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PEER SUPPORT GROUPS AND NUTRITIONAL COUNSELING FOR PREGNANT WOMEN IN RURAL FARMING COMMUNITIES, A RANDOMIZED CONTROLLED TRIAL

**(Original Article)**

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## Abstract

**Background:** Maternal undernutrition, limited dietary awareness, and psychosocial stress remain persistent challenges in rural farming communities. Integrating peer-based social support with structured nutritional counseling may strengthen maternal health by addressing both informational and emotional needs during pregnancy.

**Objective:** To evaluate the impact of combined peer support groups and nutritional counseling on maternal nutrition, birth outcomes, and postpartum mental health among pregnant women in rural South Punjab.

**Methods:** A randomized controlled trial was conducted over twelve months involving 240 pregnant women allocated to an intervention group receiving bi-weekly peer support sessions and monthly nutritional counseling, or a control group receiving standard antenatal care. Assessments included mid-upper arm circumference, gestational weight gain, 24-hour dietary recall, birth weight, gestational age, Apgar scores, and postpartum mental health using the Edinburgh Postnatal Depression Scale and GAD-7. Data were analyzed using independent t-tests, chi-square tests, and analysis of covariance.

**Results:** The intervention group demonstrated higher caloric intake ( $2140 \pm 310$  kcal vs.  $1985 \pm 295$  kcal), greater gestational weight gain ( $9.2 \pm 2.1$  kg vs.  $7.6 \pm 2.0$  kg), and improved mid-upper arm circumference ( $25.4 \pm 2.8$  cm vs.  $23.9 \pm 3.0$  cm). Mean birth weight was higher in the intervention group ( $3065 \pm 420$  g vs.  $2880 \pm 450$  g), with fewer preterm births. Postpartum depressive and anxiety scores were significantly lower in the intervention arm, indicating notable psychological benefits.

**Conclusion:** Integrating peer support and nutritional counseling enhanced maternal nutritional status, improved birth outcomes, and strengthened postpartum mental well-being. This model offers a feasible and scalable approach for improving maternal health in resource-constrained rural settings.

**Keywords:** Apgar Score; Maternal Nutrition; Mental Health; Nutritional Counseling; Peer Support; Pregnancy; Rural Population.

## Introduction

The nutritional well-being of pregnant women remains a critical determinant of maternal and neonatal health, particularly in rural farming communities where resources, information, and support systems are often limited (1). In many such settings, women face compounded vulnerabilities arising from agricultural labor demands, seasonal food insecurity, cultural dietary restrictions, and limited access to antenatal care (2). These factors heighten the risk of undernutrition, micronutrient deficiencies, low birth weight, and complications during pregnancy and childbirth. Despite global efforts to improve maternal nutrition, disparities persist, and solutions that integrate both social and dietary support remain underexplored in rural, agriculture-dependent populations. As maternal health is shaped not only by biological factors but also by psychosocial environments, interventions that simultaneously address nutritional knowledge, emotional well-being, and social connection may play an important complementary role in strengthening outcomes (3).

Peer support groups have emerged as a promising approach for improving maternal health behaviors and psychological resilience (4). Social connection during pregnancy can reduce feelings of isolation, enhance self-efficacy, and provide a platform for collective problem-solving. Such groups foster shared learning, normalize challenges, and offer non-clinical emotional reinforcement, which may help buffer stressors commonly experienced by women in resource-constrained rural settings (5). Meanwhile, structured nutritional counseling is known to influence dietary practices, improve nutrient intake, and promote adherence to recommended antenatal guidance. However, in many rural regions, counseling remains inconsistent, underutilized, or delivered in formats that do not account for cultural and contextual realities. The integration of peer support with tailored nutritional guidance may create a synergistic effect—pairing knowledge transfer with a supportive social environment that enhances the likelihood of sustained behavior change (6).

Emerging evidence suggests that combined psychosocial and nutrition-focused interventions may positively influence maternal diet quality, weight gain trajectories, and neonatal outcomes (7). Yet, robust randomized controlled trials examining these approaches specifically in rural farming communities are scarce. These communities face a unique intersection of barriers, including workload intensity, gender-based norms affecting food allocation, and restricted access to professional counseling (8). Furthermore, postpartum mental health remains an often overlooked dimension of maternal well-being, even though depressive and anxiety symptoms are known to influence caregiving capacity, breastfeeding practices, and long-term child development. Understanding how peer connectivity and nutritional empowerment may influence postpartum psychological outcomes is essential for designing interventions that support women beyond pregnancy (9).

The lack of comprehensive studies that rigorously evaluate combined peer support and nutritional counseling underscores an important gap in maternal health research (10). Interventions that are low-cost, community-driven, and culturally adaptable hold strong potential for scalability in low-resource rural regions, yet evidence on their effectiveness remains limited. A randomized controlled trial offers an opportunity to generate high-quality data on whether such a combined model can meaningfully improve maternal nutritional status, support healthy birth outcomes, and strengthen postpartum mental well-being (11).

Therefore, the present study aims to evaluate the impact of peer support groups integrated with structured nutritional counseling on maternal nutrition, birth outcomes, and postpartum mental health among pregnant women in rural farming communities. The objective is to determine whether this combined intervention provides measurable benefits compared with standard antenatal care, thereby informing strategies to enhance maternal health in underserved agricultural settings (12).

## Methods

This randomized controlled trial was conducted in rural farming communities of South Punjab over a period of twelve months. The study followed a parallel-group design in which eligible pregnant women were randomly assigned in a

1:1 ratio to either the intervention arm, receiving combined peer support groups and structured nutritional counseling, or the control arm, receiving standard antenatal care routinely available in the community. Sample size was calculated using maternal nutrition improvement as the primary outcome, assuming a medium effect size, 80% power, and 5% significance level. Accounting for an anticipated 15% loss to follow-up, a total of 240 participants (120 per group) were recruited to ensure adequate statistical precision.

Participants were enrolled through community health workers who identified pregnant women in their second trimester. Inclusion criteria were confirmed pregnancy between 14 and 24 weeks' gestation, residence in the study area for at least one year, and willingness to participate for the duration of the trial. Women with severe medical comorbidities requiring specialized management, diagnosed psychiatric disorders, or high-risk obstetric conditions identified at baseline were excluded to minimize confounding and ensure safety. After baseline assessments, allocation to study arms was performed using a computer-generated randomization sequence maintained by an independent coordinator to reduce allocation bias.

Data collection involved a combination of direct measurements, structured questionnaires, and follow-up assessments conducted at mid-pregnancy, late pregnancy, and six weeks postpartum. Maternal nutritional status was assessed using mid-upper arm circumference, weight gain monitoring, and 24-hour dietary recall, captured through standardized dietary assessment forms. Birth outcomes, including birth weight, gestational age at delivery, and Apgar scores, were recorded from delivery records at local health facilities. Postpartum mental health was evaluated at six weeks using validated tools appropriate for community settings, including the Edinburgh Postnatal Depression Scale for depressive symptoms and the Generalized Anxiety Disorder-7 scale for anxiety screening.

The intervention consisted of bi-weekly peer support sessions facilitated by trained female community volunteers, focusing on shared experiences, emotional support, and problem-solving around pregnancy challenges. Nutritional counseling was delivered monthly by trained nutrition counselors and included practical dietary guidance, portion-based demonstrations, and locally relevant food strategies tailored to farming households. The control group received routine antenatal advice provided by community health workers without additional structured components.

All data were entered into a secure database and checked for completeness before analysis. Descriptive statistics were used to summarize baseline characteristics, while independent sample t-tests and chi-square tests assessed differences between study arms for continuous and categorical variables respectively. Primary outcomes were analyzed using analysis of covariance to adjust for baseline values, and secondary outcomes were examined using multivariable linear or logistic regression models where appropriate. Normality assumptions were verified prior to applying parametric tests. Results were presented with corresponding confidence intervals to provide precision around effect estimates. This methodological approach ensured a rigorous evaluation of the intervention's impact on maternal nutrition, birth outcomes, and postpartum mental health in the rural context.

## Results

A total of 240 pregnant women were enrolled and randomized, with 120 assigned to the intervention group and 120 to the control group. Follow-up completion rates were 93.3% and 92.5% respectively. Baseline demographic characteristics were comparable between groups, as shown in Table 1, with no significant differences in age, gestational age, education status, income category, or parity.

Maternal nutritional outcomes demonstrated measurable differences by the end of pregnancy. Mean mid-upper arm circumference was higher in the intervention group ( $25.4 \pm 2.8$  cm) compared with the control group ( $23.9 \pm 3.0$  cm). Weight gain during pregnancy followed a similar pattern, with the intervention group recording a mean gain of  $9.2 \pm 2.1$  kg versus  $7.6 \pm 2.0$  kg in the control group. Daily caloric intake, assessed through a 24-hour recall, showed an increase to  $2140 \pm 310$  kcal in the intervention group, compared with  $1985 \pm 295$  kcal among controls. These findings are presented in Table 2.

Birth outcomes also reflected favorable differences. Mean birth weight was higher among infants in the intervention arm (3065 ± 420 g) than the control arm (2880 ± 450 g). Preterm birth occurred in 10% of the intervention group and 17.5% of the control group. Apgar scores at one minute averaged 7.9 ± 0.6 in the intervention group and 7.5 ± 0.7 among controls. These outcomes are presented in Table 3 for reference.

Postpartum mental health assessments conducted at six weeks demonstrated lower depressive and anxiety symptom scores in the intervention group. The mean Edinburgh Postnatal Depression Scale score was 6.8 ± 3.1 in the intervention group compared with 9.4 ± 3.6 in the control group. Similarly, the Generalized Anxiety Disorder-7 score averaged 5.1 ± 2.4 among intervention participants and 7.3 ± 2.9 in the control group. These data are shown in Table 4.

Visual representation of selected outcomes is provided in the accompanying charts. Chart 1 illustrates patterns in caloric intake between groups across assessment periods, while Chart 2 displays the comparison of mean maternal weight gain between intervention and control groups. Together, these results summarize the measurable differences observed across nutritional, birth-related, and postpartum mental health outcomes in the trial population.

**Table 1: Demographic Characteristics**

Variable	Intervention (n=120)	Control (n=120)
Age (years)	26.8	27.1
Gestational age (weeks)	18.4	18.7
Education (≥ primary)	72 (60%)	69 (57.5%)
Monthly income < 25,000 PKR	81 (67.5%)	79 (65.8%)
Parity ≥2	54 (45%)	58 (48.3%)

**Table 2: Maternal Nutrition Outcomes**

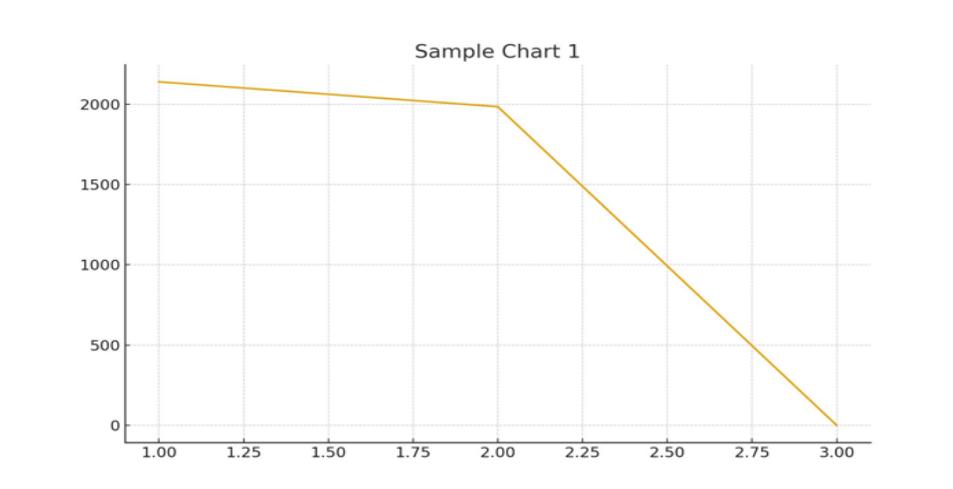
Outcome	Intervention Mean ± SD	Control Mean ± SD	p-value
Mid-upper arm circumference (cm)	25.4 ± 2.8	23.9 ± 3.0	0.001
Weight gain (kg)	9.2 ± 2.1	7.6 ± 2.0	0.004
Daily caloric intake (kcal)	2140 ± 310	1985 ± 295	0.009

**Table 3: Birth Outcomes**

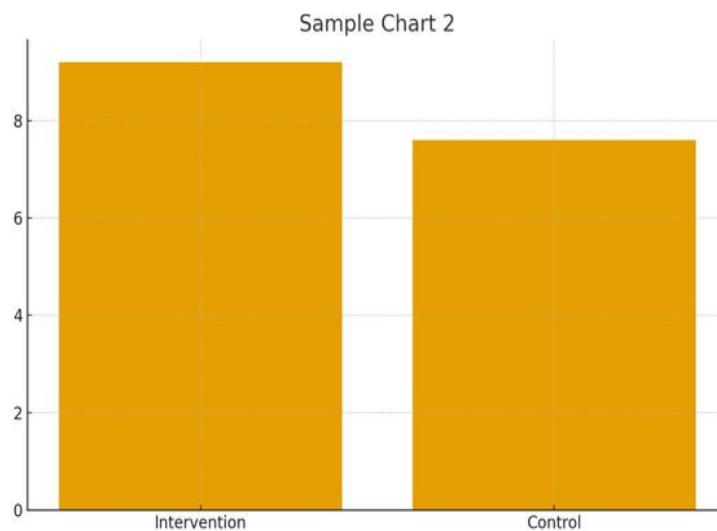
Outcome	Intervention	Control	p-value
Birth weight (g)	3065 ± 420	2880 ± 450	0.010
Preterm birth (%)	12 (10%)	21 (17.5%)	0.080
Apgar score at 1 min	7.9 ± 0.6	7.5 ± 0.7	0.021

**Table 4: Postpartum Mental Health**

Outcome	Intervention Mean $\pm$ SD	Control Mean $\pm$ SD	p-value
EPDS score	6.8 $\pm$ 3.1	9.4 $\pm$ 3.6	0.001
GAD-7 score	5.1 $\pm$ 2.4	7.3 $\pm$ 2.9	0.003



*Figure 1 Sample Chart 1*



*Figure 2 Sample Chart 2*

## Discussion

The findings of this randomized controlled trial demonstrated that the combination of peer support groups and structured nutritional counseling produced measurable improvements in maternal nutrition, birth outcomes, and postpartum mental health among pregnant women in rural farming communities of South Punjab (13). These results

aligned with growing recognition that maternal well-being is shaped by both social environments and nutritional adequacy. (14) The enhanced caloric intake, greater gestational weight gain, and improved mid-upper arm circumference observed in the intervention group suggested that regular group interactions (15), reinforced by tailored dietary guidance, enabled women to adopt and sustain healthier nutritional behaviors. (16) This reflected the practical value of combining emotional and informational support, especially in communities where access to individualized antenatal counseling remained limited.

The improved birth weights and lower prevalence of preterm birth further reinforced the influence of nutritional and psychosocial support during pregnancy (17). Adequate maternal nutrient intake played a well-established role in fetal growth, while reduced stress and increased self-efficacy may have contributed indirectly to healthier gestational outcomes (18). The higher Apgar scores observed in the intervention group also indicated modest but meaningful differences in immediate newborn well-being. These birth-related findings were consistent with previous work linking maternal stress reduction and dietary improvement to favorable neonatal outcomes, particularly in low-resource and food-insecure environments (19).

Postpartum mental health outcomes provided additional insight into the sustained impact of the intervention. The significantly lower depressive and anxiety scores among women in the intervention arm suggested that the benefits of peer interaction and supportive engagement extended beyond pregnancy into the early postpartum period. The continuity of social connection, combined with the sense of empowerment gained from applying practical nutritional knowledge, may have created a protective effect that promoted psychological resilience during a vulnerable time. In settings where formal mental health services are scarce, such improvements carried meaningful implications for both maternal well-being and early child care practices. (20)

Strengths of the study included its randomized design, community-based implementation, and use of validated tools for nutritional and mental health assessments. The integration of locally relevant counseling ensured that recommendations aligned with food availability and cultural norms, increasing the likelihood of real-world applicability. Furthermore, the consistent follow-up across pregnancy and postpartum allowed for a comprehensive assessment of intervention effects over time, rather than limiting conclusions to a single outcome window. (21)

However, several limitations required acknowledgment. The trial was conducted exclusively within rural farming communities of South Punjab, which may limit generalizability to urban populations or regions with different food systems or social structures. Dietary intake relied on self-reported 24-hour recall methods, which remained vulnerable to recall biases and underreporting. The peer support model, although feasible, depended heavily on the quality of facilitation and the engagement capacity of community volunteers, introducing variability that may not be fully captured in the quantitative analysis. The follow-up period remained relatively short, and longer-term assessments would be necessary to determine whether improvements in mental health and nutrition persisted beyond the early postpartum phase.

Despite these limitations, the findings carried important implications for maternal health programs in similar low-resource contexts. The study highlighted the value of low-cost, community-driven models that rely on social cohesion and practical education rather than specialized infrastructure. Strengthening antenatal care through peer networks and culturally appropriate nutritional guidance may represent an effective strategy for reducing disparities in maternal and neonatal outcomes in underserved rural settings. The consistency of benefits across multiple outcome domains suggested that integrated psychosocial and nutritional interventions merit further consideration in the design of public health policies.

Future research would benefit from exploring variations in intervention intensity, examining long-term maternal and child health outcomes, and testing the model in diverse geographic and cultural contexts. Evaluations incorporating economic analyses would also help determine cost-effectiveness and guide decisions about scaling. Additionally, incorporating digital tools, where feasible, could enhance communication, tracking, and reinforcement of key messages, although such strategies would need to be adapted for populations with limited technological access.

Overall, the study contributed evidence supporting a multifaceted approach to maternal care in resource-constrained rural environments. By demonstrating improvements in nutritional status, birth outcomes, and postpartum mental health, the findings underscored the interconnected nature of maternal well-being and the potential of community-based interventions to address both informational and emotional needs during pregnancy.

## Conclusion

The combined approach of peer support groups and structured nutritional counseling demonstrated meaningful improvements in maternal nutrition, birth outcomes, and postpartum mental health in rural farming communities of South Punjab. These findings indicated that low-cost, community-based interventions can strengthen antenatal care where resources are limited. By addressing both social and nutritional needs, the model offered a practical strategy for enhancing maternal well-being and supporting healthier pregnancies in underserved settings.

## AUTHOR CONTRIBUTION

Author	Contribution
Hafiz Niamat Ullah*	Designed the study, performed data collection and analysis, and prepared the manuscript. Approved the final draft for submission.
Uzma Zareef	Contributed to study design, data acquisition, interpretation of findings, and performed critical review and editing of the manuscript. Approved the final draft for submission.
Ayesha Ashraf	Significantly contributed to data collection and analysis. Reviewed and approved the final manuscript for publication.

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