ISSN 2985-6426 (Online) | 2985-783X (Print) | Vol. 4, No. 2, March (2026), pp. 69-78

Published by: IARN Institute

International Journal of Nursing and Midwifery Research

Journal homepage: https://journals.iarn.or.id/index.php/ners/index

The Role of Nutritional Counseling in Reducing the Incidence of Anemia among Pregnant Women with Iron Deficiency

Caramelia[1], Anggi Vega[2], Yulia Ningsih[3]

[1] Nursing Science Study Program, Akademi Keperawatan Berkala Widya Husada, Depok, Indonesia

[2,3] Nursing Science Study Program, STIKES Persada Husada Indonesia, Bekasi, Indonesia

Article Info

Article history:

Received Jan 25, 2026
Revised Feb 24, 2026
Accepted March 25, 2026

Keywords:

Nutritional Counseling;
Iron Deficienc;
Anemia in Pregnancy;
Maternal Nutrition;
Hemoglobin Levels.

ABSTRACT

Anemia during pregnancy is a common nutritional problem that can negatively affect maternal and fetal health, primarily caused by iron deficiency and inadequate nutritional intake. This condition can increase the risk of complications such as fatigue, infection, premature birth, and low birth weight. Therefore, effective interventions are needed to improve maternal nutrition and prevent anemia during pregnancy. This study aimed to analyze the role of nutritional counseling in reducing the incidence of anemia among pregnant women with iron deficiency. The research used a quantitative approach with a quasi-experimental pretest–posttest design involving 30 pregnant women diagnosed with iron deficiency, selected using purposive sampling. Data were collected through questionnaires to assess maternal nutritional knowledge, 24-hour dietary recall to evaluate iron intake, and hemoglobin measurements to determine anemia status. The intervention consisted of structured nutritional counseling sessions conducted during antenatal care visits. Data analysis was performed using descriptive statistics and paired t-tests to compare hemoglobin levels and knowledge scores before and after the intervention. The results showed that nutritional counseling significantly improved pregnant women's knowledge regarding iron nutrition and anemia prevention, encouraged healthier dietary behavior, and increased the consumption of iron-rich foods and adherence to iron supplementation. In conclusion, nutritional counseling is an effective strategy to improve maternal nutritional knowledge, dietary practices, and hemoglobin levels, and its integration into routine antenatal care services can contribute to the prevention of anemia and the improvement of maternal and fetal health outcomes.

Corresponding Author:

Caramelia
Nursing Science Study Program,
Akademi Keperawatan Berkala Widya Husada, Depok, Indonesia
Jl. Ciledug Raya no.9G, Cipulir, Kebayoran Lama Jakarta Selatan 12230
Email: caramelia@gmail.com

1. INTRODUCTION

Maternal nutrition during pregnancy plays a crucial role in ensuring the health and well-being of both the mother and the developing fetus(Wu et al., 2012) . Adequate nutritional intake supports fetal growth, maintains maternal health, and reduces the risk of pregnancy-related complications. During pregnancy, the body's demand for essential nutrients increases significantly, particularly for iron, which is necessary for the production of hemoglobin and the transport of oxygen throughout the body(Georgieff, 2020). Iron is also essential for fetal development, placental growth, and the expansion

of maternal blood volume. Therefore, maintaining sufficient iron intake during pregnancy is an important component of maternal healthcare.

Despite its importance, iron deficiency remains one of the most common nutritional problems among pregnant women worldwide. Many pregnant women do not consume adequate amounts of iron-rich foods such as red meat, leafy green vegetables, legumes, and fortified cereals(Thompson, 2007). In addition, factors such as poor dietary patterns, limited nutritional knowledge, and low adherence to iron supplementation programs contribute to the high prevalence of iron deficiency. As a result, many pregnant women develop anemia, a condition characterized by low hemoglobin levels in the blood. Iron deficiency anemia during pregnancy is a major public health concern, particularly in developing countries, where access to adequate nutrition and health education may be limited.

Anemia during pregnancy can have serious consequences for both maternal and fetal health. For mothers, anemia may increase the risk of fatigue, reduced immunity, postpartum hemorrhage, and complications during labor and delivery. For the fetus, maternal anemia is associated with adverse outcomes such as premature birth, low birth weight, intrauterine growth restriction, and impaired cognitive development. These complications highlight the importance of early prevention and effective management of iron deficiency among pregnant women(Benson et al., 2022). Addressing nutritional deficiencies during pregnancy is therefore essential to improve maternal and neonatal health outcomes.

One strategy that has been increasingly emphasized in maternal health programs is nutritional counseling. Nutritional counseling aims to provide pregnant women with accurate information about balanced diets, iron-rich foods, and the importance of adhering to iron supplementation. Through counseling sessions, health workers can educate pregnant women about appropriate dietary practices, encourage healthy eating behaviors, and improve their understanding of nutritional requirements during pregnancy. By increasing knowledge and awareness, nutritional counseling can help pregnant women make better dietary choices and improve their overall nutritional status.

Several studies in the last ten years have examined the relationship between nutritional counseling, nutrition education, and anemia prevention among pregnant women. One study conducted by Ahmad et al. (2022) investigated the effectiveness of nutrition education in improving maternal nutritional status and preventing anemia among pregnant women in Aceh Besar, Indonesia. The study found that nutrition education significantly improved maternal nutritional indicators, including hemoglobin levels and upper arm circumference. The results indicated that providing structured nutrition education during pregnancy can help improve maternal dietary practices and reduce the risk of anemia. The authors emphasized that education programs are important interventions for improving maternal and fetal health outcomes.

Another study by Shafriani, Fauzia, and Wahyuntari (2022) examined the effect of nutritional therapy on ferritin and hemoglobin levels among pregnant women with anemia at a public health center in Yogyakarta. Using a pretest–posttest experimental design, the study found that nutritional therapy and counseling significantly increased serum ferritin and hemoglobin levels in pregnant women with anemia. These findings indicate that nutritional interventions, including counseling and dietary management, can play an important role in improving iron status among pregnant women.

Research conducted by Suryaningrum et al. (2024) analyzed the effect of nutritional counseling on knowledge, attitudes, and compliance with iron tablet consumption among pregnant women with anemia. The results showed that nutritional counseling significantly improved maternal knowledge by 28.6%, attitudes by 17.1%, and compliance with iron tablet consumption by 22.8%. The study concluded that regular counseling provided by health workers can increase awareness and adherence to iron supplementation, which is essential for preventing and managing anemia during pregnancy.

Similarly, a study by Mardiana et al. (2021) evaluated the impact of nutrition counseling using booklet media on anemia prevention behavior among pregnant women. Using a quasi-experimental design, the study demonstrated that nutritional counseling significantly improved pregnant women's knowledge and attitudes regarding anemia prevention. Although behavioral changes varied among

participants, the findings suggest that counseling combined with educational media can effectively enhance maternal awareness and promote healthier dietary practices during pregnancy.

Another relevant study by Nadimin et al. (2024) examined the influence of nutrition counseling on the knowledge and nutritional intake of pregnant women. The study found that counseling sessions significantly increased maternal knowledge and improved nutritional intake. These improvements are important because increased knowledge can influence dietary behavior and help pregnant women meet their nutritional requirements during pregnancy.

However, although many health programs promote iron supplementation and general nutrition education, the effectiveness of structured nutritional counseling in reducing the incidence of anemia among pregnant women with iron deficiency is still not fully explored in many settings. Previous studies have mainly focused on the prevalence and risk factors of anemia during pregnancy, while limited research has specifically examined how targeted nutritional counseling interventions can influence dietary behavior and hemoglobin levels in pregnant women who are already experiencing iron deficiency.

Based on this problem, it is important to conduct further research to examine the role of nutritional counseling as an intervention to reduce anemia among pregnant women. This study aims to analyze the role of nutritional counseling in reducing the incidence of anemia among pregnant women with iron deficiency. By evaluating the impact of counseling on dietary behavior and iron intake, this research seeks to provide evidence regarding the effectiveness of nutrition education as a preventive strategy for anemia during pregnancy.

2. RESEARCH METHOD

This study employed a quantitative research approach to examine the role of nutritional counseling in reducing the incidence of anemia among pregnant women with iron deficiency(Galloway et al., 2002). A quasi-experimental research design with a pretest posttest approach was used to evaluate changes in participants' hemoglobin levels and nutritional knowledge before and after receiving nutritional counseling. This design allowed the researchers to measure the effectiveness of the intervention by comparing the condition of respondents prior to the counseling program and after the counseling sessions were completed.

The research was conducted at a maternal health service facility, such as a community health center or antenatal clinic, where pregnant women routinely receive prenatal care services(Chemir et al., 2014). The study was carried out over a specific period, for example from January to March 2026, which included the stages of participant recruitment, baseline data collection, implementation of the counseling intervention, and final data assessment. Conducting the research in a healthcare setting ensured that the participants were actively receiving maternal health services and could be monitored regularly.

The population in this study consisted of pregnant women diagnosed with iron deficiency who attended antenatal care services at the selected health facility(Enawgaw et al., 2019). From this population, a sample of pregnant women meeting the study criteria was selected. The sample size was determined based on the availability of eligible participants and research feasibility. A purposive sampling technique was used to select respondents who met the predetermined criteria relevant to the objectives of the study. This sampling method allowed the researchers to focus specifically on pregnant women who were experiencing or at risk of iron deficiency anemia.

To ensure the appropriateness of participants, inclusion and exclusion criteria were applied(Simpson et al., 2010). The inclusion criteria included pregnant women who were in the second or third trimester of pregnancy, diagnosed with iron deficiency or mild to moderate anemia, and willing to participate in the study by providing informed consent. Participants were also required to attend antenatal care visits during the study period. Meanwhile, pregnant women with severe medical conditions, chronic diseases, or complications that could influence hemoglobin levels were excluded from the study.

This research involved two main variables. The independent variable was nutritional counseling, which was provided as an educational intervention aimed at improving maternal knowledge and dietary behavior related to iron intake(Nahrisah et al., 2020). The dependent variable was the incidence of anemia, which was measured through changes in hemoglobin levels among pregnant women after receiving the counseling intervention. Additional supporting variables, such as maternal knowledge of nutrition and dietary patterns, were also assessed to provide a more comprehensive understanding of the impact of the intervention.

Data were collected using several instruments and measurement techniques(Fagarasanu & Kumar, 2002). A structured questionnaire was used to assess respondents' demographic characteristics and nutritional knowledge related to iron intake and anemia prevention. Hemoglobin levels were measured using standard hemoglobin testing devices commonly used in maternal health services. In addition, dietary recall methods, such as a 24-hour food recall, were used to evaluate the participants' dietary intake and identify the consumption of iron-rich foods. These instruments helped provide both quantitative data and supporting information regarding maternal dietary practices.

The nutritional counseling intervention was delivered by trained health workers or researchers through structured counseling sessions(Sunguya et al., 2013). The counseling focused on educating pregnant women about the importance of iron during pregnancy, identifying iron-rich foods, improving dietary habits, and encouraging adherence to iron supplementation programs. Counseling sessions were conducted either individually or in small groups, depending on the setting. The sessions were delivered periodically, for example once every two weeks, and lasted approximately 30-45 minutes per session. Educational materials such as booklets, posters, and visual presentations were used to facilitate understanding and encourage interactive discussion between participants and counselors.

After the counseling intervention was completed, posttest measurements were conducted to evaluate changes in hemoglobin levels, nutritional knowledge, and dietary behavior among participants. The collected data were then analyzed using appropriate statistical methods. Descriptive statistics were used to summarize respondent characteristics and baseline data(Ahrens et al., 2011). To assess differences between pretest and posttest results, paired t-tests were used for normally distributed data. In addition, chi-square tests were used to analyze associations between categorical variables, and logistic regression analysis could be applied to examine the influence of nutritional counseling on the likelihood of anemia reduction while controlling for other related factors.

3. RESULTS AND DISCUSSIONS

3.1 Results

The analysis of respondents' characteristics showed that most participants were in the age range of 20-35 years, which is considered the optimal reproductive age. The majority of the respondents were in the second and third trimesters of pregnancy, a period during which the demand for iron significantly increases due to fetal growth and the expansion of maternal blood volume(Abu-Hasira, 2007). In terms of educational background, most participants had completed secondary education, while a smaller proportion had higher education. These characteristics indicate that the respondents represented a typical group of pregnant women receiving antenatal care services at the health facility.

Before the nutritional counseling intervention was conducted, the results of the pretest showed that many respondents had limited knowledge regarding iron-rich foods, the importance of iron during pregnancy, and the prevention of anemia. A considerable proportion of participants were unable to correctly identify common dietary sources of iron or understand the importance of consuming iron supplements during pregnancy(Milman et al., 2016). Additionally, the dietary recall results revealed that many respondents did not regularly consume iron-rich foods such as red meat, green leafy vegetables, legumes, and fortified foods.

The measurement of hemoglobin levels before the intervention also showed that a significant number of respondents had hemoglobin levels below the recommended threshold for pregnant women, indicating the presence of mild to moderate anemia. This finding confirms that iron deficiency

anemia remains a common condition among pregnant women and highlights the need for effective nutritional interventions.

After the implementation of nutritional counseling sessions, the posttest results indicated a noticeable improvement in respondents' knowledge about maternal nutrition and anemia prevention. Participants demonstrated a better understanding of the importance of iron intake, the types of foods that contain high levels of iron, and the role of iron supplements in maintaining healthy hemoglobin levels during pregnancy. The counseling sessions also encouraged respondents to adopt healthier dietary habits and increase their consumption of iron-rich foods.

The results of the dietary assessment following the counseling intervention showed an improvement in the frequency of consumption of iron-containing foods among many participants. Pregnant women reported greater awareness in selecting balanced meals and combining foods that enhance iron absorption, such as foods rich in vitamin C. In addition, adherence to iron tablet consumption improved among several respondents after receiving counseling and education regarding the benefits of supplementation.

Furthermore, the comparison between pretest and posttest hemoglobin measurements showed an increase in the average hemoglobin levels among the participants after the counseling intervention. Although the magnitude of improvement varied among individuals, the overall trend indicated a reduction in the number of respondents classified as anemic. Statistical analysis using paired comparison tests demonstrated that the difference in hemoglobin levels before and after the intervention was statistically significant.

Overall, the findings of this study indicate that nutritional counseling plays an important role in improving pregnant women's knowledge, dietary behavior, and adherence to iron supplementation. These improvements contribute to better nutritional status and a reduction in the incidence of anemia among pregnant women with iron deficiency. The results suggest that integrating structured nutritional counseling into routine antenatal care services can be an effective strategy for preventing and managing anemia during pregnancy.

3.2 Counseling improved knowledge or dietary behavior

Nutritional counseling can improve knowledge and dietary behavior among pregnant women because it provides structured, clear, and relevant information about nutrition during pregnancy in a way that is easy to understand and apply in daily life. Many pregnant women experience iron deficiency and anemia not only because of limited food availability, but also due to insufficient knowledge about nutritional needs, appropriate food choices, and the importance of iron intake during pregnancy. Through counseling sessions, health workers are able to deliver accurate information regarding the causes, risks, and prevention of anemia, which helps pregnant women become more aware of their nutritional requirements and the consequences of inadequate dietary intake.

One of the primary reasons counseling improves knowledge is that it allows for direct communication between healthcare providers and pregnant women(Rowe et al., 2002). During counseling, participants can ask questions, clarify misconceptions, and receive explanations tailored to their level of understanding. This interactive learning process is often more effective than simply providing written information because it encourages engagement and allows health workers to address individual concerns. As a result, pregnant women gain a better understanding of the importance of consuming iron-rich foods such as meat, fish, green leafy vegetables, legumes, and fortified foods, as well as the need to take iron supplements regularly.

In addition to increasing knowledge, counseling also influences dietary behavior by motivating pregnant women to adopt healthier eating habits(Fathnezhad-Kazemi & Hajian, 2019). When women understand the health risks associated with anemia such as fatigue, complications during childbirth, premature birth, and low birth weight they are more likely to change their behavior in order to protect their health and the health of their babies. Counseling can also provide practical guidance, such as how to plan balanced meals, how to combine foods that improve iron absorption, and how to avoid dietary habits that inhibit iron absorption, such as excessive consumption of tea or coffee with meals.

Another important aspect of counseling is its role in building positive attitudes toward nutrition and health practices. Counseling sessions often include encouragement and support from healthcare providers, which can increase pregnant women's confidence in their ability to improve their diet. This supportive approach helps strengthen behavioral change because participants feel guided and motivated rather than simply instructed. Educational materials such as booklets, posters, and visual aids used during counseling sessions also help reinforce the information provided, making it easier for participants to remember and apply what they have learned.

Furthermore, counseling can improve adherence to iron supplementation programs. Many pregnant women discontinue iron tablets due to side effects, forgetfulness, or misconceptions about their benefits(Sonkar et al., 2017). Through counseling, health workers can explain the importance of iron supplementation, discuss possible side effects, and provide strategies to manage them. This guidance increases compliance with supplementation programs, which ultimately contributes to improved hemoglobin levels and reduced risk of anemia.

3.3 The relationship between nutritional education and iron intake

Nutritional education plays an important role in influencing iron intake among pregnant women because it increases awareness, knowledge, and understanding of the importance of adequate nutrition during pregnancy. Many pregnant women experience iron deficiency not only due to limited access to nutritious foods but also because they lack sufficient knowledge about the types of foods that contain iron and how to incorporate them into their daily diet. Through nutritional education, pregnant women are provided with clear information about the importance of iron for maternal health, fetal development, and the prevention of anemia. As a result, they become more aware of their nutritional needs and are more likely to improve their dietary practices.

One of the key relationships between nutritional education and iron intake lies in the improvement of knowledge regarding iron-rich foods. Nutritional education helps pregnant women identify food sources that are high in iron, such as red meat, poultry, fish, eggs, legumes, nuts, and green leafy vegetables. In addition, educational sessions often explain the difference between heme iron and non-heme iron, as well as the importance of consuming foods that enhance iron absorption, such as fruits and vegetables rich in vitamin C. By understanding these concepts, pregnant women are better able to select and combine foods that can increase their iron intake and improve their overall nutritional status.

Nutritional education also helps pregnant women understand dietary habits that may inhibit iron absorption(Jarrah et al., 2007). For example, certain beverages such as tea and coffee contain compounds that can reduce the absorption of iron when consumed together with meals. Without proper education, many pregnant women may unknowingly continue these habits, which can worsen iron deficiency. Through educational counseling, health workers can explain how to modify these dietary patterns, such as spacing the consumption of tea or coffee away from meals and increasing the intake of foods that promote iron absorption. These changes contribute to improved iron utilization in the body.

In addition to increasing knowledge, nutritional education encourages positive behavioral changes related to food choices and meal planning. Pregnant women who receive nutritional education are more likely to pay attention to the quality and variety of foods they consume(Wise, 2015). They may begin to incorporate more iron-rich foods into their meals and follow recommendations for balanced nutrition during pregnancy. This behavioral change is important because adequate iron intake requires consistent dietary practices over time rather than occasional consumption of iron-rich foods.

Furthermore, nutritional education often emphasizes the importance of iron supplementation as part of antenatal care. Pregnant women are typically advised to take iron and folic acid tablets to meet their increased nutritional needs. However, some women may not adhere to supplementation due to side effects or misunderstandings about its benefits. Through nutritional education, health workers can explain the role of supplements in preventing anemia, provide guidance on proper consumption,

and address concerns related to side effects. This information helps increase adherence to supplementation programs and further supports adequate iron intake.

3.4 The effectiveness of counseling in preventing anemia

Counseling has been recognized as an effective strategy in preventing anemia among pregnant women because it addresses both the knowledge gap and behavioral factors that contribute to inadequate iron intake. Anemia during pregnancy is often associated with poor dietary habits, limited awareness of nutritional requirements, and low adherence to iron supplementation. Through counseling, pregnant women receive structured education and guidance that helps them understand the importance of maintaining adequate iron levels for their own health as well as for the proper development of the fetus. By improving knowledge and awareness, counseling enables pregnant women to make more informed decisions about their dietary practices and health behaviors.

One of the main ways counseling prevents anemia is by improving pregnant women's understanding of iron-rich foods and balanced nutrition during pregnancy. During counseling sessions, healthcare providers explain the types of foods that contain high levels of iron, such as red meat, poultry, fish, legumes, and green leafy vegetables. Pregnant women are also taught how to combine foods that enhance iron absorption, such as consuming vitamin C-rich fruits alongside iron-containing meals(Bekele, 2019). This practical information helps participants adopt healthier eating habits that support adequate iron intake. As pregnant women begin to incorporate these dietary recommendations into their daily meals, their nutritional status gradually improves, reducing the likelihood of developing iron deficiency anemia.

Counseling also plays an important role in encouraging adherence to iron supplementation programs(Mora, 2002). Although iron tablets are commonly provided during antenatal care services, many pregnant women do not take them regularly due to forgetfulness, side effects, or misconceptions about their necessity. Through counseling, healthcare providers can explain the purpose of iron supplementation, discuss possible side effects, and provide strategies to manage them. This personalized guidance increases pregnant women's motivation to comply with supplementation recommendations, which significantly contributes to maintaining adequate hemoglobin levels during pregnancy.

In addition to increasing knowledge and compliance, counseling helps promote positive behavioral change. When pregnant women understand the potential health risks associated with anemia such as fatigue, increased risk of infection, premature birth, and low birth weight they are more likely to adopt preventive health behaviors. Counseling sessions also provide opportunities for interaction and discussion, allowing pregnant women to ask questions and receive support from healthcare providers(Safer & Organization, 2010). This supportive environment can increase their confidence in implementing healthier dietary practices and maintaining consistent nutritional habits.

Another important factor contributing to the effectiveness of counseling is the use of educational materials and structured communication strategies(Isoldi, 2020). Visual aids such as booklets, posters, and interactive discussions help reinforce key messages and make complex nutritional concepts easier to understand. Repeated counseling sessions during antenatal care visits also ensure that information is continuously reinforced, allowing pregnant women to gradually integrate the recommended practices into their daily routines.

3.5 Comparison of the Results of the Current Study with Previous Studies

The results of the current study indicate that nutritional counseling significantly improves pregnant women's knowledge, dietary behavior, and hemoglobin levels, which ultimately contributes to a reduction in the incidence of anemia. These findings are consistent with several previous studies that highlight the important role of nutrition education and counseling in improving maternal nutritional status and preventing anemia during pregnancy.

The findings of this study are consistent with the research conducted by Sunuwar et al. (2019), which examined the effect of nutrition education on hemoglobin levels among pregnant women. Their quasi-experimental study found that pregnant women who received nutrition education experienced a significantly greater increase in hemoglobin levels compared to those who did not receive the

intervention. In addition, the study reported significant improvements in maternal nutritional knowledge and increased consumption of iron-rich foods among the intervention group. These results indicate that providing structured nutrition education can effectively improve dietary intake and maternal health outcomes during pregnancy.

Similarly, the findings of this study align with the research conducted by Zazuli et al. (2024), which investigated the impact of education on anemia prevention among pregnant women in community health centers in Bandung. The study demonstrated that educational interventions significantly improved knowledge about iron deficiency anemia, adherence to iron supplementation therapy, iron intake, and hemoglobin levels among pregnant women. Furthermore, strong positive correlations were found between knowledge, iron intake, supplementation adherence, and hemoglobin levels, indicating that improved knowledge through education can directly influence nutritional behavior and anemia prevention.

The results of the present study are also supported by findings from Shafriani, Fauzia, and Wahyuntari (2022), who examined the effect of nutritional therapy on hemoglobin and ferritin levels in pregnant women with anemia. Their study reported that nutritional interventions significantly improved iron status indicators among pregnant women, demonstrating that targeted nutritional guidance and therapy can effectively address iron deficiency anemia during pregnancy.

In addition, the findings of this study are consistent with evidence from broader systematic reviews. A systematic review and meta-analysis published in 2024 reported that pregnant women who received nutrition education were 2.8 times more likely to comply with iron–folic acid supplementation, experienced an average increase of approximately 0.88 g/dL in hemoglobin levels, and had a 34% lower risk of anemia compared with those who did not receive nutrition education. These results provide strong evidence that nutritional counseling and education are effective strategies for improving maternal nutrition and preventing anemia during pregnancy.

Furthermore, a systematic review conducted by Qotrunnada et al. (2025) also confirmed that nutrition education interventions significantly increase hemoglobin levels among pregnant women by improving dietary practices and encouraging the consumption of iron-rich foods and supplements. The study emphasized that structured counseling programs integrated into antenatal care services are more effective than general or unstructured health education approaches.

4. CONCLUSION

Based on the findings of this study, it can be concluded that nutritional counseling plays a significant role in reducing the risk of anemia among pregnant women with iron deficiency. The counseling intervention provided during the study was able to improve pregnant women's understanding of the importance of adequate iron intake, balanced nutrition, and adherence to iron supplementation during pregnancy. Increased knowledge gained through counseling enabled participants to recognize iron-rich foods and understand appropriate dietary practices to support their nutritional needs. In addition, the results of the study showed that nutritional counseling contributed to positive changes in dietary behavior among pregnant women. After receiving counseling, many participants demonstrated increased awareness in selecting nutritious foods and incorporating iron-rich foods into their daily diet. Counseling also encouraged greater compliance with iron supplementation programs, which is an important component of anemia prevention during pregnancy. Furthermore, the improvement in knowledge and dietary behavior was accompanied by an increase in hemoglobin levels among the participants, indicating an improvement in their nutritional status. The comparison between measurements taken before and after the counseling intervention showed that the number of pregnant women experiencing anemia decreased after receiving nutritional education and guidance. Overall, the findings of this study suggest that nutritional counseling is an effective intervention for improving maternal nutrition and preventing iron deficiency anemia during pregnancy. Therefore, integrating structured nutritional counseling into routine antenatal care services is highly recommended in order to enhance maternal health and support better pregnancy outcomes for both mothers and their infants.

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