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Effectiveness of Nutritional Counseling on Improving Dietary Compliance Among Pregnant Women

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ABSTRACT

Introduction: *Maternal nutrition during pregnancy is critical in supporting maternal health and fetal development. However, many pregnant women do not adhere to recommended dietary practices, which may increase the risk of complications. Nutrition counseling has been proposed to improve compliance with healthy dietary behaviors.*
Objectives*: The purpose of this research was to assess how effective nutrition counseling is in enhancing dietary adherence among pregnant women.*
Methods: *This study adopted a quasi-experimental design with a non-equivalent control group and pretest–posttest format. A total of forty pregnant women in their second or third trimester participated and were allocated into an intervention group, which received structured nutritional counseling, and a control group, which continued routine antenatal care. Dietary compliance was evaluated before and after the four-week intervention using a validated instrument. The data were analyzed with paired t-tests for intra-group differences and independent t-tests for inter-group comparisons.*
Results: *Results revealed that nutrition counseling significantly enhanced compliance in the intervention group (mean gain of 0.85, $p < 0.005$). In contrast, the control group exhibited a minimal and non-significant change (mean gain of 0.15, $p = 0.120$). Post-test analysis showed that the intervention group's compliance scores were markedly greater than those of the control group ($p < 0.001$; $\alpha < 0.05$).*
Conclusions: *Findings indicate that nutrition counseling effectively enhanced compliance with dietary recommendations during pregnancy. Embedding structured counseling within antenatal services could contribute to improved eating habits, reduced maternal complications, and enhanced maternal-fetal health. Additional research is warranted to assess sustainability and broader implementation in diverse clinical contexts.*

Introduction

Maternal nutrition plays a pivotal role in shaping maternal and neonatal health outcomes. Globally, pregnant women are confronted with multiple nutritional challenges, including inadequate dietary intake, poor compliance with supplementation, and limited adherence to dietary guidelines, which collectively contribute to undernutrition and adverse pregnancy outcomes (Caut et al., 2020; Fernández-Gómez et al., 2020). Suboptimal maternal nutrition has been associated with anemia, low birth weight, preterm delivery, and increased maternal morbidity, underscoring its significance as a public health concern. Similar challenges remain evident in Indonesia, where limited dietary diversity and insufficient adherence to nutritional recommendations hinder optimal maternal health (RI, 2024). These conditions demonstrate the

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pressing need for effective interventions to strengthen maternal dietary practices and improve dietary compliance during pregnancy.

Maternal nutritional problems remain a primary global health concern, with approximately 37% of pregnant women worldwide affected by anemia (WHO, 2025). Globally, inadequate dietary intake, low dietary diversity, and poor adherence to supplementation contribute to undernutrition, anemia, and adverse pregnancy outcomes such as low birth weight and preterm delivery (Caut et al., 2020; Fernández-Gómez et al., 2020). To address these risks, the World Health Organization (WHO, 2023) recommends integrating routine nutrition counseling into antenatal care (ANC) to promote balanced diets, prevent excessive gestational weight gain, and reduce pregnancy-related complications. Evidence also demonstrates that adherence to healthy dietary patterns, such as the Mediterranean diet, can reduce the incidence of gestational diabetes and improve neonatal outcomes (Castro-Barquero et al., 2023). In Indonesia, maternal anemia remains a persistent challenge, with national surveys reporting a prevalence of about 28% among pregnant women (RI, 2024). Compliance remains suboptimal despite long-standing interventions such as anemia screening and iron–folic acid supplementation(Putri, 2019). At the regional level, nutritional problems such as chronic energy deficiency and low dietary adherence are still prevalent, further elevating maternal and neonatal health risks (Lina et al., 2022; Suryaningrum et al., 2024). Locally, in Banyuwangi District, research has shown that approximately 51% of pregnant women experience anemia. Although ANC coverage in this area is relatively high, maternal adherence to nutritional interventions remains inconsistent, particularly in rural communities where limited access to information, socioeconomic barriers, and household dietary practices hinder the effectiveness of existing programs.

Maternal nutritional problems can be addressed through various strategies, ranging from pharmacological to non-pharmacological approaches. Pharmacological interventions, such as iron–folic acid or multiple micronutrient supplementation, remain essential for preventing and treating anemia. However, their effectiveness is often limited by poor adherence and side effects that reduce compliance (Rusman Efendi et al., 2023). Non-pharmacological alternatives, including dietary modification and nutrition education, play an equally important role. Nutrition counselling addresses these gaps by improving nutritional literacy, shaping health-related attitudes, and building household-level skills for healthy food preparation. Evidence from systematic reviews confirms its effectiveness in increasing energy and nutrient intake, supporting healthy gestational weight gain, and improving maternal outcomes (Antika & Sartika, 2025; Dewidar et al., 2023). However, barriers such as limited dietary compliance, low supplement adherence, and insufficient provider support remain challenges in both approaches. Strengthening the intensity and quality of nutrition counselling, while complementing supplementation programs, is crucial to enhancing dietary compliance during pregnancy and reducing maternal and neonatal health risks. This research aims to evaluate the effectiveness of nutrition counseling in improving dietary compliance among pregnant women.

Methods

A quasi-experimental design with a control group was utilized in this study, conducted between January and March 2025 in Sembulung Village, Cluring Subdistrict, Banyuwangi Regency, Indonesia. The objective was to assess the effectiveness of nutritional counseling in enhancing dietary compliance among pregnant women. The study population consisted of all registered pregnant women in Sembulung Village (n = 86; Cluring Health Center, 2024). Participants were selected through purposive sampling based on inclusion criteria: being in the second or third trimester, agreeing to participate, and not experiencing severe medical complications. A total of 40 women were recruited and assigned equally to the intervention (n =

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20) and control groups (n = 20).The study procedure included three stages: (1) conducting a pretest in both groups to assess dietary compliance, (2) delivering the intervention in the form of four nutritional counselling sessions over four weeks to the intervention group, while the control group received routine care only, and (3) conducting a posttest in both groups after the intervention. The researcher delivered Nutritional counselling face-to-face using booklets and daily food checklist sheets, applying a participatory approach.

Dietary compliance was measured with a modified version of the Maternal Nutrition Compliance Questionnaire, consisting of 20 items across three domains: dietary intake, supplement use, and meal frequency. Validity testing produced a CVI of 0.87, suggesting strong content validity. Reliability testing using Cronbach's alpha yielded 0.89, indicating excellent internal consistency. Data analysis included univariate statistics to describe participant characteristics and bivariate analysis to examine the effect of nutrition counseling on dietary compliance. Paired t-tests assessed within-group changes, while independent t-tests compared intervention and control groups. A p-value below 0.05 was deemed statistically significant.

Results

Table 1. Characteristics of Respondents (n = 20 per group)

Characteristics	Category	Intervention Group		Control Group	
		n	%	n	%
Maternal Age	20–25 years	6	30	7	35
	26–30 years	9	45	8	40
	>30 years	5	25	5	25
Education	Primary/Junior HS	5	25	6	30
	Senior HS	11	55	10	50
	Higher Education	4	20	4	20
Parity	Primigravida	8	40	7	35
	Multigravida	12	60	13	65
Nutritional Status (BMI/Age)	Normal	14	70	15	75
	CED (Chronic Energy Deficiency)	6	30	5	25

The majority of pregnant women in both groups were between 26 and 30 years old, constituting 45% of the intervention group and 40% of the control group. Educationally, most participants had completed senior high school (55% in the intervention group; 50% in the control group). In terms of parity, multigravida women dominated, making up 60% and 65% of the intervention and control groups, respectively. According to BMI-for-age, normal nutritional status was most prevalent, observed in 70% of the intervention group and 75% of the control group.

Table 2. Compliance Scores of Pregnant Women Before and After Nutrition Counseling (n = 20 per group)

Group		Mean	Median	SD	Min–Max	95% CI	p-value (within groups)
Intervention	Pre	2.85	2.80	0.40	2.10–3.50	2.65–3.05	0.001
	Post	3.70	3.70	0.35	3.10–4.30	3.52–3.88	

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Group		Mean	Median	SD	Min–Max	95% CI	p-value (within groups)
Control	Pre	2.80	2.80	0.38	2.10–3.40	2.61–2.99	0.120
	Post	2.95	3.00	0.36	2.30–3.50	2.77–3.13	

In the intervention group, the mean score increased from 2.85 (95% CI: 2.65–3.05) at pre-test to 3.70 (95% CI: 3.52–3.88) at post-test. This improvement was statistically significant (p = 0.001; α <0.005), indicating that nutritional counseling substantially enhanced compliance with healthy eating practices. In the control group, the mean score rose slightly from 2.80 (95% CI: 2.61–2.99) to 2.95 (95% CI: 2.77–3.13). The change failed to achieve statistical significance (p = 0.120; α < 0.005), suggesting that routine antenatal care in isolation was not effective in enhancing dietary adherence.

Table 3. Differences in Mean Dietary Compliance Scores of Pregnant Women Between the Intervention and Control Groups After Nutritional Counseling (n = 20 per group)

Group	Mean	Median	SD	Min–Max	95% CI	p-value (between-groups)
Control	3.70	3.70	0.35	3.10–4.30	3.52–3.88	0.000
Intervention	12.50	12.50	1.40	9.2–14.5	11.80–13.20	

As presented in Table 3, a statistically significant gap was observed between the intervention and control groups after the counseling program, with the intervention group achieving a higher mean score (p = 0.000; α < 0.005). This outcome confirms that nutrition counseling was beneficial, as women in the intervention group demonstrated greater progress than those who only received routine care.

Discussion

Dietary Compliance of Pregnant Women Before Nutrition Counseling

The study results indicated that, prior to the provision of nutrition counseling, pregnant women in both the intervention and control groups exhibited relatively poor adherence to recommended dietary practices. The mean pre-intervention scores indicated that adherence to recommended nutritional intake was not optimal, reflecting limited awareness and consistency in maintaining balanced diets. This suggests that many pregnant women may struggle to meet their increased nutritional needs during pregnancy without additional guidance.

Previous studies have emphasized that inadequate dietary compliance among pregnant women is often linked to multiple factors, including limited nutritional knowledge, cultural eating practices, and food insecurity in low- and middle-income settings (Dewidar et al., 2021; Kaleem et al., 2020). Nutritional adequacy during pregnancy is crucial for preventing complications such as anemia, low birth weight, and maternal morbidity (Caut et al., 2020; Rahmannia et al., 2024). Evidence further suggests that behavioral barriers, rather than just food availability, play a central role in dietary non-compliance, highlighting the importance of targeted interventions (Afrilia et al., 2020).

In the context of this study, the low baseline dietary compliance underscores the urgent need for structured interventions, such as nutrition counselling, to strengthen maternal health practices. The results support the argument that counselling may serve as an essential bridge between knowledge and behaviour, addressing gaps that routine antenatal care alone may not cover. The researcher believes integrating counselling into maternal health services could

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provide personalised guidance, enhance awareness, and improve compliance with nutritional recommendations among pregnant women in resource-limited communities.

Dietary Compliance of Pregnant Women After Nutrition Counselling

The study findings indicated that nutrition counseling significantly improved dietary compliance among pregnant women. Participants in the intervention group exhibited a greater rise in mean compliance scores than those in the control group, suggesting that counseling was effective in strengthening adherence to dietary recommendations. This evidence highlights that structured nutrition counseling can positively shape maternal behaviors even within a relatively brief timeframe.

The improvement observed aligns with existing evidence that nutrition counselling promotes healthier dietary behaviors during pregnancy (Afrilia et al., 2020; Juliastuti et al., 2024). Counseling interventions increase knowledge and foster behavior change by providing practical strategies and continuous support. Previous studies have highlighted that personalised counselling integrated into antenatal care can enhance micronutrient intake, reduce risks of anemia, and improve pregnancy outcomes (Luh Putu Febriana Putri et al., 2018; Nadimin et al., 2024; Putri, 2019). This theoretical foundation reinforces the importance of nutrition counselling as a behavioural and educational approach in maternal health programs (Zare et al., 2025).

Based on the study findings, the researcher considers nutrition counselling a vital component of maternal health care. Its success in improving compliance suggests that health workers should integrate structured counselling sessions into routine antenatal visits, particularly in rural and resource-limited settings. The researcher believes counselling empowers pregnant women with knowledge and motivates consistent dietary practices, thereby strengthening maternal and fetal health outcomes. Expanding this intervention through community-based health services could enhance its sustainability and broader impact.

Differences in Mean Dietary Compliance Scores of Pregnant Women Between the Intervention and Control Groups After Nutritional Counselling

The study findings indicated a significant gap in dietary compliance scores between the intervention and control groups following nutrition counseling. Women in the intervention group achieved higher levels of compliance compared to those who received only routine antenatal care. These findings confirm that the counselling intervention effectively improved dietary adherence beyond the outcomes achieved by routine health services alone.

The observed difference is consistent with previous studies that emphasised the effectiveness of nutrition counselling in modifying dietary behaviours during pregnancy (Suryaningrum et al., 2024). Theoretical frameworks suggest counselling strengthens self-efficacy, enhances problem-solving skills, and addresses individual barriers to healthy eating. By combining education with motivational support, counselling enables women to make more informed and consistent dietary choices (Fikadu et al., 2024; Killel et al., 2024). Furthermore, systematic reviews have highlighted that structured and continuous counselling interventions significantly outperform general health education in improving dietary compliance among pregnant women (Antika & Sartika, 2025; Dewidar et al., 2021).

The researcher interprets these findings as strong evidence that nutrition counselling should be prioritised as an integral part of antenatal care services. Beyond improving compliance, counselling can reduce maternal and neonatal complications linked to poor dietary intake. In the researcher's view, scaling up this intervention within community health programs could provide sustainable improvements in maternal nutrition, particularly in rural and low-resource settings.

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Tailoring counselling strategies to local cultural and socioeconomic contexts will be crucial to maximising their effectiveness and long-term impact.

Conclusion

Findings demonstrated that nutrition counseling significantly improved dietary adherence compared with standard antenatal care, with participants in the intervention group showing greater improvements. The effectiveness of counseling in promoting healthier eating habits emphasizes the need for its inclusion within maternal health programs. Future research should explore sustained behavioral changes, clinical outcomes including anemia and birth weight, and the feasibility of scaling up such interventions across different populations and healthcare settings.

Ethics approval and consent to participate

Ethical approval for this study was obtained per institutional and national research guidelines. Before participation, all participants were informed about the study's purpose, procedures, and rights, and written informed consent was obtained. Participant confidentiality and anonymity were strictly maintained throughout the research process.

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