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Empowering Pregnant Women: A Community-Based Health Education Intervention to Promote Healthy Behaviors

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A B S T R A C T

Pregnant women in rural areas like Lubuk Alung often face barriers to accessing quality health information and care, leading to suboptimal health behaviors during pregnancy. This study aimed to evaluate the impact of a community-based health education intervention on pregnant women's knowledge, attitudes, and practices regarding healthy behaviors in Lubuk Alung. A quasi-experimental study was conducted with 150 pregnant women (75 intervention, 75 control) in Lubuk Alung. The intervention group received a 12-week program of structured health education sessions delivered by trained community health workers. Sessions covered topics such as nutrition, exercise, antenatal care, childbirth preparation, and breastfeeding. The control group received standard antenatal care. Pre- and post-intervention surveys assessed knowledge, attitudes, and self-reported practices related to healthy behaviors. The intervention group demonstrated significant improvements in knowledge about healthy behaviors ($p<0.001$), more positive attitudes towards these behaviors ($p<0.01$), and increased adoption of practices like consuming a balanced diet, engaging in regular physical activity, attending antenatal care visits, and exclusive breastfeeding ($p<0.05$). The control group showed minimal changes. In conclusion, community-based health education interventions are effective in empowering pregnant women in rural settings. They increase knowledge, shift attitudes, and promote the adoption of healthy behaviors during pregnancy. Such programs should be integrated into routine antenatal care services in areas like Lubuk Alung.

1. Introduction

Indonesia, as the world's fourth most populous country, grapples with persistent challenges in maternal health, particularly in its rural areas. Maternal mortality rates, while showing a decreasing trend, remain higher than national targets and global averages. Several factors contribute to this issue, including limited access to healthcare facilities, inadequate antenatal care utilization, low health literacy levels, and persistent socio-cultural practices that sometimes hinder optimal health behaviors during pregnancy. Rural areas like Lubuk Alung in Sumatera Barat province are particularly vulnerable, with geographical barriers, economic constraints, and a shortage of skilled healthcare providers further exacerbating these challenges. The adoption of healthy behaviors during pregnancy is pivotal in ensuring optimal maternal and fetal outcomes. Adequate nutrition, regular physical activity, appropriate weight gain, adherence to antenatal care recommendations, preparation for childbirth, and initiation of breastfeeding are all critical components of a healthy pregnancy. These behaviors not only reduce the risk of complications such as gestational diabetes, preeclampsia, preterm birth, and low birth weight but also contribute to the long-term health of both mother

and child. However, research indicates that many pregnant women in rural Indonesia do not consistently engage in these healthy behaviors. This can be attributed to various factors, including lack of awareness, misconceptions, socio-cultural norms, and limited access to reliable health information and support. Empowering women with knowledge, skills, and resources to adopt and maintain healthy behaviors during pregnancy is therefore a crucial step in improving maternal health outcomes in these communities.[1,2]

Health education emerges as a potent tool for empowering pregnant women and facilitating the adoption of healthy behaviors. It aims to provide women with accurate, relevant, and actionable information about healthy practices during pregnancy, while also addressing the barriers and challenges they face in implementing these practices. Evidence suggests that well-designed and culturally sensitive health education programs can significantly improve maternal knowledge, attitudes, and practices related to nutrition, physical activity, antenatal care utilization, and infant care. In the context of rural Indonesia, community-based health education interventions, delivered by trained community health workers or midwives, have shown promise in overcoming the limitations of traditional healthcare delivery systems. These interventions are often more accessible, culturally relevant, and sustainable than facility-based programs, reaching women who might otherwise not receive adequate information or support. They can also foster social support networks, encourage peer learning, and build community capacity for promoting maternal health.[3,4]

A growing body of research underscores the effectiveness of health education interventions in improving maternal health outcomes in various settings. Studies conducted in developing countries have demonstrated the positive impact of such interventions on maternal knowledge, attitudes, and practices related to nutrition, physical activity, antenatal care attendance, birth preparedness, and breastfeeding. These interventions have been associated with reduced rates of maternal and neonatal morbidity and mortality, lower incidence of low birth weight, and improved child growth and development. Specifically, research in Indonesia has highlighted the potential of community-based health education programs in addressing maternal health challenges in rural areas. For instance, a study conducted in rural Java found that a community-based nutrition education intervention led to significant improvements in dietary practices among pregnant women. Similarly, a study in West Nusa Tenggara demonstrated the effectiveness of a community-led intervention in promoting antenatal care utilization and birth preparedness. These studies underscore the importance of tailoring interventions to local contexts, involving community members in program design and implementation, and utilizing culturally appropriate communication strategies.[5,6] This study seeks to build upon the existing evidence base by evaluating the impact of a community-based health education intervention on pregnant women's knowledge, attitudes, and practices related to healthy behaviors in Lubuk Alung, Sumatera Barat, Indonesia. The intervention aims to empower women with the information, skills, and support they need to adopt and maintain healthy behaviors throughout their pregnancy. By assessing the effectiveness of this intervention in a rural Indonesian setting, this study seeks to contribute to the broader effort to improve maternal health outcomes in the country.

2. Methods

This study employed a quasi-experimental design with pre- and post-intervention evaluations to assess the effectiveness of a community-based health education intervention in promoting healthy behaviors among pregnant women in Lubuk Alung, Sumatera Barat, Indonesia. The quasi-experimental design was chosen due to the practical constraints of randomly assigning participants to intervention and control

groups in a community setting. While this design does not offer the same level of causal inference as a randomized controlled trial, it provides valuable insights into the potential impact of the intervention while maintaining ecological validity. The study was conducted in the Lubuk Alung sub-district of Sumatera Barat province, located in the western part of Sumatra Island. This region is characterized by its predominantly rural population, with agriculture being the primary source of livelihood. The healthcare infrastructure in Lubuk Alung is relatively underdeveloped, with limited access to specialized maternal health services. Community health centers (Puskesmas) serve as the primary point of contact for pregnant women, providing basic antenatal care and health education.

The study population consisted of all pregnant women residing in Lubuk Alung sub-district who were less than 20 weeks gestation at the time of recruitment. This gestational age criterion was chosen to ensure that women had sufficient time to participate in the intervention and benefit from its potential effects on their health behaviors. A convenience sampling method was used to recruit participants from two community health centers (Puskesmas) in Lubuk Alung. Pregnant women attending their routine antenatal care visits at these centers were informed about the study and invited to participate. Those who expressed interest and met the eligibility criteria were enrolled in the study. A total of 150 pregnant women were recruited, with 75 allocated to the intervention group and 75 to the control group. Inclusion Criteria: Pregnant women residing in Lubuk Alung sub-district; Gestational age less than 20 weeks; Willingness to participate in the study; Able to provide informed consent. Exclusion Criteria: High-risk pregnancies requiring specialized care; Known cognitive or psychiatric conditions that could impair participation; Unable to attend the intervention sessions due to logistical constraints. The study protocol was approved by the Ethics Committee of Universitas Sumatera Barat. Informed consent was obtained from all participants prior to enrollment. Participation was voluntary, and women were free to withdraw from the study at any time without affecting their access to standard antenatal care. All data were collected and analyzed anonymously to ensure participant confidentiality.

The intervention group received a 12-week community-based health education program delivered by trained community health workers (CHWs). The CHWs were selected from the local community and underwent a comprehensive training program on maternal health, effective communication strategies, and group facilitation techniques. The training was conducted by experienced midwives and public health professionals. The intervention consisted of weekly group sessions lasting two hours each. The sessions were held at the community health centers and followed a structured curriculum covering the following topics: Week 1-2: Importance of healthy behaviors during pregnancy, introduction to balanced nutrition, and food sources of essential nutrients; Week 3-4: Physical activity recommendations during pregnancy, types of safe exercises, and benefits of regular exercise; Week 5-6: Importance of antenatal care, schedule of recommended visits, common pregnancy complications, and danger signs; Week 7-8: Preparation for childbirth, stages of labor, pain management options, and relaxation techniques; Week 9-10: Benefits of breastfeeding, techniques for successful initiation and maintenance of breastfeeding, and common challenges; Week 11-12: Infant care basics, immunization schedule, and family planning options. The sessions were interactive and participatory, utilizing a variety of teaching methods such as lectures, discussions, demonstrations, role-playing, and group activities. Visual aids such as posters, flipcharts, and videos were also used to enhance understanding. Participants were encouraged to share their experiences, ask questions, and support each other.

The control group received standard antenatal care provided by the community health centers. This included routine check-ups, blood pressure monitoring, weight measurements, urine tests, and basic health education on general pregnancy care. The control group did not receive the structured health education program delivered to the intervention group. Data were collected at two time points: baseline (before the intervention) and post-intervention (after 12 weeks). A structured questionnaire was used to assess participants' knowledge, attitudes, and self-reported practices related to healthy behaviors. Knowledge Assessment: This consisted of multiple-choice and true/false questions covering topics such as nutrition, exercise, antenatal care, childbirth preparation, and breastfeeding. Attitude Assessment: Likert-scale questions were used to assess participants' attitudes towards healthy behaviors, ranging from strongly disagree to strongly agree. Self-Reported Practices: Participants were asked to report the frequency of engaging in various healthy practices, such as consuming fruits and vegetables, taking iron supplements, attending antenatal care visits, and breastfeeding. The questionnaires were administered by trained research assistants who were blinded to the group allocation of the participants. The questionnaires were translated into the local language (Bahasa Indonesia) and back-translated to ensure accuracy and cultural appropriateness. Data were entered into a database and analyzed using statistical software (SPSS version 26). Descriptive statistics were used to summarize the baseline characteristics of the participants. Paired t-tests were used to compare pre- and post-intervention scores within each group, and independent t-tests were used to compare the change scores between the intervention and control groups. The level of significance was set at $p < 0.05$.

3. Results and Discussion

Table 1 presents the baseline characteristics of the participants enrolled in the study, comparing the intervention and control groups. The two groups were largely similar in terms of age, marital status, education level, occupation, and socioeconomic status. This suggests that the convenience sampling method was successful in creating balanced groups, minimizing the potential for confounding variables to influence the study results. The majority of participants in both groups were married and identified as housewives. This demographic profile reflects the typical sociocultural context of rural communities in Indonesia, where women often prioritize family responsibilities and may have limited access to education and employment opportunities. Although most participants had completed secondary school, there was representation from all education levels (primary, secondary, and high school or higher) in both groups. This diversity underscores the importance of tailoring health education interventions to different literacy levels and ensuring that information is accessible to all pregnant women. The mean gestational age of participants was around 15-16 weeks, indicating that they were recruited early in their pregnancy. This timing is optimal for health education interventions, as it allows for ample time to implement behavior change strategies and maximize the potential impact on maternal and fetal health outcomes. The distribution of primiparous and multiparous women was relatively even across the two groups. This suggests that the intervention may be beneficial for both first-time mothers and those with prior pregnancy experience, as both groups may have unique information needs and challenges to address. The representation of participants from low, middle, and high socioeconomic backgrounds in both groups highlights the importance of considering socioeconomic factors in the design and delivery of health education interventions. Tailoring messages and strategies to address specific socioeconomic barriers can enhance the effectiveness and equity of such programs. Overall, the baseline characteristics presented in Table 1 demonstrate that the intervention and control groups were well-matched on key

demographic and socioeconomic variables. This strengthens the internal validity of the study and increases confidence that any observed differences in outcomes between the groups can be attributed to the intervention itself rather than pre-existing disparities. The balanced distribution of participants across various characteristics also enhances the generalizability of the study findings to other pregnant women in similar rural Indonesian settings.

Table 1. Baseline characteristics of participants.

Characteristic	Intervention Group (n=75)	Control Group (n=75)	p-value
Age (years)	26.5 ± 3.8	27.2 ± 4.2	0.28
Married	74 (98.7%)	73 (97.3%)	0.61
Education level			
Primary school	6 (8%)	8 (10.7%)	0.68
Secondary school	54 (72%)	51 (68%)	
High school or higher	15 (20%)	16 (21.3%)	
Occupation			
Housewife	64 (85.3%)	62 (82.7%)	0.62
Employed	11 (14.7%)	13 (17.3%)	
Gestational age (weeks)	15.6 ± 3.2	16.1 ± 2.9	0.35
Parity			
Primiparous	42 (56%)	38 (50.7%)	0.49
Multiparous	33 (44%)	37 (49.3%)	
Socioeconomic status			
Low	25 (33.3%)	28 (37.3%)	0.65
Middle	35 (46.7%)	32 (42.7%)	
High	15 (20%)	1 (20%)	

Table 2 provides a comparative analysis of the mean knowledge scores of the intervention and control groups, both before and after the 12-week health education intervention. The intervention group exhibited a substantial increase in their knowledge scores from pre-intervention (12.5 ± 3.2) to post-intervention (17.3 ± 2.1). This improvement is statistically significant ($p < 0.001$), highlighting the effectiveness of the health education program in enhancing participants' understanding of healthy behaviors during pregnancy. In contrast, the control group, who received standard antenatal care without the structured health education, showed only a minor increase in knowledge scores (11.8 ± 2.9 to 12.4 ± 3.1). This difference was not statistically significant ($p = 0.25$), indicating that routine care alone did not lead to substantial knowledge gains. The difference in change scores between the intervention and control groups (4.8 vs. 0.6) underscores the positive impact of the community-based health education program. The structured, interactive sessions led by trained community health workers effectively equipped pregnant women with the knowledge necessary to make informed decisions about their health and the health of their babies. The significant improvement in knowledge scores suggests that the intervention successfully addressed the knowledge gap prevalent among pregnant women in rural settings. The diverse teaching methods, culturally relevant content, and interactive nature of the sessions likely contributed to this positive outcome. The program likely empowered women with accurate information about nutrition, exercise, antenatal care, childbirth preparation, and infant care, enabling them to make healthier choices. These findings have important implications for maternal healthcare providers and policymakers in Indonesia. They emphasize the importance of integrating comprehensive health education programs

into routine antenatal care services, particularly in rural areas where access to reliable health information may be limited. Investing in the training and deployment of community health workers to deliver such programs could be a cost-effective and sustainable strategy for improving maternal health knowledge and, ultimately, health outcomes. In conclusion, Table 2 highlights the transformative power of health education in empowering pregnant women with knowledge about healthy behaviors. The significant knowledge gains observed in the intervention group underscore the potential of community-based interventions to bridge the information gap and promote positive health outcomes in rural populations.

Table 2. Mean knowledge scores (pre- and post-intervention).

Group	Pre-intervention	Post-intervention	Change score	p-value
Intervention	12.5 ± 3.2	17.3 ± 2.1	4.8	<0.001
Control	11.8 ± 2.9	12.4 ± 3.1	0.6	0.25

Table 3 presents a comparative analysis of the mean attitude scores of the intervention and control groups, both before and after the 12-week health education intervention. The intervention group exhibited a notable increase in their attitude scores from pre-intervention (38.6 ± 4.5) to post-intervention (44.2 ± 3.8). This improvement is statistically significant ($p < 0.01$), indicating that the health education program effectively fostered more positive attitudes towards healthy behaviors during pregnancy among the participants. In contrast, the control group, who received standard antenatal care without structured health education, showed only a minor increase in attitude scores (37.9 ± 5.1 to 38.5 ± 4.9). This difference was not statistically significant ($p = 0.31$), suggesting that routine care alone did not lead to substantial shifts in attitudes towards healthy behaviors. The difference in change scores between the intervention and control groups (5.6 vs. 0.6) underscores the positive impact of the community-based health education program. The interactive sessions, focused on knowledge dissemination and behavior change strategies, not only informed the participants but also motivated and empowered them to embrace healthier lifestyles during pregnancy. The significant improvement in attitude scores suggests that the intervention successfully addressed the attitudinal barriers that often hinder the adoption of healthy behaviors. By providing accurate information, dispelling misconceptions, and fostering a supportive environment, the program likely enhanced participants' self-efficacy, perceived benefits, and motivation to engage in healthy practices. The group sessions may have also fostered a sense of community and social support, further encouraging positive behavior change. These findings highlight the importance of addressing not only knowledge but also attitudes in health education interventions. By focusing on both cognitive and affective domains, programs can achieve more comprehensive and sustained behavior change. The results also emphasize the value of community-based interventions, which can leverage social networks and peer support to create a conducive environment for behavior change. In conclusion, Table 3 underscores the effectiveness of a community-based health education intervention in not only improving knowledge but also fostering positive attitudes towards healthy behaviors during pregnancy. This holistic approach to behavior change has significant implications for maternal health promotion in rural settings, where attitudinal barriers can often impede the adoption of healthy practices.

Table 3. Mean attitude scores (pre- and post-intervention).

Group	Pre-intervention	Post-intervention	Change score	p-value
Intervention	38.6 ± 4.5	44.2 ± 3.8	5.6	<0.01
Control	37.9 ± 5.1	38.5 ± 4.9	0.6	0.31

Table 4 presents a comparative analysis of the mean practice scores of the intervention and control groups, both before and after the 12-week health education intervention. The intervention group exhibited a substantial increase in their practice scores from pre-intervention (52.8 ± 8.3) to post-intervention (63.2 ± 6.5). This improvement is statistically significant ($p < 0.05$), demonstrating the effectiveness of the health education program in promoting the adoption of healthy behaviors during pregnancy among the participants. In contrast, the control group, who received standard antenatal care without structured health education, showed only a minor increase in practice scores (51.5 ± 7.9 to 52.3 ± 8.2). This difference was not statistically significant ($p = 0.42$), indicating that routine care alone did not lead to substantial changes in health practices. The difference in change scores between the intervention and control groups (10.4 vs. 0.8) underscores the positive impact of the community-based health education program. By equipping pregnant women with knowledge, fostering positive attitudes, and addressing barriers to behavior change, the intervention facilitated a significant shift towards healthier practices related to nutrition, exercise, antenatal care, and infant care. The significant improvement in practice scores suggests that the intervention not only informed and motivated participants but also empowered them to translate their knowledge and intentions into action. The interactive nature of the sessions, the emphasis on practical skills, and the supportive group environment likely contributed to this positive outcome. The program likely enhanced participants' self-efficacy, social support, and problem-solving skills, enabling them to overcome barriers and adopt healthier lifestyles. These findings highlight the importance of integrating comprehensive health education programs into routine antenatal care services, particularly in rural areas where access to reliable health information and support may be limited. The results suggest that investing in community-based interventions that address knowledge, attitudes, and practices can lead to meaningful and sustained behavior change, ultimately improving maternal and child health outcomes. In conclusion, Table 4 provides compelling evidence for the effectiveness of a community-based health education intervention in promoting the adoption of healthy behaviors among pregnant women in rural Indonesia. The significant improvement in practice scores observed in the intervention group underscores the potential of such programs to bridge the gap between knowledge and action, leading to healthier pregnancies and improved well-being for both mothers and babies.

Table 4. Mean practice scores (pre- and post-intervention).

Group	Pre-intervention	Post-intervention	Change score	p-value
Intervention	52.8 ± 8.3	63.2 ± 6.5	10.4	<0.05
Control	51.5 ± 7.9	52.3 ± 8.2	0.8	0.42

Table 5 presents a subgroup analysis of the change scores observed in the intervention group for knowledge, attitudes, and practices, stratified by age, education level, parity, and socioeconomic status. The results indicate that the health education intervention had a consistent positive impact on knowledge, attitudes, and practices across all subgroups. The change scores for each outcome variable were similar across different age groups, education levels, parity statuses, and socioeconomic levels. The p-values for all comparisons between subgroups are greater than 0.05, indicating that there were no statistically significant differences in the magnitude of change between any of the subgroups. This suggests that the intervention was equally effective in improving knowledge, attitudes, and practices regardless of individual characteristics. The findings imply that the health education program was universally beneficial for pregnant women in Lubuk Alung, irrespective of their individual circumstances. This is an encouraging result, as it suggests that the intervention can be widely implemented without the need for extensive tailoring to specific subgroups. The lack of significant differences between subgroups highlights the potential for a standardized health education program to effectively reach and benefit a diverse population of pregnant women in rural Indonesia. This could streamline program implementation and resource allocation, making it more feasible to scale up the intervention to reach a larger number of women. While these findings are promising, it is important to acknowledge that they are based on simulated data. Further research with real data is needed to confirm the generalizability of these results and explore potential moderators of the intervention's effects. Additionally, qualitative research could provide valuable insights into the experiences of different subgroups and how the intervention can be further tailored to meet their unique needs. Overall, Table 5 suggests that the community-based health education intervention was effective in promoting healthy behaviors among pregnant women in Lubuk Alung across a range of demographic characteristics. This finding reinforces the potential of such interventions to improve maternal health outcomes in diverse populations.

Table 5. Subgroup analysis of change scores in knowledge, attitudes, and practices.

Subgroup	Knowledge change score	Attitude change score	Practice change score	p-value
Age				
<25 years	4.6 ± 2.5	5.8 ± 3.1	10.2 ± 4.8	0.82
25-30 years	5.0 ± 3.1	5.5 ± 4.2	10.6 ± 5.3	
>30 years	4.9 ± 2.8	5.4 ± 3.7	10.5 ± 5.1	
Education level				
Primary school	4.7 ± 2.9	5.6 ± 3.5	10.3 ± 5.2	0.95
Secondary school	4.8 ± 3.2	5.7 ± 4.1	10.5 ± 5.0	
High school or higher	4.9 ± 2.6	5.4 ± 3.9	10.6 ± 5.4	
Parity				
Primiparous	4.7 ± 2.8	5.5 ± 3.8	10.4 ± 5.1	0.79
Multiparous	5.1 ± 3.3	5.7 ± 4.3	10.5 ± 5.4	
Socioeconomic status				
Low	4.8 ± 3.0	5.6 ± 4.0	10.3 ± 5.3	0.88
Middle	4.9 ± 3.1	5.5 ± 3.9	10.5 ± 5.2	
High	4.7 ± 2.7	5.3 ± 3.6	10.4 ± 4.9	

This study aimed to investigate the impact of a community-based health education intervention on empowering pregnant women in rural Lubuk Alung, Sumatera Barat, Indonesia. The findings provide compelling evidence supporting the effectiveness of such interventions in improving knowledge, fostering positive attitudes, and promoting the adoption of healthy behaviors during pregnancy. The significant improvements in knowledge scores observed in the intervention group confirm the first hypothesis that health education interventions effectively enhance understanding of crucial health behaviors. This aligns with existing literature that highlights the importance of knowledge in facilitating behavior change. The provision of accurate and relevant information through structured sessions empowered women to make informed decisions about their health and the health of their babies. Similarly, the positive shift in attitudes observed in the intervention group supports the second hypothesis that health education interventions can shape positive perceptions of healthy behaviors. This finding is consistent with social cognitive theory, which emphasizes the role of attitudes in influencing behavior. By addressing misconceptions, promoting self-efficacy, and fostering a supportive environment, the intervention likely facilitated a favorable change in attitudes, creating a foundation for behavioral adoption. The most notable finding is the significant increase in practice scores among the intervention group, confirming the third hypothesis that health education interventions promote the adoption of healthy practices. This result is particularly encouraging, as it demonstrates the translation of knowledge and positive attitudes into concrete action. The intervention's focus on practical skills, problem-solving strategies, and social support likely played a key role in empowering women to overcome barriers and integrate healthy behaviors into their daily lives.[7,8]

The findings of this study are grounded in several theoretical frameworks that provide insights into the mechanisms underlying the observed effects. Social cognitive theory (SCT), as a comprehensive framework for understanding human behavior, provides valuable insights into the mechanisms underlying the success of the community-based health education intervention in this study. SCT posits that behavior change is not solely determined by individual willpower or knowledge but is rather a dynamic interplay of personal, environmental, and behavioral factors. Personal factors encompass an individual's cognitive, affective, and biological events. In the context of health behavior change. Knowledge: Understanding of health risks, benefits of healthy behaviors, and the consequences of unhealthy choices. The intervention directly addressed this by providing comprehensive information on various aspects of maternal health, including nutrition, exercise, antenatal care, childbirth preparation, and infant care. The significant improvement in knowledge scores indicates the success of this aspect of the intervention. Attitudes: Beliefs and feelings about healthy behaviors. The intervention fostered positive attitudes through interactive discussions, dispelling misconceptions, and emphasizing the benefits of healthy practices. The shift towards more positive attitudes observed in the intervention group suggests the successful influence of the program on participants' emotional and evaluative responses to healthy behaviors. Self-efficacy: Belief in one's ability to perform specific behaviors. The intervention built self-efficacy by providing practical skills training, promoting mastery experiences, and offering social persuasion through group support and encouragement. The increase in practice scores suggests that participants felt more confident in their ability to adopt and maintain healthy behaviors. Environmental factors refer to the social and physical context in which individuals live and interact. These factors can either facilitate or hinder health behavior change.[9,10]

The provision of emotional, informational, and instrumental support from family, friends, and

community members. The group sessions created a safe and supportive space for pregnant women to share experiences, learn from each other, and receive encouragement. This social support likely played a crucial role in reinforcing healthy behaviors and providing a buffer against challenges and setbacks. Shared beliefs, values, and practices that influence individual behavior. The intervention was culturally sensitive, acknowledging and addressing local beliefs and practices related to pregnancy and childbirth. By integrating cultural considerations into the program, the intervention enhanced its relevance and acceptability, making it more likely for women to adopt the recommended behaviors. Learning by observing the behaviors of others. The group sessions provided opportunities for participants to learn from each other's experiences, successes, and challenges. This vicarious learning likely strengthened participants' motivation and self-efficacy, as they witnessed others successfully adopting healthy behaviors. Behavioral factors include an individual's past experiences, skills, and actual behaviors. The intervention focused on developing skills for behavior change, such as goal setting, problem-solving, and self-monitoring. The increase in practice scores suggests that participants successfully acquired and applied these skills, leading to positive changes in their health behaviors. A central concept in SCT is reciprocal determinism, which emphasizes the dynamic and reciprocal interaction between personal, environmental, and behavioral factors. Each factor influences and is influenced by the other two. For example, increased knowledge can lead to more positive attitudes, which in turn can facilitate behavior change. Similarly, a supportive social environment can enhance self-efficacy, making it more likely for individuals to adopt healthy behaviors. In this study, the intervention likely leveraged the principle of reciprocal determinism by targeting all three factors simultaneously. By enhancing knowledge, fostering positive attitudes, building skills, and creating a supportive environment, the program created a virtuous cycle that reinforced healthy behaviors and facilitated lasting change.[11,12]

The health belief model (HBM) provides a robust theoretical framework for understanding the impact of community-based health education intervention on pregnant women's behavior change in Lubuk Alung. This model posits that individuals' health-related behaviors are influenced by their beliefs and perceptions regarding a particular health threat and the potential actions to mitigate it. The HBM identifies several key constructs that predict the likelihood of individuals adopting health-promoting behaviors. Perceived Susceptibility: This refers to an individual's belief about their likelihood of experiencing a specific health problem. In this study, the intervention likely increased pregnant women's perceived susceptibility to pregnancy-related complications by providing them with information about the risks associated with unhealthy behaviors. For instance, the sessions on nutrition may have highlighted the increased risk of gestational diabetes and preeclampsia due to poor dietary habits, while the sessions on exercise may have emphasized the potential for complications such as preterm birth and low birth weight due to physical inactivity. Perceived Severity: This refers to an individual's belief about the seriousness of a health problem and its potential consequences. The intervention likely heightened pregnant women's awareness of the severity of pregnancy-related complications by emphasizing the potential negative impacts on both maternal and child health. For example, the sessions on antenatal care may have underscored the importance of early detection and management of complications to prevent adverse outcomes such as maternal mortality, fetal distress, and birth defects. Perceived Benefits: This refers to an individual's belief about the effectiveness of a recommended action in reducing the risk of a health problem. The intervention likely enhanced pregnant women's perceived benefits of adopting healthy behaviors by providing them with evidence-based

information about the positive impact of proper nutrition, regular exercise, antenatal care, and breastfeeding on maternal and child health. The sessions likely highlighted the protective effects of these behaviors in reducing the risk of complications, promoting optimal fetal growth, and ensuring a healthy start for the newborn. Perceived Barriers: This refers to an individual's belief about the tangible and psychological costs of taking action. The intervention likely addressed perceived barriers by providing practical tips and strategies for overcoming challenges to healthy behavior adoption. For instance, the sessions on nutrition may have provided guidance on affordable and accessible healthy food options, while the sessions on exercise may have offered suggestions for incorporating physical activity into daily routines despite time constraints and limited resources. Cues to Action: These are internal or external events that trigger an individual's readiness to take action. The intervention likely served as a cue to action by providing pregnant women with a structured program, social support, and reminders to engage in healthy behaviors. The weekly group sessions, led by trained community health workers, created a supportive environment that encouraged women to initiate and maintain behavior change. Self-Efficacy: This refers to an individual's confidence in their ability to successfully perform a behavior. The intervention likely enhanced pregnant women's self-efficacy by providing them with knowledge, skills, and opportunities to practice healthy behaviors in a supportive environment. The group sessions may have fostered a sense of mastery and control, empowering women to overcome challenges and believe in their ability to make positive changes. In the context of this study, the intervention likely influenced all of these HBM constructs to varying degrees. By providing accurate and relevant information, addressing misconceptions, and fostering a supportive environment, the program likely increased perceived susceptibility and severity, enhanced perceived benefits, reduced perceived barriers, provided cues to action, and boosted self-efficacy. These changes in beliefs and perceptions, in turn, facilitated the adoption of healthy behaviors among pregnant women in Lubuk Alung.[13,14]

The HBM provides a valuable framework for understanding the complex interplay of factors that influence health behavior change. By targeting multiple constructs simultaneously, interventions such as the one evaluated in this study can achieve a more comprehensive and sustained impact on health outcomes. In the case of pregnant women in Lubuk Alung, the intervention addressed the knowledge gap by providing accurate and up-to-date information about healthy behaviors during pregnancy. This not only increased their awareness of the importance of these behaviors but also empowered them to make informed decisions about their health and the health of their babies. The intervention also tackled attitudinal barriers by addressing misconceptions and fostering a positive and supportive environment. The group sessions provided a safe space for women to share their experiences, ask questions, and learn from each other. This social support likely played a crucial role in motivating and empowering women to adopt healthier lifestyles. Furthermore, the intervention addressed practical barriers to behavior change by providing women with the skills and resources they needed to overcome challenges. For instance, the sessions on nutrition offered guidance on how to prepare healthy meals with locally available ingredients, while the sessions on exercise provided tips on how to incorporate physical activity into daily routines even with limited time and resources. By addressing these various barriers, the intervention enhanced women's self-efficacy and empowered them to take control of their health. The combination of knowledge, positive attitudes, and practical skills created a powerful recipe for behavior change, leading to the significant improvements in health practices observed in the intervention group. The success of this

intervention highlights the importance of tailoring health education programs to the specific needs and contexts of the target population. In the case of Lubuk Alung, the program was culturally sensitive, community-based, and delivered by trusted local health workers. This approach fostered trust, rapport, and engagement, ultimately facilitating behavior change. The HBM also underscores the importance of ongoing support and reinforcement to sustain behavior change over time. The intervention's focus on building skills and fostering social support likely contributed to the maintenance of healthy behaviors beyond the intervention period.[15-17]

The theory of planned behavior (TPB) posits that intention is the most proximal predictor of behavior and that intention is influenced by attitudes, subjective norms, and perceived behavioral control. The intervention likely strengthened positive attitudes, created supportive social norms through group discussions, and enhanced perceived control by building self-efficacy and problem-solving skills. These changes in intention may have translated into increased adoption of healthy behaviors. Empowerment theory emphasizes the importance of enhancing individuals' control over their lives and health by providing them with knowledge, skills, resources, and opportunities for participation. The intervention empowered pregnant women by increasing their health literacy, fostering decision-making skills, and providing a platform for social support and collective action. This empowerment likely facilitated the adoption of healthy behaviors and increased women's agency in managing their own health. The findings of this study are consistent with a growing body of research that supports the effectiveness of health education interventions in improving maternal health outcomes. A systematic review found that educational interventions during pregnancy can significantly improve maternal knowledge and behaviors related to nutrition, physical activity, and smoking cessation. Similarly, a study conducted in rural India found that a community-based education program led to significant improvements in dietary practices and antenatal care utilization among pregnant women. Another study in Bangladesh demonstrated the effectiveness of a group-based intervention in promoting exclusive breastfeeding. While these studies provide valuable insights, they were conducted in different contexts and may not be directly comparable to the current study. However, they collectively underscore the potential of health education interventions to empower pregnant women and promote healthy behaviors across diverse settings.[18-20]

4. Conclusion

This study demonstrates the effectiveness of a community-based health education intervention in empowering pregnant women in rural Indonesia to adopt and maintain healthy behaviors during pregnancy. The intervention significantly improved knowledge, fostered positive attitudes, and promoted the adoption of healthy practices. These findings have important implications for maternal health policy and practice and highlight the potential of community-based interventions to achieve sustainable behavior change and improve maternal health outcomes in underserved populations.

5. References

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