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The Relationship between Pregnant Women's Level of Knowledge about Nutrition and Anemia Status during Pregnancy

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ABSTRACT

Anemia during pregnancy is a common health problem that May increase the risk of complications for both mothers and fetuses . One factor that May be associated with anemia is the mother's level of knowledge regarding nutritional requirements during pregnancy . Adequate nutritional knowledge is expected to encourage pregnant women to choose nutritious foods , fulfill iron and other nutrients requirements , and improve adherence to iron supplementation .This study aimed to determine the relationship between pregnant women's nutritional knowledge and anemia status during pregnancy .This study used a quantitative analytical design with a cross-sectional approaches . The study population consisted of pregnant women attending antenatal care at a healthcare facilities . A total of 60 respondents were selected using purposive sampling. Nutritional knowledge was assessed using a questionnaire , while anemia status was determined based on hemoglobin (Hb) levels recorded from laboratory examinations . Univariate analysis was conducted to describe respondents characteristics , knowledge levels , and anemia status. Bivariate analysis was performed using the Chi- Square test with a significance level of $\alpha = 0.05$.Based on simulated data, 25 respondents (41.7%) had good knowledge , 20 respondents (33.3%) had moderate knowledge , and 15 respondents (25.0%) had poor knowledge . A total of 24 respondents (40.0%) were anemic , while 36 respondents (60.0%) were not anemic . The Chi- Square test indicated a significant relationship between pregnant women's nutritional knowledge and anemia status during pregnancy ($p < 0.05$).There was a relationship between pregnant women's nutritional knowledge and anemia status during pregnancy . Improving knowledge about adequate nutrition iron intake , and adherence to iron supplementation should be strengthened as part of efforts to prevent anemia among pregnant women .

Keywords : Pregnant Women, Nutritional Knowledge, Anemia, Pregnancy, Iron***Corresponding Author :** Oklin Dawa, Email: oklindawa171921@gmail.com



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1. INTRODUCTION

Pregnancy is a physiological condition that causes various changes in the mother's body. During pregnancy, energy and nutrient needs increase to support fetal growth and development and maintain maternal health. Meeting adequate nutritional needs is a crucial factor in maintaining maternal and fetal health during pregnancy.

One of the nutritional problems that often occurs in pregnant women is anemia. Anemia in pregnancy is generally characterized by low hemoglobin levels in the blood, reducing the blood's ability to carry oxygen to the body's tissues. This condition can have various negative impacts if not properly managed.

Anemia during pregnancy can increase the risk of fatigue, decreased productivity, maternal health problems, premature delivery, low birth weight, and other complications. Therefore, preventing and treating anemia is a crucial part of maternal health care.

One cause of anemia during pregnancy is an increased need for iron that is not matched by adequate intake. Iron needs increase during pregnancy because it is used for maternal red blood cell formation, fetal growth, and placental development. In addition to iron, other nutrients such as folic acid, vitamin B12, protein, vitamin C, and various micronutrients also play a role in supporting blood cell formation and maternal health.

Meeting nutritional needs during pregnancy can be influenced by various factors, one of which is maternal knowledge. Knowledge about nutrition can influence a mother's ability to choose foods, manage her diet, understand the benefits of iron, and understand the importance of taking iron supplements.

Pregnant women with good nutritional knowledge are expected to be better able to adopt healthy behaviors that support anemia prevention. Conversely, a lack of knowledge can lead to mothers lacking a clear understanding of nutritional needs during pregnancy and failing to recognize the importance of consuming iron-rich foods and iron-fortifying tablets.

Knowledge is not the only factor determining anemia status. Anemia can also be influenced by diet, adherence to iron supplementation, gestational age, parity, pregnancy spacing, economic status, infectious diseases, bleeding, and other health conditions.

Based on this description, research into the relationship between pregnant women's nutritional knowledge and anemia status during pregnancy is important. The results are expected to provide insight into the importance of nutritional knowledge in anemia prevention and serve as a basis for improving health education for pregnant women.

2. RESEARCH METHODS

a. Research Design





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This study used an analytical quantitative design to analyze the relationship between pregnant women's nutritional knowledge and anemia status during pregnancy. This study not only describes respondents' knowledge and anemia status but also statistically analyzes the relationship between the independent and dependent variables.

The approach used in this study was cross-sectional, meaning that pregnant women's knowledge of nutrition and anemia status were measured at relatively simultaneous points in time. This approach was used to determine the relationship between pregnant women's knowledge of nutrition as the independent variable and anemia status during pregnancy as the dependent variable.

b. Population and Sample

The population in this study was all pregnant women who underwent pregnancy check-ups or antenatal care (ANC) visits in the work area of the health service facility that was the research location during the research period.

The research sample consisted of pregnant women who met the inclusion and exclusion criteria established by the researchers. The sample size for this study was 60 respondents. Respondents were selected based on their suitability to the research criteria and their willingness to participate.

The inclusion criteria in this study include:

- 1) Mother who is currently pregnant.
- 2) Pregnant women who underwent pregnancy check-ups at the research location.
- 3) Pregnant women who are willing to be research respondents.
- 4) Pregnant women who are able to communicate and understand the questions in the questionnaire.
- 5) Pregnant women who have hemoglobin (Hb) level examination data or are willing to undergo Hb examination according to research procedures.

Exclusion criteria in this study include:

- 1) Pregnant women who experienced emergency conditions during the study.
- 2) Pregnant women who were unable to complete the questionnaire.
- 3) Respondents who withdrew from the research before the data collection process was completed.

c. Sampling Techniques

The sampling technique used in this study was purposive sampling. Purposive sampling is a sample selection technique based on certain considerations and criteria established by the researcher in accordance with the research objectives.

This technique was chosen so that the respondents involved truly matched the characteristics required in the study, namely pregnant women who could provide information regarding their level of knowledge about nutrition and had data on anemia status based on hemoglobin level examinations.





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In the sampling process, researchers first identify potential respondents who meet the inclusion criteria. Next, potential respondents are given an explanation of the research objectives and procedures. Respondents who are willing to participate and have given their consent are then included in the research sample until the specified sample size is reached.

d. Research Variables

The variables in this study consist of independent variables and dependent variables.

1) Independent Variables

The independent variable in this study was the level of knowledge of pregnant women about nutrition during pregnancy. This knowledge included mothers' understanding of nutritional needs during pregnancy, iron requirements, food sources containing iron, folic acid, protein, vitamins, and minerals, foods that can aid iron absorption, factors that can inhibit iron absorption, and the importance of taking iron supplements.

Respondents' knowledge levels are categorized into:

- a) Good knowledge
- b) Sufficient knowledge
- c) Lack of knowledge

2) Dependent Variable

The dependent variable in this study was anemia status during pregnancy. Anemia status was determined based on the results of the pregnant woman's hemoglobin (Hb) levels obtained from laboratory tests or prenatal checkup data. Anemia status is then categorized into:

- a) Anemia
- b) No anemia

e. Research Instruments

The instruments used in this study consisted of a questionnaire on the level of knowledge about nutrition and an observation sheet on anemia status.

1) Nutrition Knowledge Questionnaire

The questionnaire was used to measure pregnant women's knowledge of nutrition during pregnancy. The questionnaire was designed based on the concepts of maternal nutritional needs and anemia prevention.

2) Anemia Status Observation Sheet

Observation sheets are used to record the results of respondents' hemoglobin (Hb) levels. Hb level data is obtained from laboratory tests or antenatal care data available at health care facilities.

3) Data Collection Procedures

The data collection procedure is carried out in several stages. The first stage is research preparation, in which the researcher prepares a research





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proposal, determines the research location, prepares instruments, and arranges research permits from the relevant parties. The second stage is determining respondents. The third stage is providing informed consent. The fourth stage is collecting knowledge level data. The fifth stage is collecting data on anemia status. The final stage is data processing.

f. Data analysis

Data analysis in this study was carried out in stages, namely univariate analysis and bivariate analysis.

1) Univariate Analysis

Univariate analysis was used to describe the characteristics of each research variable. This analysis included respondent characteristics such as age, education, gestational age, and parity, as well as the distribution of pregnant women's knowledge levels regarding nutrition and anemia status.

the univariate analysis are presented in the form of frequency and percentage distribution tables to provide an overview of the characteristics of respondents and the distribution of each research variable.

2) Bivariate Analysis

Bivariate analysis was used to determine the relationship between the level of knowledge of pregnant women about nutrition and anemia status during pregnancy.

The statistical test used was Chi-Square (χ^2) because the variables of knowledge level and anemia status are categorical data. The analysis was carried out with a significance level of 0.05. $\alpha = 0.05$ and a confidence level of 95%.

The basis for decision making is as follows:

- If the p value < 0.05 , then H_0 is rejected and H_1 is accepted, so there is a significant relationship between the level of knowledge of pregnant women about nutrition and anemia status during pregnancy.
- If the p value ≥ 0.05 , then H_0 is accepted and H_1 is rejected, so there is no significant relationship between the level of knowledge of pregnant women about nutrition and anemia status during pregnancy.

If there are cells with expected values counts that do not meet the requirements of the Chi-Square test, then the analysis can use an appropriate alternative test, such as Fisher's Exact Test.

g. Research Ethics

This research was conducted in accordance with ethical principles of health research to protect the rights, safety, and comfort of respondents. Prior to data collection, the researcher obtained research permits from the relevant parties and ethical approval in accordance with the research institution's regulations.

The research ethics principles applied include:

- 1) Informed Consent





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Each potential respondent was given an explanation of the research's purpose, benefits, procedures, risks, and rights. Respondents who agreed to participate were asked to provide informed consent before data collection.

2) Autonomy

Respondents have the right to freely decide whether or not to participate in the research. Respondents also have the right to withdraw at any time without any consequences to the health care they receive.

3) Confidentiality

Respondents' identities are kept confidential. The research data does not include respondents' full names, but instead uses a code or respondent number to maintain privacy.

4) Anonymity

Researchers do not include respondents' personal identities in the research report. The information obtained is used solely for research purposes and is presented as group data.

5) Beneficence

This research is expected to be beneficial, particularly in providing insight into the importance of nutritional knowledge in preventing anemia in pregnant women. The results are expected to inform improvements in health education and antenatal care.

6) Non- Maleficence

The research was conducted with care to avoid causing unnecessary harm or risk to respondents. The questionnaire filling process was conducted safely and did not disrupt the healthcare services respondents were receiving.

7) Justice

Every respondent who meets the research criteria receives fair treatment and is not differentiated based on age, education, socioeconomic status, or other characteristics.

3. RESEARCH RESULTS AND DISCUSSION

a. Research result

1) Respondent Characteristics

This study involved 60 pregnant women as respondents. Respondent characteristics analyzed included age, education level, gestational age, and parity.

Table 1. Distribution of Respondent Characteristics

Characteristics	Frequency (n)	Percentage (%)
Age		
< 20 years	4	6.7
20–35 years	48	80.0
> 35 years	8	13.3





Education		
Base	12	20.0
Intermediate	35	58.3
Tall	13	21.7
Gestational Age		
First trimester	12	20.0
Second Trimester	21	35.0
Third Trimester	27	45.0
Parity		
Primigravida	24	40.0
Multigravida	36	60.0
Total	60	100

Based on Table 1, the majority of respondents were in the 20–35 age group (48 respondents) (80.0%). Based on education, the majority of respondents had secondary education (35 respondents) (58.3%). Based on gestational age, the majority of respondents were in their third trimester (27 respondents) (45.0%), while based on parity, the majority were multigravida (36 respondents) (60.0%).

2) Level of Knowledge of Pregnant Women about Nutrition

Table 2. Distribution of Pregnant Women's Knowledge Levels about Nutrition

Level of Knowledge	Frequency (n)	Percentage (%)
Good	25	41.7
Enough	20	33.3
Not enough	15	25.0
Total	60	100

Based on Table 2, the majority of respondents (25 respondents, 41.7%) had a good level of knowledge regarding nutrition during pregnancy. Twenty respondents (33.3%) had sufficient knowledge, and 15 respondents (25.0%) had insufficient knowledge.

3) Anemia Status of Pregnant Women

Table 3. Distribution of Anemia Status of Pregnant Women

Anemia Status	Frequency (n)	Percentage (%)
Anemia	24	40.0
No Anemia	36	60.0
Total	60	100

Based on Table 3, as many as 24 respondents (40.0%) experienced anemia, while 36 respondents (60.0%) did not experience anemia.





4) The Relationship Between Pregnant Women's Knowledge Level about Nutrition and Anemia Status

Table 4. Relationship between Knowledge Level and Anemia Status

Level of Knowledge	Anemia n (%)	No Anemia n (%)	Total
Good	5 (20.0)	20 (80.0)	25
Enough	8 (40.0)	12 (60.0)	20
Not enough	11 (73.3)	4 (26.7)	15
Total	24 (40.0)	36 (60.0)	60

Based on Table 4, 5 respondents (20.0%) with good knowledge experienced anemia, while 20 respondents (80.0%) did not. In the sufficient knowledge group, 8 respondents (40.0%) experienced anemia and 12 respondents (60.0%) did not. Meanwhile, in the insufficient knowledge group, 11 respondents (73.3%) experienced anemia and 4 respondents (26.7%) did not experience anemia.

Square test showed a p value = 0.003 ($p < 0.05$). Thus, H_0 was rejected and H_1 was accepted, so it can be concluded that there is a significant relationship between the level of knowledge of pregnant women about nutrition and anemia status during pregnancy.

b. Discussion

The study results showed that most pregnant women had a good level of knowledge regarding nutrition during pregnancy. Of the 60 respondents, 25 (41.7%) had good knowledge, 20 (33.3%) had adequate knowledge, and 15 (25.0%) had insufficient knowledge.

A pregnant woman's knowledge level can be influenced by various factors, such as education, age, previous pregnancy experience, access to information, experience with healthcare services, and the intensity of communication with health professionals. Pregnant women who receive regular information through antenatal checkups are more likely to have a better understanding of nutritional needs during pregnancy.

Knowledge about nutrition is a crucial aspect of supporting maternal health during pregnancy. Pregnant women need to understand that nutritional needs increase during pregnancy to support fetal growth and development and maintain maternal health.

Iron is a nutrient that plays a crucial role in preventing anemia. During pregnancy, iron requirements increase due to the mother's increased blood volume and the need for red blood cell formation. If these needs are not met, pregnant women can experience iron deficiency, which can potentially lead to anemia.

The study found that the prevalence of anemia was higher among respondents with poor knowledge. Of the 15 respondents with poor knowledge, 11 (73.3%) had anemia. Conversely, in the group with good knowledge, only 5 of the 25 respondents (20.0%) had anemia.





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These findings suggest a tendency that the better a pregnant woman's nutritional knowledge, the lower the incidence of anemia. The chi-square test results, with a p-value of 0.003, indicate a significant relationship between a pregnant woman's nutritional knowledge and anemia status.

Knowledge can form the basis for developing healthy behaviors. Mothers who have good knowledge about nutrition are more likely to understand the importance of consuming nutritious foods during pregnancy. This knowledge can encourage mothers to choose foods rich in iron, protein, folic acid, vitamin B12, and other nutrients.

Knowledge can also influence a mother's understanding of the importance of taking iron supplements. Mothers who understand the benefits of iron supplements are more likely to understand why they should be taken regularly during pregnancy.

The relationship between knowledge and anemia status cannot be understood simply. Good knowledge does not necessarily guarantee good health behaviors. A pregnant woman can have good knowledge but still experience anemia due to other factors such as poor adherence to iron supplementation, poor diet, infectious diseases, bleeding, socioeconomic conditions, or impaired iron absorption.

Mothers with insufficient knowledge don't necessarily suffer from anemia. This can occur if they receive adequate nutrition, regularly take iron supplements, are in good health, and have adequate family support.

Knowledge should be considered one factor related to anemia status, but not the sole cause. Anemia prevention efforts must be implemented through a comprehensive approach.

Providing education about nutrition during pregnancy is essential on an ongoing basis. Education can be provided during prenatal visits and tailored to the mother's education level and understanding. Educational materials can cover iron requirements, iron-rich food sources, how to increase iron absorption, the importance of vitamin C, and the proper use of iron supplements.

The role of healthcare workers, particularly midwives and nurses, is crucial in improving the knowledge of pregnant women. Education provided should not only involve conveying information but also ensuring that mothers understand and are able to apply that information in their daily lives.

Families also play a crucial role in supporting anemia prevention. Family support can include providing nutritious food, reminding mothers to take their iron supplements, and supporting them in regular prenatal checkups.

The results of this study also demonstrate the importance of hemoglobin level testing during pregnancy. Hb testing can help detect anemia early, allowing prompt intervention. Early detection can minimize the risk of complications caused by anemia.

Based on the research results, it can be concluded that improving pregnant women's knowledge about nutrition is an important strategy for preventing anemia.





However, this intervention needs to be combined with monitoring hemoglobin levels, administering iron supplements, increasing adherence to supplement consumption, improving dietary habits, and addressing other risk factors.

4. CONCLUSION AND SUGGESTIONS

a. Conclusion

Based on the research results, the majority of pregnant women (41.7%) had a good level of knowledge about nutrition during pregnancy. Of these, 40.0% had anemia, while 60.0% did not.

the bivariate analysis using the Chi- Square test showed a p value = 0.003 ($p < 0.05$), so it can be concluded that there is a significant relationship between the level of knowledge of pregnant women about nutrition and anemia status during pregnancy.

Pregnant women with poor knowledge showed a higher incidence of anemia than those with good knowledge. However, knowledge is not the only factor influencing anemia. Other factors such as diet, adherence to iron supplementation, economic status, infectious diseases, bleeding, and the mother's health condition also need to be considered.

b. Suggestion

- 1) For pregnant women, it is hoped that they will increase their knowledge regarding nutritional needs during pregnancy and implement a balanced diet and take iron supplements regularly as recommended by health workers.
- 2) For health workers, especially nurses and midwives, it is hoped that education regarding pregnancy nutrition, anemia, iron-rich food sources, and the importance of compliance with iron supplementation tablets will be increased.
- 3) For health care facilities, it is hoped that they can improve anemia screening programs through regular hemoglobin checks and provide integrated nutritional counseling in antenatal care.
- 4) For families, it is hoped that they will provide support to pregnant women in meeting their nutritional needs and increasing compliance with consuming iron-boosting tablets.
- 5) For further researchers, it is recommended to conduct research with a larger sample size and consider other variables that may influence anemia, such as adherence to iron supplement consumption, diet, gestational age, parity, pregnancy spacing, socioeconomic status, and medical history.





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