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Impact of Maternal Nutritional Status on Morning Sickness Severity and Fetal Health: A Correlational Study

Israini Suriati[1]*, Reski Juliani[1]

[1] Midwifery Study Program, Faculty of Health Sciences, University Muhammadiyah Palopo, Indonesia

Corresponding Author Email: israinisuriati@umpalopo.ac.id

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ABSTRACT

Morning sickness is a common symptom of pregnancy that occurs in the first trimester, characterized by nausea, vomiting, and fatigue due to hormonal changes such as hCG and estrogen. Although physiological, this condition can interfere with the mother's nutritional intake and have a negative impact on fetal health, especially if it is severe and prolonged. Masih there are still many pregnant women who face obstacles in meeting nutritional needs and optimally handling morning sickness. This study aims to determine and analyze the relationship between the severity of morning sickness, nutritional status of pregnant women, and fetal health. Method This study used a quantitative design with a cross-sectional approach. A sample of 100 pregnant women who experienced morning sickness in the first or second trimester, selected by purposive sampling at five Health Centers in Palopo City during July–November 2024. Data were collected through questionnaires and interviews, then analyzed using the Chi-square test with a significance level of $p < 0.05$. A total of 36% of respondents had good nutritional status, 36% were undernourished, and 28% were overnourished. The severity of morning sickness was categorized as mild in 28% of respondents, moderate in 40%, and severe in 32%. Fetal health was considered good in 58% of respondents and poor in 42%. There was a statistically significant relationship between maternal nutritional status and the severity of morning sickness (P-value = 0.005), as well as between nutritional status and fetal health (P-value = 0.003). Additionally, a significant association was found between the severity of morning sickness and fetal health.

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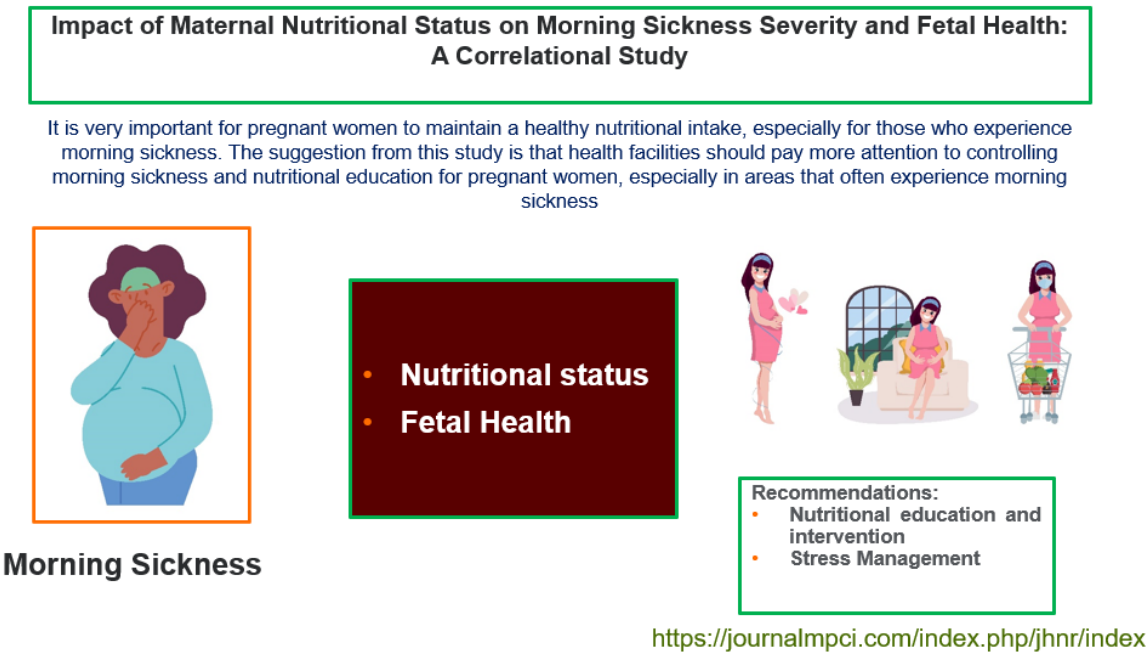
Key Messages:

- Nutritional status is a critical factor in reducing the severity of morning sickness during the first trimester of pregnancy, emphasizing the need for nutritional counseling as part of antenatal care services.
- The findings suggest that improving maternal nutrition can significantly enhance fetal health and decrease pregnancy complications such as low birth weight and premature delivery, offering a practical intervention point for maternal health programs.

GRAPHICAL ABSTRACT



INTRODUCTION

Pregnancy is an important phase in a woman's life, marked by various physical, hormonal, and emotional changes (1,2) . Morning sickness is a common condition experienced by most pregnant women, especially during the first trimester of pregnancy. The term refers to symptoms of nausea, vomiting, and fatigue that occur as a result of hormonal changes in the body in response to pregnancy, particularly the increased levels of human chorionic gonadotropin (hCG) and estrogen. Although it is called “morning” sickness, the symptoms are not limited to the morning hours and can occur at any time throughout the day.It is important to note that morning sickness is not a disease but rather a normal physiological part of pregnancy. However, the intensity and duration of symptoms can vary greatly between individuals, and in some women, the condition may persist into the second trimester (3). Although this symptom is often considered part of the natural process in pregnancy, its impact on maternal well-being and fetal health often does not receive enough attention, especially in terms of adequate nutritional intake (4). Globally, about seventy to eighty percent of pregnant women experience morning sickness, with varying degrees of severity. In some mothers, morning sickness can persist into the second trimester of pregnancy (5). Morning sickness symptoms, such as nausea, vomiting, and fatigue, are usually caused by hormonal changes that occur as the body adapts to pregnancy, especially with increased levels of the hormones human chorionic gonadotropin (hCG) and estrogen (6).

Although this condition is often considered a mild disorder that will go away on its own, morning sickness can reduce the quality of life of pregnant women if not treated properly (7). Moreover, if morning sickness prevents adequate food intake, it can cause nutritional deficiencies that are dangerous to the mother's health and fetal development (8) . At the national level, Indonesia has a fairly high prevalence of morning sickness, with around 75% of pregnant women experiencing these symptoms in the first trimester of pregnancy (9,10). Most of the existing research focuses more on the medical or treatment aspects of morning sickness, while the nutritional aspects and their impact on fetal development receive less attention (11). This has the potential to cause pregnant women to not gain sufficient understanding of the importance of maintaining good nutritional intake during pregnancy, especially in conditions of severe morning sickness (12). At the local level, especially in South Sulawesi, the handling of morning sickness and attention to nutrition for pregnant women are still inadequate In some areas in South Sulawesi, access to health information on managing morning sickness is still limited, and many pregnant women do not know the right steps to maintain adequate nutritional intake (13). Maintaining adequate food and fluid

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intake is a major problem for pregnant women who experience morning sickness (14,15). Severe morning sickness, if not treated properly, can cause dehydration, malnutrition, and emotional disturbances that can have a negative impact on the mother and fetus (16). The risk of pregnancy complications such as premature birth, low birth weight (LBW), and fetal development disorders increases if the pregnant mother is malnourished (17,18). Therefore, it is important to know how morning sickness, maternal nutritional status, and fetal health correlate with each other to prevent pregnancy complications (19). Therefore, early detection of this condition is very important, so that appropriate treatment can be given to maintain the health of the mother and fetus and prevent more serious complications. Research shows that pregnant women with severe morning sickness are at higher risk of nutritional deficiencies, including iron, vitamin B12, folate, and protein (20). Around 70-80% of pregnant women globally, including in South Sulawesi, experience morning sickness in the first trimester of pregnancy. This is a fairly consistent figure across countries, including Indonesia (21).

Several factors can influence the occurrence of morning sickness in pregnant women, including gestational age, nutritional status, and environmental conditions. In addition to limited access to healthcare services, certain cultural and societal factors specific to South Sulawesi, particularly in the city of Palopo, may also affect the health of pregnant women and their fetuses. Many pregnant women still adhere to traditional dietary restrictions, such as avoiding fish, eggs, or certain fruits, which are believed to be harmful—even though these foods are essential for adequate maternal nutrition. Some women also place greater trust in traditional remedies than in consulting healthcare professionals, which may lead to untreated or improperly managed morning sickness symptoms. The uniqueness of this study lies in its focus on the correlation between morning sickness, maternal nutritional status, and fetal health—an area that has rarely been specifically investigated in South Sulawesi. This research highlights the urgent need to address maternal nutrition as a preventive measure to reduce the severity of morning sickness and improve fetal health outcomes. The relationships among these three variables were statistically analyzed using the chi-square test to yield empirically robust findings. This study also provides significant contributions to expanding the understanding of the impact of morning sickness on maternal and fetal health, particularly in community health center (Puskesmas/PKM) service areas that still face limited healthcare access. Based on these considerations, the primary objective of this study is to examine and analyze the relationship between morning sickness, maternal nutritional status, and their impact on fetal health.

METHODS

This research is a quantitative study with a cross-sectional design utilizing an observational approach. The purpose of this study is to explore and analyze the relationship between morning sickness, maternal nutritional status, and their impact on fetal health. The aim was to find and analyze the relationship between morning sickness, nutritional status of pregnant women, and its impact on fetal health (22). The study was conducted at five Community Health Centers (Puskesmas) in Palopo City, South Sulawesi, namely PKM Sendana, PKM Wara Selatan, PKM Wara Kota, PKM Pontap, and PKM Benteng, over a period of five months, from July to November 2024. The population in this study consisted of all pregnant women experiencing morning sickness across the five health centers, totaling 250 individuals. The sampling technique used was purposive sampling, which involves the deliberate selection of samples based on specific criteria relevant to the study's objectives. A total of 100 participants were selected, representing each Community Health Center (PKM). The inclusion criteria were pregnant women experiencing morning sickness in the first or second trimester, willing to participate as respondents, and able to communicate effectively. Meanwhile, the exclusion criteria included pregnant women with chronic medical conditions such as diabetes mellitus, hypertension, multiple pregnancies (twins), and a history of eating disorders.

Data were collected using a structured questionnaire developed by the researchers based on relevant theories and previous studies. The questionnaire assessed the intensity of nausea, frequency of vomiting, and its impact on the daily activities of pregnant women. The severity level was categorized as mild, moderate, and severe.The validity and reliability of the questionnaire were tested in a preliminary study, yielding results of $r > 0.30$ and a Cronbach's alpha > 0.70, indicating that the instrument is both valid

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and reliable.Maternal nutritional status was measured using the Body Mass Index (BMI), calculated from weight and height. BMI was then categorized as underweight, normal, or overweight. This classification refers to commonly used nutritional standards in maternal healthcare services. Meanwhile, fetal well-being can be assessed through ultrasound examination, as well as by monitoring fetal growth and development Before being used in the main study, the questionnaire underwent validity and reliability testing on 20 respondents during the pilot study. The questionnaire was administered through face-to-face interviews conducted by the researchers to minimize errors in data collection. In addition to the questionnaire, the researchers also conducted semi-structured interviews with healthcare personnel at each Community Health Center, particularly midwives and nutrition officers. These interviews helped verify the data provided by respondents and offered contextual insights into the questionnaire results (23).

The collected data were analyzed using descriptive and inferential statistical approaches. Descriptive statistics were used to describe the characteristics of respondents, the prevalence of morning sickness, maternal nutritional status, and fetal health indicators. The results of the descriptive analysis were presented in the form of frequency distributions, percentages, means, and standard deviations to facilitate data interpretation. To determine the relationship between the severity of morning sickness, maternal nutritional status, and fetal health, the Chi-square test or logistic regression analysis was used. All statistical analyses were performed using SPSS software version 25.0. The level of statistical significance was set at $p < 0.05$, meaning that relationships between variables were considered statistically significant if the p-value was less than 0.05 (24).

CODE OF HEALTH ETHICS

This study has received ethical approval with the number 20/KEP/III.3.AU/F/2024 from the Research and Community Service Institute (LPPM) of Muhammadiyah University Palopo.

RESULTS

Table 1 shows the general characteristics of 100 pregnant women experiencing morning sickness at the Community Health Centers (PKM) in Palopo City. The majority of respondents were aged between 20 and 30 years (55%), followed by those over 30 years old (30%) and under 20 years old (15%). Based on gestational age, most respondents were in their second trimester (60%), while the remaining 40% were in their first trimester. The severity of morning sickness experienced by pregnant women varied, with 28% reporting mild symptoms, 40% moderate, and 32% severe. Regarding nutritional status, the majority of respondents had a good nutritional status (36%), while 36% were classified as undernourished and 28% as overweight. Meanwhile, fetal health conditions were mostly categorized as healthy (58%), with 42% of fetuses classified as less healthy.

Table 1. Frequency Distribution of Respondent Characteristics

Characteristics	n	%
Age (Years)		
< 20	15	15
20-30	55	55
>30	30	30
Trimesters of Pregnancy		
Trimester 1	40	40
Trimester 2	60	60
Severity of Morning Sickness		
Light	28	28
Medium	40	40
Heavy	32	32
Nutritional status		
Good Nutritional	36	36
Undernutrition	36	36
Overnutrition	28	28
Fetal Health		
Healt	58	58
Fetal Distress	42	42
Total	**100**	**100%**

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Table 2 shows that out of a total of 100 respondents, the majority of those with good nutritional status experienced mild to moderate morning sickness, accounting for 21% (mild) and 15% (moderate), respectively. None of the pregnant women with good nutritional status experienced severe morning sickness. Conversely, among the undernourished group, only 4% experienced mild morning sickness, while 16% experienced moderate, and another 16% experienced severe morning sickness. Similarly, the overweight group showed a comparable trend, with 3% experiencing mild symptoms, 9% moderate, and 16% severe morning sickness. Statistically, a p-value of 0.005 indicates a significant association between nutritional status and the severity of morning sickness ($p < 0.05$). These results suggest that the more imbalanced the maternal nutritional status (either undernutrition or overnutrition), the greater the likelihood of experiencing more severe morning sickness.

Table 2. Relationship Between Nutritional Status and the Severity of Morning Sickness

Nutritional status	Severity of Morning Sickness						Total		P – Value
	Light		Medium		Heavy				
	n	%	n	%	n	%	N	%	
Good Nutritional	21	21.0	15	15.0	0	0	36	36	0.005
Undernutrition	4	4.0	16	16.0	16	16.0	36	36	
Overnutrition	3	3.0	9	9.0	16	16.0	28	28	
Total	28	28.0	40	40.0	32	32.0	100	100	

Table 3. Relationship Between Nutritional Status and Fetal Health

Nutritional status	Fetal Health				Total		P – Value
	Fetal Health		Fetal Distress				
	n	%	n	%	N	%	
Good Nutritional	36	36.0	0	0	36	36	0,003
Undernutrition	13	13.0	23	23.0	36	36	
Overnutrition	9	9.0	19	19.0	28	28	
Total	58	58.0	42	42.0	100	100	

Table 4. Relationship Between Morning Sickness Severity and Fetal Health

Severity of Morning Sickness	Fetal Health				Total		P – Value
	Fetal Health		Fetal Distress				
	n	%	n	%	N	%	
Light	28	28,0%	0	0%	28	28,0	0,004
Medium	30	30, 0%	10	10,0%	40	40,0	
Heavy	0	0%	32	32,0%	32	32,0	
Total	58	58,0%	42	42,0%	100	100%	

Table 3 presents data illustrating the relationship between maternal nutritional status and the health condition of the fetus. According to the study results, all 36 pregnant women with good nutritional status (100%) gave birth to healthy infants. This indicates a very strong association between optimal maternal nutrition and positive pregnancy outcomes. Meanwhile, among the undernourished group, only 13% had healthy fetuses, whereas 23% experienced pregnancies with fetuses in less healthy conditions. A similar pattern was observed in the overweight group, where only 9% of fetuses were born healthy, and the remaining 19% were in less healthy condition. The p-value of 0.003 confirms a highly significant relationship between maternal nutritional status and fetal health ($p < 0.05$). This means that the more optimal the maternal nutritional status, the greater the likelihood of delivering a healthy fetus. Poor nutrition, whether in the form of deficiency or excess, can lead to intrauterine growth restriction, metabolic disorders, and pregnancy complications that adversely affect fetal health.

Table 4 shows that all pregnant women experiencing mild morning sickness had healthy fetuses (100%). In the group with moderate morning sickness, 30% gave birth to healthy infants, while 10% delivered infants in less healthy conditions. The most striking finding was in the group with severe morning sickness: none of the women gave birth to healthy infants, and all (32%) delivered infants in less healthy conditions. Statistically, a p-value of 0.004 indicates a significant association between the severity of morning sickness and fetal health.

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DISCUSSION

The results of this study indicate a significant relationship between maternal nutritional status and the severity of morning sickness, with a p-value of 0.005. Pregnant women with undernutrition or overnutrition tend to experience more severe morning sickness compared to those with normal or adequate nutritional status. Women with poor nutritional status have limited energy, protein, and micronutrient reserves, making their bodies more sensitive to hormonal fluctuations, including hCG and estrogen. This finding aligns with the study by Firoz et al. (2021), which states that malnourished women are more likely to experience severe nausea and vomiting during early pregnancy due to metabolic imbalances and low energy reserves (25). Physiologically, morning sickness is closely related to the increased levels of hCG and estrogen during the first trimester. However, the lack of a statistically significant association may be due to limitations in sample size or variations in the measurement methods of morning sickness, which are not entirely objective. Nevertheless, the finding that pregnant women with normal nutritional status predominantly experience mild morning sickness supports previous literature suggesting that good nutritional status helps the body better adapt to hormonal changes during pregnancy (26). Thus, early management and improvement of nutritional status before and during pregnancy can be preventive strategies to reduce the severity of morning sickness (27), and continued with a class for pregnant women (28).

There is a significant relationship between maternal nutritional status and fetal health, with a p-value of 0.003. Mothers with normal or above-normal nutritional status have a higher proportion of healthy babies compared to mothers with poor nutritional status. These results are consistent with various studies indicating that maternal nutrition directly influences fetal growth and development, including birth weight, length, and the risk of prenatal complications (29). Good nutritional status before and during pregnancy enhances the supply of essential nutrients such as folic acid, iron, zinc, and protein, which are crucial for the development of fetal tissues and the placenta. Conversely, mothers with poor nutrition often experience anemia, hypoproteinemia, and micronutrient deficiencies that negatively affect blood flow to the placenta, thereby disrupting the supply of oxygen and nutrients to the fetus (30). This finding further emphasizes the importance of monitoring maternal nutritional status from the early stages of pregnancy (31). Efforts such as providing iron and folic acid supplements, nutrition education, and additional food support for undernourished pregnant women should be prioritized in antenatal care services (17,32,33). Moreover, findings from the Public Health Centers in Palopo City indicate that 25% of the mothers in this study were classified as undernourished, highlighting a considerable risk to fetal health that requires immediate intervention.

The statistical test results also showed a significant association between the severity of morning sickness and fetal health status, with a p-value of 0.004. Pregnant women experiencing severe morning sickness tend to have fetuses in poor health condition. This finding indicates that uncontrolled morning sickness can affect maternal nutrient intake, ultimately impacting fetal growth. Intrauterine growth retardation (IUGR), preterm birth, and low birth weight (LBW) (34). Furthermore, it is important to understand the psychological impact of morning sickness, which can cause psychological effects such as stress, anxiety, emotional fatigue, and mild depression, especially when symptoms are severe and prolonged. This condition can also reduce quality of life and disrupt the social and emotional relationships of pregnant women during pregnancy. Therefore, based on the research findings, it is recommended that local governments integrate mandatory nutritional counseling into every antenatal care (ANC) service at community health centers (Puskesmas) to improve pregnant women's understanding of the importance of nutrition in reducing the risk of morning sickness and pregnancy complications. Additionally, there is a need to develop educational modules focused on first-trimester dietary management, including foods rich in vitamin B6 and strategies for nausea management.

CONCLUSION

Based on the research findings, it is evident that the nutritional status of pregnant women has a significant relationship with fetal health. Mothers with normal or above-normal nutritional status tend to have healthier fetuses. There is a statistically significant association between nutritional status and the

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severity of morning sickness, with a tendency for undernourished mothers to experience more severe nausea and vomiting symptoms. Moreover, the severity of morning sickness is meaningfully related to the condition of the fetus; the more severe the symptoms, the higher the risk of adverse health outcomes for the unborn baby.

These findings highlight the importance of ensuring adequate nutritional intake from the early stages of pregnancy to prevent the negative impacts of morning sickness on fetal development. Targeted nutritional interventions, routine monitoring of pregnant women's health, and comprehensive education on managing pregnancy symptoms are essential. If morning sickness is not properly managed, it can trigger psychological stress, reduce the mother's quality of life, and increase the risk of pregnancy complications that harm the fetus.

Therefore, concrete and systematic policies are urgently needed, including the implementation of nutritional counseling services at primary healthcare facilities, provision of supplements for at-risk pregnant women, development of educational materials such as pocket guides, regular training for healthcare workers, and cross-sector collaborative programs such as the development of nutrition gardens. These measures are expected to improve the quality of maternity care, reduce complication rates, and ensure the health of both mothers and babies, particularly in areas like Palopo City.

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CONFLICTS OF INTEREST

The authors declare no conflict of interest.

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