

Effectiveness of Community-Based Nutrition Education on Weight Gain of Pregnant Women in the Second Trimester: A Quasi-Experimental Study

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A B S T R A C T

Pregnancy is a critical period that requires optimal nutrition to support maternal health and fetal growth. However, many pregnant women's dietary practices often fall short of nutritional recommendations, putting them at risk for health problems and pregnancy outcomes. This study aimed to evaluate the effectiveness of community-based nutrition education in improving the nutritional status and weight gain of pregnant women in the second trimester. This study used a quasi-experimental design with a pre-test and post-test control group approach. The study sample consisted of second-trimester pregnant women selected purposively. The intervention consisted of structured nutrition education through lectures, discussions, and mentoring by health workers using a behavioral theory approach. Data were collected through knowledge questionnaires, 24-hour dietary recalls, and anthropometric measurements, and analyzed using descriptive and inferential statistics. The results showed that the intervention group experienced greater weight gain (4.31 ± 3.04 kg) compared to the control group (1.41 ± 2.25 kg). Furthermore, there was an increase in nutritional knowledge and improved consumption patterns in the intervention group. This study shows that community-based nutrition education is effective in improving the nutritional status of pregnant women through changes in consumption behavior. This model has the potential to be an applicable strategy in obstetric services to improve maternal health and prevent the risk of pregnancy complications.

I. INTRODUCTION

Pregnancy is a critical period in the life cycle that significantly determines the health of the mother and her unborn baby. During this period, nutritional requirements increase substantially to support fetal growth and development as well as maternal physiological adaptations. Inadequate or imbalanced nutritional intake during pregnancy can lead to various complications, including anemia, preeclampsia, low birth weight (LBW), and even maternal and neonatal mortality. Furthermore, maternal undernutrition contributes to impaired fetal growth and increases the risk of stunting in later life, reinforcing the intergenerational cycle of malnutrition (Rasmussen & Yaktine, 2010). Globally, maternal nutrition remains a major public health concern, particularly in low- and middle-income countries where the triple burden of malnutrition continues to pose significant challenges (Sangy et al., 2023).

One of the key indicators of maternal nutritional status is gestational weight gain, especially during the second trimester when energy and nutrient demands increase significantly (Rasmussen & Yaktine, 2010). Appropriate weight gain during pregnancy is essential for optimal maternal and fetal outcomes. Conversely, inadequate or excessive weight gain has been associated with adverse outcomes such as preeclampsia, gestational diabetes, cesarean delivery, and fetal growth restriction (Goldstein et al., 2017)(Sun et al., 2020). In addition, pre-pregnancy body mass index (BMI) and weight gain patterns significantly influence pregnancy outcomes and postpartum health status (Haugen et al., 2014).

In Indonesia, maternal nutrition continues to be a priority issue in national health development. The prevalence of anemia among pregnant women remains high, and chronic energy deficiency (CED) is still widely reported. Moreover, stunting prevalence remains above national targets, with maternal nutritional status during pregnancy identified as a key determinant. Inadequate gestational weight gain is still commonly observed, especially in areas with limited access to health services and nutrition information (Haugen et al., 2014), (Sari et al., 2024)

Dietary practices among pregnant women in developing countries, including Indonesia, often do not meet balanced nutrition recommendations. Only a small proportion of pregnant women demonstrate appropriate dietary practices, while most have inadequate dietary diversity and insufficient nutrient intake. Factors such as low educational level, poor nutritional knowledge, and limited access to antenatal care (ANC) services have been identified as key determinants influencing maternal dietary behavior and weight gain (Arora & Tamber Aeri, 2019), (Sari et al., 2025). In addition, energy intake, nutritional knowledge, and family support are dominant factors affecting gestational weight gain among pregnant women (Fitri & Wiji, 2018), (Ningsih et al., 2021).

Gestational weight gain is influenced by multidimensional factors, including physiological, psychological, social, and environmental determinants (Kominiarek & Peaceman, 2017). Psychological factors such as stress, body image perception, and motivation can affect dietary behavior and physical activity levels (Fitri & Wiji, 2018),(Kapadia et al., 2015). Low physical activity has also been associated with inappropriate weight gain during pregnancy (Barakat et al., 2019). Therefore, interventions aimed at improving gestational weight gain should consider behavioral and social aspects (Asefa et al., 2021), (McDonald et al., 2020)

Nutrition education has been widely recognized as an effective strategy to improve maternal nutritional status. Structured nutrition education and counseling can enhance knowledge, attitudes, and dietary behaviors, ultimately leading to improved nutritional indicators and gestational weight gain (Fitri & Wiji, 2018),. In addition, behavioral-based approaches are more effective in promoting sustainable behavior change as they address perceptions and motivations influencing health practices (Kominiarek & Peaceman, 2017)

In the Indonesian context, community-based approaches have gained increasing attention due to their ability to improve access to health information and strengthen social support systems. The involvement of health workers and Posyandu cadres in providing education and mentoring has been shown to enhance maternal adherence to nutritional recommendations and healthy lifestyle practices (Miele et al., 2021), (McDonald et al., 2020). Community-based interventions are also more contextually appropriate, as they consider socio-cultural and environmental factors influencing maternal behavior.

Despite the growing evidence supporting nutrition education, most studies still focus on conventional approaches and have not comprehensively integrated behavioral theory with community empowerment strategies. Furthermore, limited research has specifically examined community-based nutrition education models targeting gestational weight gain in the second trimester within the Indonesian context. This gap highlights the need for more comprehensive and context-specific interventions.

Therefore, this study aims to evaluate the effectiveness of a community-based nutrition education model in improving weight gain among second-trimester pregnant women using a quasi-experimental design. This study is expected to contribute to the development of more effective, applicable, and evidence-based midwifery interventions to improve maternal and infant health outcomes.

II. METHODS

This study used a quasi-experimental design with a pre-test and post-test control group to evaluate the effectiveness of nutrition education on changes in nutritional status and weight gain in pregnant women. This design was chosen because it provides a stronger picture of causal relationships than observational studies and allows for comparisons before and after the intervention in the two groups.

The study population consisted of pregnant women in their second trimester attending antenatal care (ANC) visits. The sample was determined using purposive sampling based on inclusion criteria: gestational age 14–27 weeks, no complications, and willingness to participate. Exclusion criteria included women with chronic illnesses, multiple pregnancies, and those who did not complete the intervention.

The research instruments included a nutritional knowledge questionnaire, a 24-hour food consumption recall method, and anthropometric measurements using digital scales and a MUAC tape. The instruments' validity and reliability were tested to ensure data accuracy. Measurements were conducted according to standard procedures to ensure consistency of results.

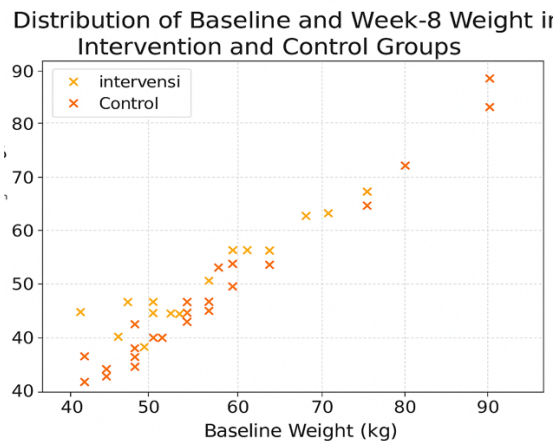
The intervention consisted of structured nutrition education covering nutritional needs during pregnancy, a balanced diet, and monitoring weight gain. Education was provided through lectures, discussions, and mentoring by health workers using a behavioral theory approach to promote behavioral change in pregnant women. Data collection was conducted through pre-test, intervention, and post-test stages. Data analysis used descriptive and inferential statistics, including paired t-tests to assess changes within groups and independent t-tests to compare between groups.

III. RESULT

Table 1. Summary statistics of baseline weight, week-8 weight, and total weight gain by group

Group	Mean Baseline Weight (kg)	SD Baseline	Mean Week-8 Weight (kg)	SD Week-8	Mean Total Weight Gain (kg)	SD Gain
Intervention	55.31	10.63	59.63	9.69	4.31	3.04
Control	55.12	11.08	56.53	11.89	1.41	2.25

Table 1 shows that the average initial weight of the intervention group (55.31 ± 10.63 kg) and the control group (55.12 ± 11.08 kg) was relatively comparable, indicating a homogeneous baseline. After 8 weeks, weight gain was higher in the intervention group (59.63 ± 9.69 kg) than in the control group (56.53 ± 11.89 kg). The average weight gain in the intervention group (4.31 ± 3.04 kg) was greater than that of the control group (1.41 ± 2.25 kg), demonstrating the effectiveness of nutrition education. The range of weight gain in the intervention group (0–15 kg) was also higher than that in the control group (-2 to 7 kg), with no weight loss in the intervention group, while weight loss was still observed in the control group.



determining pregnant women's weight gain in Deli Serdang (Sari et al., 2025).

From a behavioral perspective, the success of this intervention is also influenced by the integration of psychological and social aspects into nutrition education. Factors such as body perception, motivation, and family support have been shown to influence pregnant women's consumption patterns and physical activity (Kominiarek & Peaceman, 2017; Kapadia et al., 2015). Furthermore, low physical activity also contributes to weight imbalance during pregnancy (Barakat et al., 2019). Therefore, an approach that considers both behavioral and social aspects is more effective than an individual approach.

Furthermore, the success of this model demonstrates the strategic role of involving Posyandu (Integrated Health Post) cadres and health workers in enhancing the effectiveness of the intervention. Social support provided through home visits and regular mentoring has been shown to improve adherence of pregnant women to nutritional recommendations. This aligns with research emphasizing the importance of community support in changing health behaviors and improving the nutritional status of pregnant women (McDonald et al., 2020; Id et al., 2020).

V. CONCLUSION

This study demonstrates that a community-based nutrition education model is effective in increasing weight gain in pregnant women during the second trimester. The intervention group experienced greater weight gain than the control group, indicating that structured education with social support can improve the nutritional status, knowledge, and consumption behavior of pregnant women. A community-based approach through education, demonstrations, and mentoring by cadres proved more effective because it created an environment that supported behavior change. This model has the potential to be an applicable strategy in midwifery services to improve maternal health and prevent the risk of pregnancy complications.

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