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The Relationship Between Diet Quality and Nutritional Status of Pregnant Women in Bandung Regency

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ABSTRACT

Diet quality in pregnant women is a crucial factor in supporting maternal health and optimal fetal development. A diverse and balanced diet helps fulfill the increased macronutrient needs during pregnancy. However, many pregnant women in Indonesia, including those in Cangkuang District, Bandung Regency, still fail to meet the recommended dietary diversity. This study aimed to analyze the relationship between diet quality and nutritional status of pregnant women in Cangkuang District, Bandung Regency. This quantitative cross-sectional study involved 60 pregnant women selected by convenience sampling. Data were collected using structured questionnaires. Diet quality was assessed using the Minimum Dietary Diversity for Women (MDD-W) score, and nutritional status was measured using Mid-Upper Arm Circumference (MUAC). Spearman's rank correlation test was used to analyze the relationship between diet quality and nutritional status. The result showed a significant relationship between diet quality and nutritional status ($p < 0.01$). A total of 63.3% of the pregnant women had an MDD-W score ≥5, indicating adequate dietary diversity. Focused interventions, such as nutrition education and food supplementation, are recommended to improve dietary diversity in this group.

Keywords *: Pregnant women; diet quality; nutritional status*

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INTRODUCTION

Maternal health remains a global public health priority, given its direct impact on maternal and neonatal outcomes. During pregnancy, women undergo significant anatomical, physiological, and hormonal changes that demand increased nutritional intake to support fetal growth and maintain maternal health (1). Adequate nutritional intake during this critical period plays a pivotal role in reducing the risks of pregnancy complications, preterm birth, and maternal and infant morbidity and mortality (2).

At the national level, Indonesia still faces considerable challenges in ensuring adequate maternal nutrition. The 2023 World Health Organization (WHO) data show that 64% of pregnant women in Indonesia have inadequate dietary diversity, and 89% do not meet their energy requirements, reflecting persistent issues in the quality of maternal diets (3). Many Indonesian pregnant women prioritize the quantity of food over its quality, which affects their nutritional status. Nutritional deficiencies during pregnancy increase the risk of complications such as anemia, metabolic disorders, and chronic energy deficiency (CED), all of which can adversely impact maternal health indicators such as body mass index (BMI), mid-upper arm circumference (MUAC), and biochemical markers (4).

Diet quality, defined by the adequacy of macro- and micronutrient intake, as well as dietary diversity, is a key factor influencing maternal nutritional status. A high-quality diet includes a diverse intake of food groups that align with balanced nutrition guidelines (5). During pregnancy, there is a substantial increase in the need for energy, protein, iron, and folic acid, making dietary quality even more critical (6). However, low dietary diversity remains a common issue. Meha (2022) emphasized that poor diet quality in pregnant women is associated with higher rates of CED and inadequate nutrient intake (7).

At the local level, these problems are particularly pronounced in areas with limited access to nutritious foods and health education. In Cangkuang District, Bandung Regency, the prevalence of chronic energy deficiency among pregnant women reaches 16.6%,

significantly higher than the district average of 5% (8). Socioeconomic factors, educational levels, access to information, and local food availability are all determinants of dietary behavior and nutritional status (9). This highlights the importance of examining the specific relationship between diet quality and nutritional outcomes in this region.

Previous studies have shown that pregnant women with low dietary diversity have twice the risk of experiencing CED compared to those with adequate diets (10). Although there is abundant research on maternal nutrition, many studies focus solely on anthropometric measurements and biochemical indicators without assessing the underlying diet quality. Furthermore, studies that comprehensively analyze the relationship between diet quality and nutritional status, particularly in high-risk areas such as Cangkuang District, remain limited (11). Based on this background, this study aims to analyze the relationship between diet quality and the nutritional status of pregnant women in Cangkuang District, Bandung Regency.

METHODS

This study was a quantitative research with a cross-sectional design aimed at examining the relationship between diet quality and nutritional status of pregnant women in Cangkuang District, Bandung Regency. The research was conducted from January to February 2025 at several healthcare facilities and integrated health posts (posyandu) in the selected area. The research location was purposively chosen based on data from the Bandung District Health Office, which indicated that Cangkuang District had the highest prevalence of chronic energy deficiency (CED) among pregnant women. The study involved a sample of 60 pregnant women selected using convenience sampling, where subjects were chosen based on availability and willingness to participate.

The main variables in this study were diet quality and nutritional status of pregnant women. Diet quality was assessed based on dietary diversity using a 24-hour food recall,

from which the Minimum Dietary Diversity for Women (MDD-W) score was calculated. Additionally, a food frequency questionnaire (FFQ) was used to describe participants' habitual food consumption pattern. Nutritional status was measured using anthropometric data, specifically mid-upper arm circumference (MUAC).

Additional data were collected through structured interviews using a subject characteristics questionnaire, which included variables such as age, gestational age, education level, and occupation. All research instruments were tested for validity and reliability prior to use. Data analysis was conducted descriptively and inferentially, using frequency distributions and percentages. The Spearman's rank correlation test was used to determine the relationship between diet quality and nutrition status. Data processing was performed using IBM SPSS Statistics version 21. This study received ethical approval from the Health Research Ethics Committee (non-medical) of Universitas Muhammadiyah Prof. Dr. Hamka, with approval number: KEPK-NK/02/2025/03234, dated February 19, 2025.

RESULTS

Distribution of Subject Characteristics

Table 1 presents the demographic and pregnancy characteristics of the respondents, including age, education level, employment status, gestational age, pregnancy status, and supplementary feeding (PMT) participation.

Table 1
Respondent Characteristics

Variables	N	%
Age		
<20 years	6	10
20-35 years	44	73,3
>35 years	10	16,7
Mean ± Std. Dev	27,8 ± 6,66	

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Variables	N	%
Employment Status		
Housewife	50	83,3
Entrepreneur	6	10
Other	4	6,7
Education		
Elementary School	6	10
Junior High School	22	36,7
Senior High School	27	45
Higher Education	5	8,4
Gestational Age		
First Trimester	6	10
Second Trimester	34	56,7
Third Trimester	20	33,3
Mean ± Std. Dev	25,28 ± 8,69	
Pregnancy Status		
Primigradiva	23	38,3
Multigrvida	37	61,7
Supplementary Feeding (PMT)		
Yes	8	13,3
No	52	86,7

Source : Primary Data, 2025

Based on Table 1, the majority of subjects (73,3%) were in the age range of 20–35 years, with a mean age of 27,8 years. Nearly half of the subjects (45%) had completed senior or vocational high school education. In terms of employment, most pregnant women were housewives (83,3%). Approximately 56,7% of the participants were in the second trimester of pregnancy, with a mean gestational age of 25,38 weeks. Regarding pregnancy status, the majority of the subjects were classified as multigravida (61,7%). Additionally, only 13,3% (n=8) of respondents reported receiving supplementary feeding (PMT), while the remaining 86,7% (n=52) did not.

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Distribution Of Nutritional Status Of Subjects

Nutritional status was assessed using primary data obtained through direct measurement of mid-upper arm circumference (MUAC). Table 2 presents the distribution of nutritional status variables among the study subjects.

Table 2
Description Of Subjects Nutritional Status

MUAC	Normal N (%)	CED N (%)
First Trimester	4 (66,7)	2 (33,3)
Second Trimester	29 (85,3)	5 (14,7)
Third Trimester	17 (85)	3 (15)
Mean ± Std. Dev	27,17 ± 3,64	

Source : Primary Data, 2025

Based on Table 2, the nutritional status of the subjects varied across each trimester of pregnancy. In the first trimester (66,7%), second trimester (85,3%), and third trimester (85%), the majority of subjects were classified as having normal nutritional status. The average MUAC among the subjects was 27,17 cm.

Distribution of Food Consumption Frequency Based on the Food Frequency Questionnaire (FFQ)

Table 3 presents the types of food consumed based on frequency per week using the Food Frequency Questionnaire (FFQ).

Table 3
Types of Food Based on Weekly Consumption Frequency

Types of Food	Average Frequency of Consumption (Mean± Std. dev)
Staple Foods (Frequency/week)	
Rice	18,31 ± 7,07
Bread	2,02 ± 3,99
Potato	1,10 ± 2,87

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Types of Food	Average Frequency of Consumption (Mean± Std. dev)
Noodles (soun)	0,99 ± 0,90
Porridge	0,81 ± 1,42
Corn	0,62 ± 0,95
Animal Protein	
Milk	5,26 ± 5,95
Chicken eggs	4,20 ± 3,25
Chicken meat	3,82 ± 4,01
Fish	1,40 ± 3,29
Sausage	0,60 ± 1,24
Yogurt	0,48 ± 1,07
Cheese	0,21 ± 0,95
Quail eggs	0,04 ± 0,27
Plant Protein	
Tofu	3,69 ± 3,34
Tempeh	3,21 ± 2,41
Mung beans	0,76 ± 1,21
Red beans	0,29 ± 0,62
Peanuts	0,09 ± 0,64
Vegetables	
Carrot	2,57 ± 3,76
Green beans	2,57 ± 3,76
Spinach	1,28 ± 1,84
Cauliflower	1,22 ± 2,77
Water spinach	1,20 ± 1,25
Tomato	0,69 ± 2,35
Mustard greens	0,49 ± 0,87
Chayote	0,40 ± 1,160
Chinese cabbage	0,36 ± 1,05
Cucumber	0,27 ± 1,05
Broccoli	0,20 ± 0,48
Radish	0,14 ± 0,91

Types of Food	Average Frequency of Consumption (Mean± Std. dev)
Mushroom	0,11 ± 0,42
Bean sprouts	0,50 ± 0,38
Watercress	0,03 ± 0,25
Eggplant	0,01 ± 0,12
Water hyacinth	0,004 ± 0,03
Fruits	
Banana	1,38 ± 2,46
Avocado	1,16 ± 2,46
Watermelon	1,04 ± 1,87
Orange	1,00 ± 1,42
Papaya	0,50 ± 1,04
Apple	0,46 ± 1,08
Rambutan	0,35 ± 0,86
Mango	0,34 ± 1,07
Dragon fruit	0,30 ± 0,76
Longan	0,28 ± 0,15
Melon	0,20 ± 0,62
Langsat	0,13 ± 0,90
Strawberry	0,09 ± 0,42
Guava	0,06 ± 0,30
Mangosteen	0,04 ± 0,18
Kiwi	0,02 ± 0,12
Fried Foods	
Crackers	2,89 ± 3,36
Chips	1,39 ± 2,07
Donut	0,55 ± 1,40
Fast food	0,28 ± 2,31
Savory cookies	0,21 ± 0,73
Instant noodles	0,18 ± 0,47
Sweet Foods	
Biscuits	2,76 ± 3,22

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Types of Food	Average Frequency of Consumption (Mean± Std. dev)
Ice cream	2,54 ± 2,51
Candy	0,99 ± 1,09
Chocolate	0,67 ± 1,19
Sweet cakes	0,65 ± 1,67
Pudding	0,47 ± 0,90

Source: Primary Data, 2025

Based on Table 3, rice was the most frequently consumed staple food among the subjects, with an average frequency of 18 times per week, indicating that rice remains the primary staple in the dietary patterns of the participants. Among the plant-based protein sources, tofu (3,69 times/week) and mung beans (0,76 times/week) were the most frequently consumed. For animal-based protein, milk (5,26 times/week), chicken eggs (4,20 times/week), and chicken meat (3,8 times/week) were the dominant sources.

In the vegetable category, carrots were the most frequently consumed (2,57 times/week). Other vegetables such as spinach, water spinach, and mustard greens were also consumed with varying frequencies. Among fruits, bananas had the highest average consumption (1,38 times/week). Additionally, side foods sucs has crackers (2,89 times/week) and biscuits (2,76 times/week) were also consumed relatively often.

Distribution of Diet Quality Among Subject

The quality of diet in this study was analyzed to assess the dietary diversity of the subjects. Table 4 presents the distribution of dietary quality among the participants.

Table 4
Respondent Characteristics

Category	N	%
≥ MDDW Score (≥5 Food Groups) (Diverse)	38	63,3
< MDDW Score (<5 Food Groups) (Less Diverse)	22	36,7
Mean ± Std. Dev	5,43 ± 1,61	

Source: Primary Data, 2025

The majority of subjects had good diet quality based on the Minimum Dietary Diversity for Women (MDD-W) score. Approximately 63.3% of participants demonstrated a diverse dietary pattern, while the remaining 36.7% still exhibited less varied food consumption. The average MDD-W score was 5.43, indicating that most subjects consumed at least five different food groups within the last 24 hours, which meets the threshold for a balanced diet as recommended by WHO.

Geographical and social factors in the study area also played a role in this outcome. Cangkuang District is recorded as one of the regions with the largest vegetable harvest area in Bandung Regency (BPS, 2025), which supports the sustainable availability of fresh and local food. Observations also revealed that some participants utilized their home yards to grow vegetables such as spinach, water spinach, and mustard greens. This direct access to food sources encourages healthy eating without full dependence on the market.

The availability and affordability of local food ingredients were key factors influencing dietary variation. Participants living in environments with diverse food availability were more likely to consume food such as tubers, fruits, and green vegetables rich in vitamins and minerals. Such ease of access to food significantly affects dietary intake, especially in semi-urban and rural areas. (4,22)

Nevertheless, a small proportion of subjects still showed poor diet quality. One of the main contributing factors was the habit of not cooking at home, resulting in monotonous diets that did not include a variety of food groups. Dependence on ready-to-eat meals or instant side dishes further limited daily food diversity. This condition is also reflected in a study by Uwase et al. (2024), which found that limited food preparation practices negatively impacted dietary diversity among pregnant women. (5)

Association Between Diet Quality and Nutritional Status of Subjects

Table 5 presents the results of the statistical test examining the association between diet quality and the nutritional status of the subjects.

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Table 5
Association Between Diet Quality and Nutritional Status

Diet Quality	Nutritional Status				*p value*	*R*
	Normal		CED			
	n	%	n	%		
≥ MDDW Score (≥5 Food Groups)	36	94,7	2	5,3	0,001*	0,402**
< MDDW Score (<5 Food Groups)	14	63,6	8	36,4		

*Uji *Rank Spearman* ≤0,05
** *Correlation is significant at the 0,01 level (2-tailed)*
Source: Primary Data, 2025

The results show a significant positive correlation between the two variables (Spearman rank test, p = 0,001, r = 0,402). Most women with adequate dietary diversity (≥5 food groups) had normal nutritional status (94,7%), compared to 63,6% among those with lower diversity. These findings highlight that greater dietary diversity is associated with improved nutritional status among pregnant women.

DISCUSSION

Subject Characteristics

The subjects in this study were pregnant women, with the majority aged between 20 and 35 years, which is considered the optimal reproductive age due to the peak performance of reproductive organs. (6,7) Although most participants were within this ideal age range, a large proportion were multigravida, with some having up to four living children. This pattern indicates a relatively high birth rate at a young age, which may be associated with early marriage practices that remain prevalent in the study area. Data from the BPS of Bandung Regency in 2022 reported that 65,33% of adolescents who married had an educational level below senior high school, suggesting a tendency toward early marriage and an increased risk of early pregnancy before achieving adequate social and economic readiness.

Based on this background, most subjects were homemakers, not merely by choice but also due to restrictions imposed by their husbands, who considered household needs to be sufficiently met. Additionally, limited employment opportunities for women and prevailing cultural norms assigning men as the primary breadwinners further reinforced this condition. (8) Therefore, the housewife status among participants reflects the influence of cultural values, social conditions, and economic structures deeply embedded in the local community.

In addition to individual and household characteristics, the availability and quality of healthcare services may also influenced participant characteristics. The study area was supported by relatively good maternal healthcare services, including access to ultrasound examinations, iron supplementation (TTD), laboratory testing, and responsive healthcare personnel. These services are commonly accessed starting from 20 weeks of gestation, which corresponds to the second trimester. This may explain why most participants in this study were in their second trimester at the time of data collection. (9) Adequate healthcare services have been shown to encourage regular antenatal care (ANC) attendance, and previous studies have demonstrated that service quality plays a significant role in improving ANC compliance among pregnant women. (10)

Furthermore, community health posts (posyandu) in the study area also provided supplementary feeding (PMT) programs. However, PMT distribution was not exclusively targeted at pregnant women with chronic energy deficiency (CED) but also provided to posyandu cadres or individuals with close affiliations to them. This finding highlights potential inequities in PMT distributions, where supplementation may not always reach those with the greatest nutritional need, particularly pregnant women with poor nutritional status. (11,12)

Diet Quality of the Subjects

The majority of subjects exhibited good and diverse diet quality, influenced by the availability of food in their living environments. (5) Observations revealed that some subjects cultivated a variety of vegetables—such as mustard greens, spinach, and water spinach—in their home gardens. According to BPS Bandung Regency (2025), Cangkuang District ranks second in terms of vegetable harvest area, ensuring the availability of nutritious and affordable local food.

Access to diverse local food sources encouraged pregnant women to consume more nutritious and varied foods, such as green vegetables, tubers, and fruits rich in nutrients. (22) These findings align with Sitorus et al. (2022), who noted that food availability and accessibility are key factors influencing diet quality among pregnant women. (4) On the other hand, a small number of subjects had poor dietary diversity, primarily due to their habit of not preparing food at home, which limited the variety in their daily meals. (5)

Association Between Diet Quality and Nutritional Status

A significant relationship was found between diet quality and the nutritional status of the subjects, indicating that better diet quality corresponds with better nutritional outcomes. Diet quality in this study was assessed based on dietary diversity, encompassing staple foods such as rice, bread, and potatoes, as well as plant-based proteins like tofu and tempeh, animal-based proteins including chicken, fish, and eggs, and various vegetables and fruits. This dietary diversity reflects a high-quality diet, which positively impacts nutritional status. (13)

These findings support previous research by Zaidah et al. (2022), which showed a strong association between diet quality and nutritional status among pregnant women. (14) Similarly, Karemoi et al. (2020) emphasized the significant role of a quality diet in maintaining maternal nutrition during pregnancy. (15)

Complex carbohydrates from rice, bread, and potatoes serve as the primary energy sources essential for daily activities and fetal development, helping prevent fatigue and CED. (16) Plant-based proteins from tofu, tempeh, mung beans, and milk contribute to tissue development. Tofu and tempeh provide protein, iron, folic acid, and calcium, while mung beans are rich in folate, crucial for preventing neural tube defects. Milk supplies calcium and vitamin D, supporting bone health for both mother and fetus. (17,20)

Additionally, animal proteins such as chicken, fish, and eggs offer essential amino acids, vitamin B12, iron, and omega-3 fatty acids (DHA), which are vital for fetal brain and nervous system development. (27) Green vegetables, such as spinach and water spinach, and fruits like bananas, avocados, oranges, and watermelon, also meet maternal vitamin and mineral requirements. Vitamin C enhances iron absorption, while potassium in bananas and avocados helps regulate maternal blood pressure. (17,22)

CONCLUSIONS AND RECOMMENDATIONS

This study found a significant association between diet quality and the nutritional status of pregnant women. The majority of subjects demonstrated diverse dietary patterns, characterized by the consumption of various food groups, including carbohydrates, proteins, vegetables, and fruits. These findings highlight that a high-quality diet is essential for achieving better nutritional outcomes during pregnancy.

Based on these results, it is recommended that nutrition interventions focus on increasing education regarding dietary diversity, particularly for pregnant women with poor diet quality. Future research should investigate the relationship between diet quality and pregnancy outcomes, such as birth weight, and consider additional variables, including eating behaviour, family support, and the role of healthcare providers.

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