

The Relationship Between Diet and Nutritional Status of Pregnant Women in the Third Trimester

Yeni Friska Sinulingga*, Endang Sihaloho, Evlindari Sentani Daulay, Ristiani, Titin Sundari Nazara

Universitas Wirahusada Medan

* Email Correspondence: sinulinggayeni5@gmail.com

ARTICLE INFO

Article History:

Submitted 13-05-2026

Received 03-06-2026

Published 04-06-2026

Keywords:

Diet;

Nutritional status;

Third trimester pregnant women

ABSTRACT

The nutritional status of pregnant women is an important factor affecting maternal health and fetal growth. One factor that plays a role in determining nutritional status during pregnancy is diet. An unbalanced diet can increase the risk of nutritional disorders in pregnant women, especially in the third trimester when nutritional needs increase. This study aims to analyze the relationship between diet and the nutritional status of pregnant women in the third trimester. This study used an observational analytical design with a cross-sectional approach. The study was conducted at the Helen Tarigan Clinic in January 2026. The study sample consisted of 43 pregnant women in the third trimester selected using a total sampling technique. Dietary data were obtained through questionnaires, while nutritional status was assessed based on anthropometric measurements. Data were analyzed univariately and bivariately using the Chi-Square test with a significance level of 95%. Most respondents were aged 20–35 years (74.4%), had a high school education (46.5%), worked as housewives (60.5%), and were multigravida (58.1%). Pregnant women with good dietary habits were more likely to have good nutritional status (48.8%), while those with poor dietary habits were more likely to have poor nutritional status (25.6%). Chi-square test results showed a significant relationship between dietary habits and nutritional status of pregnant women in the third trimester ($p=0.003$). Dietary habits were significantly associated with nutritional status of pregnant women in the third trimester. Implementing a good dietary habit can help maintain optimal nutritional status during pregnancy.

INTRODUCTION

Pregnancy is an anabolic state with increased nutritional needs to support the growth and metabolism of maternal, placental, and fetal tissues, while also preparing for lactation. During pregnancy, various physiological adaptations occur, such as hormonal changes, increased plasma volume, and changes in energy, protein, and micronutrient metabolism, all aimed at maintaining maternal homeostasis and supporting fetal growth and development

(Perumal & Gernand, 2025). The need for macronutrients (energy and protein) and essential micronutrients such as folic acid, iron, calcium, iodine, and omega-3 fatty acids increases to support new tissue formation and vital fetal functions. Good maternal nutritional status before and during pregnancy plays a significant role in birth weight, preventing premature birth, obstetric complications, and the risk of metabolic diseases later in life in children. Therefore, monitoring and fulfilling maternal nutritional needs requires special attention throughout pregnancy (Mousa et al., 2019).

The nutritional status of pregnant women is a state of health that reflects the balance between nutrient intake and the body's increased needs during pregnancy. This can be assessed through BMI, mid-upper arm circumference, and weight gain (Febiana et al., 2024). Good nutritional status plays a crucial role in supporting fetal growth, preventing chronic energy deficiency (CED), and reducing the risk of low birth weight and subsequent growth disorders (Asferie et al., 2025). Conversely, CED and inadequate nutritional intake increase the risk of anemia in pregnancy, maternal and perinatal complications such as bleeding, infection, premature birth, low birth weight (LBW), and neonatal death. Anemia and CED during pregnancy are also associated with higher neonatal intensive care requirements and infant morbidity, making nutritional monitoring and interventions from early pregnancy crucial for reducing maternal and infant morbidity and mortality (Indarti et al., 2023).

One of the main factors determining the nutritional status of pregnant women is diet, which is reflected in food consumption habits based on the type, quantity, frequency, and variety of daily intake. Various studies have shown that a quality diet characterized by the consumption of a variety of nutritious foods such as cereals, protein sources, vegetables, fruit, milk, and low in processed foods and saturated fats is associated with better nutritional status, a lower risk of malnutrition, and more adequate diet quality and micronutrient intake in pregnant women (Khammarnia et al., 2024). Conversely, an unbalanced diet, poor in variety, and dominated by low-nutrient foods is associated with low intakes of energy, protein, and various important micronutrients (e.g., iron, calcium, folate, zinc, magnesium), which can increase the risk of undernutrition and nutritional disorders in pregnant women (Mitran et al., 2024).

In the third trimester of pregnancy, maternal nutritional needs increase because this phase is marked by accelerated fetal growth, the formation of new tissue (placenta, maternal fat, breasts, uterus), and increased energy and nutrient needs in preparation for labor and lactation (Lawi et al., 2023). Energy needs increase by approximately 450–465 kcal/day in the final trimester, accompanied by higher protein requirements compared to early pregnancy to support maternal and fetal tissue deposition. In addition to energy and protein, the need for various micronutrients such as iron, folic acid, calcium, vitamin D, B-complex vitamins, iodine, and zinc also increases to support hematopoiesis, fetal brain and organ development, and maternal physiological adaptation (Prasad & Sylvester, 2025).

Despite the implementation of various nutrition improvement programs and education-based



interventions, nutritional problems in pregnant women, such as chronic energy deficiency (CED), anemia, and undernutrition, remain a significant challenge in developing countries, including Indonesia. Various studies show a high prevalence of CED and anemia among women of reproductive age and pregnant women, along with energy, protein, and micronutrient intakes that are far below recommended levels. These conditions are associated with poor dietary quality, limited access to nutritious food, and poverty, particularly in rural areas and low-income groups. Furthermore, low levels of education and nutritional knowledge, as well as a lack of effective nutrition counseling during antenatal care, contribute to poor dietary practices and a high risk of CED and anemia (Lipoeto et al., 2020; Saleh & Retnaningsih, 2025).

Physiological changes during pregnancy, such as nausea, vomiting, decreased appetite, and food aversions, can alter maternal dietary patterns and reduce intake of energy, protein, and various essential micronutrients. Nausea and vomiting in pregnancy (NVP) often leads to decreased consumption of vegetables, fruit, animal products, milk, and meat, accompanied by increased consumption of white bread and sugary drinks, thus reducing diet quality, especially in severe cases (Chakona & Shackleton, 2019). Habitual consumption of fast food, foods high in fat, sugar, and ultra-processed foods is associated with lower diet quality, reduced intake of fiber, fruits, and vegetables, and the risk of excess energy and excessive weight gain during pregnancy. This suggests that maternal dietary patterns are shaped by a complex interaction between physiological changes, culture, and modern eating habits, requiring special attention in efforts to improve maternal nutritional status (Nansel et al., 2022).

Various studies have shown a close relationship between diet and the nutritional status of pregnant women, where a more balanced or "balanced/healthy/prudent" diet is associated with more adequate nutrient intake, better nutritional status, and more favorable pregnancy outcomes compared to unhealthy or obesogenic diets (Mitran et al., 2024). Pregnant women who consume a diverse diet, rich in vegetables, fruits, whole grains, animal and plant protein sources, and who limit ultra-processed foods and foods high in sugar/saturated fat, tend to have better diet quality and macro-micronutrient adequacy, and a lower risk of undernutrition. However, diet and nutritional status vary widely across regions and countries, influenced by education, income, residence (urban-rural), household food security, nutritional knowledge, and local socio-cultural norms (Fikadu et al., 2024).

Information on the relationship between dietary patterns and the nutritional status of pregnant women in the third trimester is crucial as a basis for developing evidence-based health promotion programs, nutrition education, and midwifery interventions. Various studies have shown that dietary patterns during pregnancy are closely related to the quality of nutrient intake, maternal nutritional status (e.g., CED, anemia, and weight gain), and pregnancy outcomes such as low birth weight (LBW) and prematurity. Analysis of maternal dietary patterns and nutritional status is used to identify deficiencies in energy, protein, iron, zinc, magnesium, and other micronutrients, which are often below recommended intakes (Arlym et al., 2025). This study aims

to analyze the relationship between dietary patterns and the nutritional status of pregnant women in the third trimester.

METHOD

This study is a quantitative study with an observational analytical design using a cross-sectional approach, which aims to analyze the relationship between dietary patterns and the nutritional status of pregnant women in the third trimester. The study was conducted at PMB Helen Tarigan in January 2026. The population in this study were all pregnant women in the third trimester who underwent antenatal care at the Helen Tarigan Clinic during the study period. The sampling technique used total sampling, resulting in 43 respondents who met the study criteria. Dietary data were obtained using a dietary questionnaire, while nutritional status was assessed based on anthropometric measurements recorded in the pregnancy checkup book.

Inclusion criteria for this study included pregnant women in their third trimester who were willing to participate as respondents, able to communicate well, and present during the study. Exclusion criteria included pregnant women experiencing severe pregnancy complications, having chronic diseases that affect nutritional status, or not completing the questionnaire completely. The data obtained were analyzed univariately to describe the characteristics of the respondents and bivariately using the Chi-Square test with a significance level of $\alpha = 0.05$ to determine the relationship between dietary patterns and nutritional status of pregnant women in their third trimester.

RESULTS AND DISCUSSION

Table 1. Respondent characteristics (n = 43)

Characteristics	n	%
Age		
< 20 Years	4	9,3
20–35 Years	32	74,4
> 35 Years	7	16,3
Education		
Elementary School	5	11,6
Junior High School	10	23,3
High School	20	46,5
College	8	18,6
Occupation		
Housewife	26	60,5
Self-Employed	8	18,6
Private Employee	6	14,0
Civil Servant	3	7,0
Parity		
Primigravida	18	41,9
Multigravida	25	58,1

Table 2. Relationship between Dietary Patterns and Nutritional Status of Pregnant Women in the Third Trimester (n=43)

Nutritional Status					
Dietary habit	Poor		Good		p-value
	n	%	n	%	
Not Good	11	25.6	6	14.0	0.003
Good	5	11.6	21	48.8	

* Chi-Square Test

The majority of respondents were pregnant women aged 20–35 years (74.4%), had a high school education (46.5%), worked as housewives (60.5%), and were multigravida (58.1%) (Table 1). Most pregnant women with good dietary habits had good nutritional status (48.8%), while mothers with poor dietary habits were more likely to experience malnutrition (25.6%). The results of the Chi-Square test showed a significant relationship between dietary patterns and nutritional status of pregnant women in the third trimester ($p=0.003$) (Table 2).

The results showed a significant relationship between dietary patterns and the nutritional status of pregnant women in the third trimester ($p=0.003$). Most pregnant women with good dietary patterns showed good nutritional status, while those with poor dietary patterns were more likely to experience malnutrition. These findings suggest that dietary quality during pregnancy plays a crucial role in determining maternal nutritional status, particularly in the third trimester when nutrient needs increase to support fetal growth and development.

Dietary patterns in pregnant women describe daily food consumption habits, including the type, quantity, frequency, and diversity of food ingredients that determine nutritional adequacy. During pregnancy, energy and protein needs increase to maintain the mother's body balance and support fetal growth, while the need for various vitamins and minerals (such as folate, iron, calcium, iodine, and vitamin D) also increases to prevent pregnancy complications and impaired fetal development (Hanley-Cook et al., 2022). A study by Khammarnia et al. (2024) showed that energy and macronutrient intakes of pregnant women in many countries, including Indonesia, are often below recommendations, and many mothers experience deficiencies in several important micronutrients.

This study aligns with Arlym et al. (2025) who reported that dietary patterns are associated with maternal nutritional status, with a better diet associated with better nutritional status, including a lower risk of CED, anemia, and inappropriate weight gain. Similar findings were also reported in pregnant women of the Bajo tribe in Muna and in Ethiopia, where poor dietary patterns were significantly associated with malnutrition during pregnancy (Diddana, 2019; Trees, 2018). These similar findings reinforce the idea that dietary quality, including adequate energy and nutrients (protein, iron, folate, and other micronutrients), is an important factor influencing nutritional status during pregnancy (Arlym et al., 2025).

This research aligns with the findings of various studies showing that diverse food group consumption is associated with nutrient adequacy and better nutritional status in pregnant women. Mothers who consume more food groups (e.g., carbohydrates, animal protein, vegetables, and fruit) have a higher probability of micronutrient adequacy than mothers with low dietary diversity (Verger et al., 2023). The Minimum Dietary Diversity for Women (MDD-W) indicator, with a minimum consumption limit of ≥ 5 food groups, has been shown to be positively correlated with the adequacy of various essential vitamins and minerals in pregnant women in various low- and middle-income countries (Uwase et al., 2024). Dietary diversity is a key indicator in meeting nutritional needs during pregnancy (Madzorera et al., 2020).

In the third trimester, energy and protein requirements increase significantly due to accelerated fetal growth and the mother's body's preparation for labor and lactation. According to Prasad and Sylvester (2025), energy requirements during pregnancy increase with each trimester, with the greatest spike occurring in the third trimester due to the rapid development of the fetus, placenta, and uterus, as well as increases in maternal blood and tissue volume. The average daily energy requirement for pregnant women is estimated to be around 2,000–2,800 kcal per day, with the highest requirement in the final trimester. A meta-analysis has shown that actual energy intake for pregnant women in various countries is often below this requirement, although slightly higher in the third trimester than in earlier trimesters (Khammarnia et al., 2024).

In addition to the quantity of food consumed, the quality of food consumed also affects the nutritional status of pregnant women. Khammarnia et al. (2024) explain that consuming foods rich in protein, iron, folic acid, calcium, and other vitamins and minerals plays a role in maintaining optimal nutritional status during pregnancy. Conversely, excessive consumption of foods high in sugar, saturated fat, and processed foods can lead to an imbalance in the body's nutritional intake.

Other factors that may influence the relationship between diet and nutritional status include education level, occupation, and pregnancy experience. In this study, most respondents had a high school education and were multigravida. A higher level of education can improve mothers' understanding of the importance of nutritional fulfillment during pregnancy, while previous pregnancy experience can help mothers adopt healthier eating patterns. This study aligns with the opinion of O et al. (2023) that nutritional knowledge plays a crucial role in shaping pregnant women's eating behavior. Various studies have shown that mothers with better nutritional knowledge tend to have better eating practices, including dietary diversity, nutritious food choices, and adherence to pregnancy dietary recommendations.

CONCLUSION

There was a significant correlation between diet and nutritional status of pregnant women in the third trimester at the Helen Tarigan Clinic ($p=0.003$). Pregnant women with good diets tended to have better nutritional status compared to those with poor diets. This finding confirms that meeting nutritional needs through a balanced and varied diet is a crucial factor in maintaining

nutritional status during pregnancy. Therefore, ongoing nutrition education and counseling efforts are needed in antenatal care to improve the dietary habits of pregnant women, thereby supporting optimal maternal health and fetal growth.

REFERENCES

- Arlym, L. T., Rukmaini, R., & Mahmudah, E. S. (2025). Analysis of Dietary Patterns on the Nutritional Status of Pregnant Women in Depok City, West Java. *JNKI (Jurnal Ners dan Kebidanan Indonesia) (Indonesian Journal of Nursing and Midwifery)*. [https://doi.org/10.21927/jnki.2025.13\(4\).523-538](https://doi.org/10.21927/jnki.2025.13(4).523-538)
- Asferie, W. N., Kassaw, A., Kefale, D., Kebede, S. D., Azmeraw, M., Ayenew, Y. E., & Aytenew, T. M. (2025). Association Between Maternal Undernutrition During Pregnancy and Newborn Low Birth Weight in Ethiopia: A Systematic Review and Meta-Analysis. *Maternal & Child Nutrition*, 21. <https://doi.org/10.1111/mcn.70040>
- Chakona, G., & Shackleton, C. (2019). Food Taboos and Cultural Beliefs Influence Food Choice and Dietary Preferences among Pregnant Women in the Eastern Cape, South Africa. *Nutrients*, 11. <https://doi.org/10.3390/nu1112668>
- Diddana, T. Z. (2019). Factors Associated with Dietary Practice and Nutritional Status of Pregnant Women in Dessie Town, Northeastern Ethiopia: a Community-Based Cross-Sectional Study. *BMC Pregnancy and Childbirth*, 19. <https://doi.org/10.1186/s12884-019-2649-0>
- Febiana, C. E., Siregar, N., Astuti, D. R., & Jasmawati, J. (2024). Impact of Maternal Nutritional Status on Anemia in the Third Trimester of Pregnancy. *Jurnal Kesehatan Ibu dan Anak*. <https://doi.org/10.29238/kia.v18i1.2217>
- Fikadu, T., Tamiru, D., & Ademe, B. (2024). Factors Associated with Dietary Patterns (DPS) and Nutritional Status among Pregnant Women in AM-HDSS, South Ethiopia. *Frontiers in Nutrition*, 11. <https://doi.org/10.3389/fnut.2024.1443227>
- Hanley-Cook, G., Toe, L., Tesfamariam, K., De Kok, B., Argaw, A., Compaoré, A., Ouédraogo, M., Dailey-Chwalibóg, T., Kolsteren, P., Lachat, C., & Huybregts, L. (2022). Fortified Balanced Energy-Protein Supplementation, Maternal Anemia, and Gestational Weight Gain: A Randomized Controlled Efficacy Trial among Pregnant Women in Rural Burkina Faso. *The Journal of Nutrition*, 152, 2277-2286. <https://doi.org/10.1093/jn/nxac171>
- Indarti, J., Wonodihardjo, H., Sianipar, K. A., & Antoniman, M. A. (2023). Maternal and Neonatal Outcome in Pregnant Women with Chronic Energy Deficiency in Cipto Mangunkusumo General Hospital, Indonesia. *Open Access Macedonian Journal of Medical Sciences*. <https://doi.org/10.3889/oamjms.2023.8509>
- Khammarnia, M., Ansari-Moghaddam, A., Kakhki, F. G., Clark, C. C. T., & Barahouei, F. B. (2024). Maternal Macronutrient and Energy Intake during Pregnancy: a Systematic Review and Meta-Analysis. *BMC public health*, 24. <https://doi.org/10.1186/s12889-024-17862-x>
- Lawi, D. A., Blasi, R., Alnimer, M., & Ghazzaw, H. (2023). Assessment of Dietary Consumption in a Group of Pregnant Women at Their Second and Third Trimesters in Amman. *Palestinian Medical and Pharmaceutical Journal*. <https://doi.org/10.59049/2790-0231.1139>

- Lipoeto, N., Masrul, & Nindrea, R. (2020). Nutritional Contributors to Maternal Anemia in Indonesia: Chronic Energy Deficiency and Micronutrients. *Asia Pacific journal of clinical nutrition*, 29 Suppl 1. [https://doi.org/10.6133/apjcn.202012_29\(s1\).0002](https://doi.org/10.6133/apjcn.202012_29(s1).0002)
- Madzorera, I., Isanaka, S., Wang, M., Msamanga, G., Urassa, W., Hertzmark, E., Duggan, C., & Fawzi, W. (2020). Maternal Dietary Diversity and Dietary Quality Scores in Relation to Adverse Birth Outcomes in Tanzanian Women. *The American journal of clinical nutrition*. https://doi.org/10.1093/cdn/nzaa054_103
- Mitran, A.-M., Popa, A., Gherasim, A., Niță, O., Mihalache, L., Arhire, L., Gafițanu, D., Hăncianu, M., & Cioancă, O. (2024). Dietary Patterns of Pregnant Women and Their Association with Diet Quality Measures: A Comparative Analysis. *Nutrients*, 16. <https://doi.org/10.3390/nu16111736>
- Mousa, A., Naqash, A., & Lim, S. (2019). Macronutrient and Micronutrient Intake during Pregnancy: An Overview of Recent Evidence. *Nutrients*, 11. <https://doi.org/10.3390/nu11020443>
- Nansel, T., Cummings, J., Burger, K., Siega-Riz, A., & Lipsky, L. (2022). Greater Ultra-Processed Food Intake during Pregnancy and Postpartum Is Associated with Multiple Aspects of Lower Diet Quality. *Nutrients*, 14. <https://doi.org/10.3390/nu14193933>
- O, J. R., A, E. A., & T, I. A. (2023). Nutritional Knowledge and Cultural Food Beliefs on Dietary Practices of Pregnant Women. *International Journal of Home Economics, Hospitality and Allied Research*. <https://doi.org/10.57012/ijhhr.v2n2.012>
- Perumal, N., & Gernand, A. (2025). Nutrition during Pregnancy and Birth Outcomes. *Annals of Nutrition and Metabolism*, 81, 19-32. <https://doi.org/10.1159/000541205>
- Prasad, H., & Sylvester, S. K. (2025). Nutritional Deficiencies and Requirements during Pregnancy. *Asian Journal of Applied Science and Technology*. <https://doi.org/10.38177/ajast.2025.9112>
- Saleh, S., & Retnaningsih, R. (2025). Analysis of Nutritional Intake and Economic Status as Risk Factors for Chronic Energy Deficiency (CED) in Pregnant Women at Patilanggio Community Health Center. *NAJ Nursing Applied Journal*. <https://doi.org/10.57213/naj.v3i3.1019>
- Trees. (2018). The Relationship between Dietary Patterns and Nutritional Knowledge with the Nutritional Status of Bajo Tribe Pregnant Women in Duruka District, Muna Regency. *International Journal of Healthcare Education & Medical Informatics*. <https://doi.org/10.24321/2455.9199.201817>
- Uwase, A., Nsereko, E., Pillay, N., & Levin, J. (2024). Dietary Diversity and Associated Factors among Pregnant Women in the Southern Province of Rwanda: A Facility-Based Cross-Sectional Study. *PLOS ONE*, 19. <https://doi.org/10.1371/journal.pone.0297112>
- Verger, E., Eymard-Duvernay, S., Bahya-Batinda, D., Hanley-Cook, G., Argaw, A., Becquey, E., Diop, L., Gelli, A., Harris-Fry, H., Kachwaha, S., Kim, S., Nguyen, P. H., Saville, N., Tran, L. M., Zagré, R., Landais, E., Savy, M., Martin-Prével, Y., & Lachat, C. (2023). Defining a Dichotomous Indicator for Population-Level Assessment of Dietary Diversity Among Pregnant Adolescent Girls and Women: A Secondary Analysis of Quantitative 24-h Recalls from Rural Settings in Bangladesh, Burkina Faso, India, and Nepal. *Current Developments in Nutrition*, 8. <https://doi.org/10.1016/j.cdnut.2023.102053>