, contributing to the high rate of low birth weight babies.

The researchers suggest that community-based educational interventions can improve pregnant women's knowledge about the importance of nutrition during pregnancy. This increased knowledge is believed to improve diet and ultimately have a positive impact on maternal and foetal health. This can be done through an approach that involves health workers, such as midwives and posyandu cadres.

CONCLUSIONS

This study concluded that the level of knowledge of pregnant women about nutrition has a significant influence on nutritional intake and LBW. Mothers with a low level of knowledge tend to have a diet that does not meet the needs of pregnancy, especially in carbohydrate and protein intake, which has an impact on the high prevalence of LBW. In contrast, mothers with a high level of knowledge exhibit a better diet, resulting in babies with normal birth weight. In addition, socioeconomic factors, including limited access to information and nutritious food, contribute to

poor nutritional fulfilment during pregnancy, especially in remote areas. This study highlights the need for structured and community-based nutrition education, policy interventions to improve access to healthy food, and further research to enrich understanding of the determinants of maternal and foetal health. With these measures, it is hoped that the risk of pregnancy complications due to malnutrition can be minimised and the quality of maternal and infant health can be significantly improved.

REFERENCES

Alfa Berhimpong, M. J., Maynard Rattu, A. J., & Pertiwi, J. M. (2020). Analysis of the Implementation of Physical Activity Based on the Health Belief Model by Health Workers at Puskesmas. *Journal of Public Health and Community Medicine*, *1*(4).

Alodokter. (2016, March 3). Pregnant Women, These Are the Risks of Being Overweight During Pregnancy. Alodokter. https://www.alodokter.com/risiko-yang-kamu-hadapi-jika-kelebihan-berat-badan-saat-hamil

Alodokter. (2024, August 17). This is the Impact of Malnutrition During Pregnancy. Alodokter. https://www.alodokter.com/ini-dampak-gizi-buruk-pada-masa-kehamilan

Ardiaria, M. (2017). Micronutrient Intake and Anemia Incidence in Pregnant Women in Semarang City. JNH (Journal of Nutrition and Health), 5(1).

Cristy Pane, MD (2018, August 21). Come on, Fulfill the 7 Types of Nutrition for Pregnant Women Below. Alodokter. https://www.alodokter.com/jangan-cemas-kita-bahas-nutrisi-ibu-hamil-di-sini

Cristy Pane, MD (2019, December 10). Don't Take It Lightly, These Are the Impacts of Malnutrition During Pregnancy. Alodokter. https://www.alodokter.com/jangan-disepelekan-ini-dampak-kurang-gizi-saat-hamil

Darmayudha, B., Devi, A., & Noor, E. (2022). Scoping Review: Relationship between Knowledge, Attitude, and Behaviour of Students and Health Workers about Hepatitis B with Preventive Measures. *Bandung Conference Series Medical Science*, *2*(1). https://doi.org/10.29313/bcsms.v2i1.719

FK UI. (2019, April 10). Characteristics of Pregnant Women with Malnutrition that Need to be Watched Out for – Health Info FKUI. Ui.ac.id. https://fk.ui.ac.id/infosehat/ciri-ciri-ibu-hamil-kurang-gizi-yang-perlu-diwaspadai/

Hadya, RA (2023). Incidence of Low Birth Weight Seen from the Anemia Condition of Pregnant Women at Wulan Windi General Hospital in 2022. Journal of Health and Medical Science, 2(2).

Ministry of Health. (2023, December 16). Efforts to Prevent Premature Birth. Healthy My Country. https://sehatnegeriku.kemkes.go.id/baca/rilis-media/20231216/4544469/upaya-pencegahan-bayi-lahir-prematur/

Misago, N., Habonimana, D., Ouedraogo, L., & Bitangumutwenzi, P. (2021). Prevalence and Determinants of Low Birth Weightin Burundi: An Investigation from The

NationalDemographic and Health Survey. *Progressing Aspects in Pediatrics and Neonatology*, *3*(2), 232–238. https://doi.org/10.32474/papn.2021.03.000157

Mutiara, E., Manalu, L., Klise, R. E., Aginta, S., Aini, F., & Rusmalawaty. (2023). Analysis of Blood Addition Tablet Administration in Pregnant Women at Puskesmas: A Literature Review Study. Indonesian Public Health Media, 22(2), 125–135. https://doi.org/10.14710/mkmi.22.2.125-135

Nurhayati. (2023). The Importance of Nutrition for Pregnant Women. Kemkes.go.id. https://yankes.kemkes.go.id/view_artikel/2827/pentingnya-nutrisi-untuk-ibu-hamil

Papotot, G. S., Rompies, R., & Salendu, P. M. (2021). Pengaruh Kekurangan Nutrisi Terhadap Perkembangan Sistem Saraf Anak. *Jurnal Biomedik:JBM*, *13*(3), 266. https://doi.org/10.35790/jbm.13.3.2021.31830

Pamungkas, NS (2024). Obesity During Pregnancy, Normal or Not? Rsabhk.co.id. https://www.rsabhk.co.id/artikel-kesehatan/obesitas-selama-hamil-wajar-atau-tidak

Putra, DF (2024, March 6). Nutritional Needs of Pregnant Women and Fetuses, What Nutrients Are Needed? | Pondok Indah Hospital. Www.rspondokindah.co.id. https://www.rspondokindah.co.id/id/news/kebutuhan-gizi-ibu-hamil-dan-janin-nutrisi-apa-saja-yang-dibutuhkan

Rieke, N., Mahmudiono, T., & Rifqi, MA (2022). Factors Associated with the Incidence of Low Birth Weight (LBW) in Indonesia Based on Secondary Data Analysis of the 2017 SDKI. Media Gizi Kesmas, 11(2), 451–457. https://doi.org/10.20473/mgk.v11i2.2022.451-457

R. Labatjo, Y. Tagoli, Kadir, S., M. Goi, & N. Arwanti. (2023). Stunting: what are the potential risk factors? *Food Research*, *7*(Supplementary 5), 59–64. https://doi.org/10.26656/fr.2017.7(s5).8

Setiani, AI (2024, March 23). 6 List of Foods as Natural Sources of Folic Acid that are Good for Pregnant Women and Adults. 6 List of Foods as Natural Sources of Folic Acid that are Good for Pregnant Women and Adults, Check it Out! - Jawa Pos; Jawa Pos. https://www.jawapos.com/kesehatan/014474335/6-daftar-makanan-sumber-asam-folat-alami-yang-baik-dikonsumsi-ibu-hamil-dan-orang-dewasa-simak

Setiaputri, KA (2016, November 11). 13 Types of Nutrition for Pregnant Women that Must be Fulfilled for 9 Months. Hello Sehat. https://hellosehat.com/kehamilan/kandungan/nutrisi-zat-gizi-ibu-hamil/

Valentina, N. P., Rusdi, B., & Farendina Suarantika. (2024). Review Article: Pharmacological Activity of Carbohydrate Compounds for Health. *Bandung Conference Series Pharmacy*, *4*(2), 963–968. https://doi.org/10.29313/bcsp.v4i2.15208

World Health Organization (WHO). (2023, May 10). *Preterm birth*. Preterm Birth; World Health Organization: WHO. https://www.who.int/news-room/fact-sheets/detail/preterm-birth