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EFFECT OF HOME VISITS AND FAMILY CENTERED MIDWIFERY CARE ON FAMILY SUPPORT AND MATERNAL WEIGHT AMONG WOMEN WITH HIGH RISK PREGNANCIES: A QUASI EXPERIMENTAL STUDY

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ABSTRACT

Low birth weight and poor maternal nutritional status remain important public health concerns, particularly among women with high-risk pregnancies. Limited family involvement may reduce adherence to nutritional recommendations and antenatal care, thereby contributing to suboptimal maternal outcomes. This study aimed to evaluate the association of structured home visits combined with family-centered midwifery care with family support and maternal weight among women with high-risk pregnancies. This quasi-experimental study used intervention and control groups with repeated measurements. A total of 104 pregnant women were initially enrolled, with 52 participants in each group. Four participants did not complete the study: two women in the intervention group relocated, whereas one woman in the control group relocated and one voluntarily withdrew. The final analysis included 100 participants, with 50 women in each group. The intervention group received structured home visits, early risk detection, individualized nutritional counseling, maternal health monitoring, and active family involvement for 12 weeks, whereas the control group received routine antenatal care. Maternal weight was measured repeatedly from baseline to the third trimester. Data were analyzed using association analysis, repeated-measures ANOVA, an independent-samples t-test, ANCOVA, and multiple linear regression. Assignment to the intervention group was statistically associated with a higher family-support score (point-biserial r=0.724; 95% CI: 0.615–0.806; p<0.001). At the third-trimester measurement, mean maternal weight was 57.80±7.96 kg in the intervention group and 51.02±6.69 kg in the control group. The mean difference was 6.78 kg (95% CI: 3.86–9.69; p<0.001). After adjustment for maternal age, education, occupation, and parity, the group effect remained statistically significant (F=19.852; p<0.001; partial η^2=0.174). Family support had a statistically significant individual regression coefficient (B=3.288; 95% CI: 0.819–5.758; p=0.010); however, the overall regression model was not statistically significant (R^2=0.088; p=0.117). Structured home visits combined with family-centered midwifery care were associated with higher family support and higher third-trimester maternal weight among women with high-risk pregnancies. These findings should be interpreted cautiously because of the nonrandomized design and the absence of formal mediation analysis.

Kata Kunci:

Dukungan keluarga;
Kehamilan berisiko tinggi;
Kunjungan rumah;
Berat badan ibu;
Pelayanan kebidanan

ABSTRAK

Berat badan lahir rendah dan status gizi ibu yang kurang masih menjadi masalah kesehatan masyarakat, terutama pada ibu dengan kehamilan berisiko tinggi. Keterlibatan keluarga yang terbatas dapat menurunkan kepatuhan ibu terhadap rekomendasi gizi dan pelayanan antenatal sehingga berkontribusi terhadap luaran maternal yang kurang optimal. Penelitian ini bertujuan mengevaluasi hubungan kunjungan rumah terstruktur yang dipadukan dengan asuhan kebidanan berpusat pada keluarga dengan dukungan keluarga dan berat badan ibu pada kehamilan berisiko tinggi. Penelitian kuasi-eksperimental ini menggunakan kelompok intervensi dan kontrol dengan pengukuran berulang. Sebanyak 104 ibu hamil direkrut pada awal penelitian, masing-masing 52 responden pada setiap kelompok. Empat responden tidak menyelesaikan penelitian, yaitu dua responden kelompok intervensi berpindah alamat, sedangkan pada kelompok kontrol satu responden berpindah alamat dan satu responden mengundurkan diri. Analisis akhir melibatkan 100 responden, masing-masing 50 responden pada setiap kelompok. Kelompok intervensi memperoleh kunjungan rumah terstruktur, deteksi dini risiko, konseling gizi individual, pemantauan kesehatan ibu, dan pelibatan aktif keluarga selama 12 minggu, sedangkan kelompok kontrol memperoleh pelayanan antenatal rutin. Berat badan ibu diukur secara berulang sejak awal penelitian hingga trimester ketiga. Data dianalisis menggunakan analisis hubungan, repeated-measures ANOVA, uji t tidak berpasangan, ANCOVA, dan regresi linear berganda. Keikutsertaan dalam kelompok intervensi berasosiasi secara statistik dengan skor dukungan keluarga yang lebih tinggi (point-biserial r=0,724; 95% CI: 0,615–0,806; p<0,001). Pada pengukuran trimester

ketiga, rerata berat badan ibu pada kelompok intervensi sebesar 57,80±7,96 kg dan kelompok kontrol sebesar 51,02±6,69 kg. Perbedaan rerata antara kedua kelompok sebesar 6,78 kg (95% CI: 3,86–9,69; p<0,001). Setelah dikontrol berdasarkan usia, pendidikan, pekerjaan, dan paritas, efek kelompok tetap signifikan secara statistik (F=19,852; p<0,001; partial η^2=0,174). Dukungan keluarga memiliki koefisien regresi individual yang signifikan (B=3,288; 95% CI: 0,819–5,758; p=0,010), tetapi model regresi secara keseluruhan tidak signifikan (R^2=0,088; p=0,117). Kunjungan rumah terstruktur yang dipadukan dengan asuhan kebidanan berpusat pada keluarga berasosiasi dengan dukungan keluarga dan berat badan ibu trimester ketiga yang lebih tinggi pada ibu dengan kehamilan berisiko tinggi. Hasil penelitian perlu diinterpretasikan secara hati-hati karena desain penelitian tidak menggunakan randomisasi dan belum dilakukan analisis mediasi formal.

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INTRODUCTION

Low birth weight and inadequate maternal nutrition remain major public health concerns because they contribute to neonatal morbidity, impaired growth and development, and increased risks of adverse pregnancy outcomes, particularly in low- and middle-income countries (Hunter et al., 2023; WHO and UNICEF, 2025). Antenatal nutritional interventions, including individualized dietary counseling and monitoring of maternal nutritional status, are therefore essential components of efforts to prevent low birth weight and improve maternal and neonatal outcomes (Hanifi et al., 2024; WHO, 2023). In the *Global Nutrition Targets 2030: Low Birth Weight Brief*, the World Health Organization reported that the latest global estimate indicated a low birth weight prevalence of 14.7% in 2020, affecting approximately 19.8 million newborns, or nearly one in every seven births worldwide. This figure represents only a slight decline from 15.0% in 2012, indicating that global progress remains insufficient to achieve the international target for reducing low birth weight (WHO and UNICEF, 2025).

Maternal nutritional problems also remain evident in South Sulawesi Province. According to the 2023 Indonesian Health Survey, the prevalence of chronic energy deficiency among pregnant women in South Sulawesi was 19.7%, which was higher than the national prevalence of 16.9% (BKPK, 2023). In Makassar City, Health Office data published by Statistics Indonesia recorded 926 cases of low birth weight among 24,782 live births in 2023 (BPS Kota Makassar, 2024). These findings indicate that maternal undernutrition and low birth weight continue to require attention through interventions that strengthen nutritional assessment, provide individualized nutrition counseling, improve the quality and continuity of antenatal care, and involve families in meeting the nutritional needs of pregnant women (Hanifi et al., 2024; Hunter et al., 2023).

This issue is particularly important among women with high-risk pregnancies because nutritional vulnerability may coexist with biological, socioeconomic, and healthcare-access-related risks. In the present study, high-risk pregnancy was operationally defined as pregnancy among women younger than 19 years or older than 35 years. These groups were prioritized because they may require more intensive nutritional and obstetric monitoring throughout pregnancy. Maternal weight and gestational weight gain should also be interpreted in relation to pre-pregnancy body mass index, baseline nutritional status, and pregnancy-related conditions rather than being assessed solely on the basis of absolute body weight (Aji et al., 2022; Deshpande et al., 2025). Inadequate early risk detection, delayed initiation or incomplete use of antenatal care, and limited household support may further increase maternal vulnerability and delay appropriate management (Kartika et al., 2024; Laksono et al., 2022; Paratmanitya et al., 2021). These conditions are relevant to the service areas of Cenderawasih Community Health Center and Kalukubodoa Community Health Center in Makassar City, where continuous nutritional monitoring and family involvement are important components of antenatal care.

Family support is an important determinant of maternal health behavior during pregnancy. Emotional support may reduce psychological burden and strengthen maternal confidence, informational support may improve understanding of nutritional and antenatal recommendations, and instrumental support may facilitate access to nutritious food, transportation, health facilities, and routine pregnancy

examinations. Evidence indicates that perceived social support is associated with health-promoting behaviors and objective health indicators among pregnant women (Mitchell et al., 2022). In the Indonesian context, husbands' involvement and educational background are also associated with participation in antenatal care and may influence household decisions regarding maternal healthcare (Laksono et al., 2022; Wulandari et al., 2022). A systematic review of antenatal-care utilization in Indonesia similarly identified husband support, family support, maternal knowledge, education, socioeconomic status, and access to healthcare as important determinants of antenatal-care use (Kartika et al., 2024). Nevertheless, meaningful family engagement may remain limited because of insufficient knowledge of pregnancy risks, unequal household decision-making, socioeconomic constraints, and structural barriers to accessing healthcare.

Home visits combined with family-centered midwifery care may provide a practical strategy for strengthening continuity between facility-based antenatal care and support within the household. Through structured home visits, midwives and other maternal health workers can directly assess maternal conditions, identify nutritional and obstetric risks, provide individualized counseling, reinforce adherence to antenatal recommendations, and engage husbands or other family members in maternal-care planning. Maternal mentoring in Indonesia has been shown to improve the timing of the first antenatal-care visit through education, monitoring, and ongoing support (Paratmanitya et al., 2021). Midwife-coordinated and midwifery led models of care can also improve continuity, individualization of services, and selected pregnancy outcomes, particularly among women who require more complex care (de Wolff et al., 2021; Fikre et al., 2023). Furthermore, community based health and nutrition programs demonstrate that strengthened service delivery and targeted household visits can improve contact with pregnant women and facilitate the provision of health and nutrition services (Dilworth et al., 2024; Patil et al., 2022).

Family-centered care positions the family not merely as part of the pregnant woman's social environment but as an active partner in maintaining maternal health. The conceptual pathway underlying the present study proposes that structured home visits and family-centered midwifery care increase the family's knowledge, involvement, and capacity to provide emotional, informational, and practical support. Stronger family support may encourage adherence to nutrition counseling, improve food selection and meal regularity, facilitate antenatal-care attendance, and promote timely responses to maternal danger signs. Individualized nutrition counseling and professional dietary support during pregnancy may also contribute to improved dietary practices and maternal and neonatal outcomes (Hanifi et al., 2024; Hunter et al., 2023). These behavioral changes may subsequently support more appropriate gestational weight gain. However, gestational weight gain is influenced by multiple factors, including pre-pregnancy body mass index, baseline nutritional status, dietary intake, physical activity, healthcare support, and pregnancy related conditions (Aji et al., 2022; Teede et al., 2022).

Although antenatal nutrition and lifestyle interventions have demonstrated potential benefits for gestational weight gain and pregnancy outcomes, the magnitude of their effects varies according to baseline maternal characteristics, intervention intensity, and service-delivery context (Mackeen et al., 2022; Teede et al., 2022). Existing reviews of gestational weight-management interventions have largely focused on diet, physical activity, overweight, obesity, and healthcare based lifestyle programs (Aung et al., 2022; Barroso et al., 2022). Studies addressing maternal undernutrition have more frequently evaluated birth weight and other neonatal outcomes rather than repeated maternal nutritional indicators during pregnancy (Hanifi et al., 2024). In addition, implementation barriers including limited time, insufficient professional training, fragmented services, and difficulties integrating nutrition and weight management into routine antenatal care may reduce intervention effectiveness (Dilworth et al., 2024).

Community and home based maternal health studies have also commonly focused on antenatalc are utilization, service delivery, household targeting, or birth outcomes (Owoputi et al., 2024; Patil et al., 2022). Consequently, evidence remains limited regarding whether structured family engagement delivered through repeated midwifery home visits is associated simultaneously with improvements in family support and maternal weight trajectories among women with high-risk pregnancies. Family involvement is frequently treated as a contextual or background factor rather than as a modifiable target of a structured maternal-health intervention.

The novelty of this study lies in its simultaneous evaluation of a behavioral outcome, namely family support, and a physiological outcome, namely maternal weight, through repeated measurements

within a quasi-experimental design. Family support was examined as an outcome associated with the intervention and as a potential explanatory factor related to maternal weight. However, it was not considered a confirmed mediator because baseline and repeated family support measurements and formal mediation analysis were not conducted. Therefore, this study aimed to evaluate whether structured home visits combined with family-centered midwifery care were associated with improved family support and more favorable maternal weight trajectories among women with high-risk pregnancies in the service areas of Cenderawasih Community Health Center and Kalukubodoa Community Health Center, Makassar City.

METHOD

Study Design and Setting

This study employed a quasi-experimental design with intervention and control groups and repeated measurements. The research was conducted at Cenderawasih Community Health Center and Kalukubodoa Community Health Center, Makassar City, South Sulawesi Province, in 2025.

Participants and Intervention

A total of 104 pregnant women with high-risk pregnancies were initially enrolled and allocated equally to the intervention and control groups, with 52 participants in each group. High-risk pregnancy was operationally defined as pregnancy among women aged younger than 19 years or older than 35 years. During follow-up, two participants in the intervention group were lost to follow-up because they relocated. In the control group, one participant relocated and one voluntarily withdrew from the study. Consequently, 100 participants completed the study and were included in the final analysis, comprising 50 participants in each group.

The intervention group received structured home visits and family-centered midwifery care for 12 weeks. The intervention included early detection of pregnancy risks, individualized nutritional counseling, regular maternal health monitoring, and active involvement of husbands or other family members in supporting maternal care during pregnancy. The control group received routine antenatal care according to the standard services provided by the community health centers.

Data Collection and Measurements

Data were collected using structured questionnaires, maternal health records, family-support assessments, and maternal weight measurements. Maternal weight was assessed repeatedly at baseline and during the first, second, and third trimesters.

Statistical Analysis

Baseline characteristics were summarized and compared between the intervention and control groups. Categorical variables were analyzed using the chi-square test or an exact test, as appropriate. Continuous baseline variables were compared using an independent-samples t-test. Nonsignificant p-values were not interpreted as evidence that the two groups were identical.

The association between study-group membership and family support was evaluated using point-biserial correlation analysis. Changes in maternal weight over time within each group were evaluated using repeated-measures ANOVA. Because the sphericity assumption was violated, corrected results were considered in the interpretation. Third-trimester maternal weight was compared between the groups using an independent-samples t-test. ANCOVA was used to examine differences in third-trimester maternal weight after adjustment for maternal age, education, occupation, and parity. Multiple linear regression was performed to identify factors associated with third-trimester maternal weight. Family support was examined as an associated factor and was not interpreted as a mediator because formal mediation analysis was not performed. Effect estimates were reported with 95% confidence intervals, and statistical significance was set at $p<0.05$.

Ethical Considerations

Ethical approval was obtained from the relevant ethics committee under approval number 528/UN4.6.4.5.31/PP36/2026.

RESULT

Participant Flow

A total of 104 pregnant women were initially enrolled, comprising 52 participants in each study group. During follow-up, two participants in the intervention group were lost to follow-up because they relocated. In the control group, one participant relocated and one voluntarily withdrew from the study. Consequently, 100 participants completed the study and were included in the final analysis, with 50 participants in each group.

Baseline Characteristics

Baseline characteristics of the participants included in the final analysis are presented in Table 1. No statistically significant baseline differences were detected between the intervention and control groups in maternal age, education, occupation, parity, nutritional knowledge, baseline maternal weight, or mid-upper arm circumference. However, p-values greater than 0.05 were not interpreted as evidence that the two groups were identical, particularly because group allocation was nonrandomized.

Table 1. Distribution of Respondents Based on Study Variables (N=105)

Variable	Category	Control n (%)	Intervention n (%)	*p*
Age	<19 years	37 (74.0)	36 (72.0)	0.822
	>35 years	13 (26.0)	14 (28.0)	
Education	Basic	6 (12.0)	7 (14.0)	0.809
	Middle	37 (74.0)	38 (76.0)	
	Higher	7 (14.0)	5 (10.0)	
Occupation	Working	6 (12.0)	7 (14.0)	0.766
	Not working	44 (88.0)	43 (86.0)	
Parity	Primipara	11 (22.0)	18 (36.0)	0.296
	Multipara	23 (46.0)	18 (36.0)	
	Grand multipara	16 (32.0)	14 (28.0)	
Nutritional Knowledge	Poor	41 (82.0)	39 (78.0)	0.592
	Moderate	8 (16.0)	8 (16.0)	
	Good	1 (2.0)	3 (6.0)	
Weight (kg)	Mean ± SD	46.14 ± 6.63	44.92 ± 6.33	0.349
Mid-Upper Arm Circumference (cm)	Mean ± SD	23.21± 1.94	23.51 ± 2.22	0.467

Family Support at Final Assessment

The final distribution of family support is presented in Table 2. Good family support was observed in 34 participants (68.0%) in the intervention group and in none of the control participants, corresponding to an absolute difference of 68.0 percentage points (95% CI: 52.5-79.2). The overall distribution differed significantly between groups (chi-square(2)=55.692; p<0.001; Cramer's V=0.746). Because family support was not measured at baseline, these findings represent a between-group association at final assessment rather than a pre-post change.

Table 2. Distribution of Family Support at Final Assessment by Study Group (n=100)

Family-support category	Control n (%)	Intervention n (%)	p-value
Poor	14 (28.0)	0 (0.0)	<0.001
Moderate	36 (72.0)	16 (32.0)	
Good	0 (0.0)	34 (68.0)	

Maternal Weight by Study Group and Measurement Time

Maternal weight according to study group and measurement time is presented in Table 3. At baseline, mean maternal weight was 46.14±6.63 kg in the control group and 44.92±6.33 kg in the intervention group. At the third-trimester measurement, mean maternal weight was 51.02±6.69 kg in the control group and 57.80±7.96 kg in the intervention group.

Table 3. Maternal Weight by Study Group and Measurement Time (n=100)

Measurement time	Control mean ± SD (kg)	Intervention mean ± SD (kg)
Baseline	46.14 ± 6.63	44.92 ± 6.33
First trimester	47.15 ± 6.89	45.45 ± 6.27
Second trimester	51.42 ± 7.40	48.15 ± 6.60
Third trimester	51.02 ± 6.69	57.80 ± 7.96

Group-by-Time Analysis of Maternal Weight

Mixed repeated-measures analysis showed a significant effect of time and a significant group-by-time interaction (Table 4). The interaction indicates that maternal-weight trajectories differed between the intervention and control groups. The overall group main effect averaged across all measurement times was not statistically significant, which is consistent with the crossover pattern of the group profiles.

Table 4. Effects of Time, Study Group, and Group-by-Time Interaction on Maternal Weight

Effect	F	p-value	Partial eta squared
Time	757.266	<0.001	0.885
Study group	0.012	0.914	<0.001
Group x time	234.203	<0.001	0.705

Third-Trimester Maternal Weight Comparison

The comparison of third-trimester maternal weight is presented in Table 5. The intervention group had a 6.78-kg higher mean third-trimester maternal weight than the control group (95% CI: 3.86-9.69; p<0.001). This is an absolute maternal-weight comparison and should not be interpreted as gestational weight gain.

Table 5. Comparison of Third-Trimester Maternal Weight Between Study Groups

Outcome	Control, mean ± SD	Intervention, mean ± SD	Mean difference	95% CI	p-value
Third-trimester maternal weight, kg	51.02 ± 6.69	57.80 ± 7.96	6.78	3.86-9.69	<0.001

Covariate-Adjusted Analysis

The covariate-adjusted analysis is presented in Table 6. After adjustment for maternal age, education, occupation, and parity, study-group membership remained statistically associated with third-trimester maternal weight (F=19.852; p<0.001; partial eta squared=0.174). Baseline maternal weight and gestational age were not included in this model and are addressed as limitations.

Table 6. ANCOVA of Third-Trimester Maternal Weight

Variable	F	p-value	Partial eta squared
Study group	19.852	<0.001	0.174
Maternal age	0.215	0.644	0.002
Education	0.007	0.932	<0.001
Occupation	0.941	0.334	0.010
Parity	0.024	0.877	<0.001

Model: R squared=0.191; adjusted R squared=0.148; p=0.001.

Factors Associated with Third-Trimester Maternal Weight

Multiple linear regression results are presented in Table 7. Family support had a statistically significant individual coefficient (B=3.288; 95% CI: 0.819-5.758; p=0.010). However, the overall model was not statistically significant and explained only 8.8% of the variation in third-trimester maternal weight (R squared=0.088; adjusted R squared=0.040; F(5,94)=1.819; p=0.117). Family support was therefore interpreted as an associated factor rather than an established independent predictor or mediator.

Table 7. Multiple Linear Regression Analysis of Third-Trimester Maternal Weight

Variable	B	SE	Standardized beta	95% CI for B	p-value
Maternal age	0.742	2.092	0.041	-3.411 to 4.895	0.723
Education	-0.532	1.742	-0.033	-3.991 to 2.928	0.761
Occupation	-2.713	2.527	-0.114	-7.729 to 2.304	0.286
Parity	0.346	1.208	0.033	-2.052 to 2.744	0.775
Family support	3.288	1.244	0.272	0.819 to 5.758	0.010

Model statistics: R squared=0.088; adjusted R squared=0.040; F(5,94)=1.819; p=0.117.

DISCUSSION

This study found that structured home visits combined with family-centered midwifery care were associated with a more favorable distribution of family support and a different maternal-weight trajectory among women with high-risk pregnancies. At the final assessment, 68.0% of participants in the intervention group had good family support, whereas no participant in the control group was classified in this category. However, because family support was not measured at baseline, this finding should be interpreted as a between-group difference at the final assessment rather than evidence of improvement from baseline. The significant group-by-time interaction further indicated that the pattern of maternal-weight change differed between the intervention and control groups rather than representing a uniform increase in weight throughout pregnancy.

The observed difference in family support is plausible because the intervention directly involved husbands or other family members in nutritional counseling, recognition of pregnancy risks, antenatal care planning, and practical support. Perceived social support during pregnancy has been associated with healthier maternal behaviors and better subjective and objective health indicators (Mitchell et al., 2022). In the Indonesian context, husband involvement is also an important component of antenatal-care utilization, particularly in relation to accompanying women, supporting household decisions, and facilitating access to maternal healthcare (Laksono et al., 2022). Husband education may further influence understanding of pregnancy-related recommendations and the use of antenatal services among socioeconomically disadvantaged households (Wulandari et al., 2022). A systematic review of antenatal-care utilization in Indonesia similarly identified husband support, family support, maternal knowledge, education, socioeconomic conditions, and healthcare access as relevant determinants of service utilization (Kartika et al., 2024).

Family involvement may also strengthen adherence to nutritional recommendations by improving communication, practical assistance, household decision-making, and access to appropriate

food and health services. Nutrition counseling during pregnancy should encourage healthy dietary practices, adequate nutrient intake, and appropriate maternal weight gain according to individual nutritional conditions (WHO, 2023). Evidence from systematic reviews indicates that antenatal nutrition interventions and professional dietary support may contribute to improved maternal dietary practices and selected birth outcomes, although intervention effects vary according to baseline nutritional status, intervention intensity, and healthcare context (Hanifi et al., 2024; Hunter et al., 2023). Therefore, the present intervention may have strengthened the household environment in which pregnant women followed nutritional and antenatal recommendations.

Home based and community-linked approaches may strengthen continuity between professional recommendations provided in healthcare facilities and daily practices within the household. In Indonesia, a maternal mentoring program that incorporated education, monitoring, reminders, and ongoing support improved the timing of the first antenatal care visit (Paratmanitya et al., 2021). Community health and nutrition programs have also shown that structured household contact can increase service delivery to pregnant women and facilitate the identification of women requiring additional nutritional or healthcare support (Owoputi et al., 2024; Patil et al., 2022). These findings support the use of home visits as a mechanism for connecting antenatal services with the social and practical conditions experienced by women within their households.

The family centered component of the intervention is also consistent with evidence supporting individualized and coordinated maternity care. Midwife-coordinated care for pregnant women with chronic medical conditions can strengthen continuity, individualized support, and women's experiences of maternity care (de Wolff et al., 2021). More broadly, midwifery-led models have been associated with improvements in selected maternal and neonatal outcomes in low- and middle-income countries, although effects depend on the organization of services, study quality, and population characteristics (Fikre et al., 2023). The present findings extend this rationale by incorporating repeated home contact and treating family participation as an intervention component rather than merely as a background characteristic.

The maternal weight findings require careful interpretation. Body weight during pregnancy reflects several physiological components, including fetal and placental growth, amniotic fluid, expansion of maternal blood volume, enlargement of maternal tissues, fat accumulation, and fluid retention. It is also affected by pre-pregnancy body mass index, baseline nutritional status, gestational age, dietary intake, physical activity, edema, and pregnancy complications. Indonesian cohort evidence demonstrates that both pre-pregnancy body mass index and gestational weight gain are associated with pregnancy outcomes (Aji et al., 2022). Clinical recommendations similarly emphasize that maternal weight should be assessed in relation to pre-pregnancy body mass index, nutritional risk, and individualized weight management goals rather than interpreted solely as an absolute measurement (Biaggi et al., 2025).

Therefore, the higher mean third-trimester weight observed in the intervention group should not automatically be interpreted as a beneficial outcome or as evidence of appropriate gestational weight gain. The reported 6.78 kg difference represented an absolute comparison of third trimester maternal weight between groups rather than a direct comparison of weight gain from baseline. Appropriate gestational weight gain differs according to maternal pre pregnancy body mass index and may be influenced by numerous behavioral, clinical, and socioeconomic factors (Aji et al., 2022; Zhou et al., 2022). Interpretation should therefore consider whether participants began pregnancy with undernutrition, normal nutritional status, overweight, or obesity and whether weight changes remained within clinically appropriate ranges.

The significant group-by-time interaction is more informative than separate within-group comparisons because it directly evaluates whether the trajectories of maternal weight differed between groups over time. Nevertheless, the adjusted analysis included only maternal age, education, occupation, and parity. Baseline maternal weight, pre-pregnancy body mass index, gestational age at each measurement, dietary intake, food security, physical activity, edema, and pregnancy complications were not included. These omitted variables could have affected both maternal-weight trajectories and the estimated magnitude of the intervention effect.

Previous studies have generally reported that structured antenatal diet, physical activity, and lifestyle interventions produce relatively modest changes in gestational weight gain, with effects varying

according to maternal risk profile, intervention components, adherence, and intensity of professional support (Lapian et al., 2022; Vigod et al., 2025). Reviews focusing on women with overweight or obesity have similarly shown that intervention effectiveness depends on behavioral strategies, clinical integration, frequency of contact, and participant characteristics (Aung et al., 2022; Barrera et al., 2022). Consequently, the relatively large difference observed in the present study may partly reflect residual confounding, differences in gestational age at measurement, baseline nutritional variation, or other unmeasured pregnancy-related factors.

Implementation factors should also be considered when interpreting the potential application of the intervention. Integrating nutrition counseling and gestational weight management into routine antenatal care may be affected by limited consultation time, inadequate staff training, inconsistent clinical protocols, competing service priorities, and insufficient referral or follow up systems (Prina et al., 2023). Standardized home visit protocols, clearly defined nutritional targets, appropriate training for midwives, and consistent anthropometric measurement procedures would therefore be required before implementing the intervention more broadly.

The findings were obtained from two urban community health centers and may therefore not be generalizable to rural areas, hospitals, private maternity services, or populations with different socioeconomic and cultural characteristics. Despite these limitations, structured family centered home visits may be considered a complementary antenatal care strategy. Their implementation should emphasize early risk detection, individualized nutrition counseling, active family participation, continuity of midwifery care, and maternal nutritional monitoring based on clinically appropriate targets rather than weight increase alone.

CONCLUSION AND SUGGESTION

Structured home visits combined with family-centered midwifery care were associated with a more favorable distribution of family support at final assessment and significantly different maternal-weight trajectories among women with high-risk pregnancies. The intervention group also had a higher mean third-trimester maternal weight than the control group.

The findings should not be interpreted as proof of causality, optimal gestational weight gain, or mediation by family support. The nonrandomized design, absence of baseline family-support measurement, and incomplete adjustment for baseline nutritional and pregnancy-related factors limit causal inference.

Future studies should use randomized or cluster-randomized designs, validated repeated measures of family support, formal group-by-time and mediation analyses, and adjustment for baseline weight, pre-pregnancy body mass index, gestational age, dietary intake, food security, and pregnancy complications. In practice, family-centered home visits may complement antenatal care when delivered by trained midwives using standardized procedures and clinically appropriate nutritional targets.

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