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Differences in knowledge and skills before and after in pregnant women in the working area of the Bolo Health Center, Bima Regency

Aniharyati[1*], Muhtar[2], Fadllurahmi[3], Heni Nurhaeni[4], Sukandriani Utami[5], M. Riapu Adamrumae[6]

1,2,3 Afiliasi Jurusan Keperawatan Poltekkes Kemenkes Mataram
4 Jurusan keperawatan Poltekkes Jakarta
5,6 Fakultas Kedokteran Universitas Islam Al-Azhar Mataram

Abstract
This study aims to analyze the differences in knowledge and skills of pregnant women before and after intervention using the "Kawara Angi" method in the Bolo Community Health Center Working Area, Bima Regency. Referring to the increasing prevalence of Gestational Diabetes Mellitus (GDM) and its impact on maternal and infant health, this study emphasizes the importance of health education for pregnant women. The study design used a quasi-experimental method with a pre-test and post-test approach involving 60 respondents, divided into two groups: intervention and control. The intervention group received interactive education through discussions and demonstrations of skills, while the control group only received an information booklet. The analysis results showed a significant increase in knowledge and skills in the intervention group. The average knowledge increased from 1.50 to 2.27 ($p < 0.001$), while skills increased from 1.33 to 2.13 ($p < 0.001$). In contrast, the control group only showed a small increase in knowledge and skills. These findings indicate that interactive education methods, accompanied by direct practice, are effective in increasing the capacity of pregnant women to recognize and prevent GDM. This increase in knowledge and skills is expected to contribute to reducing the risk of complications during pregnancy and improving maternal health in Bima Regency. This study emphasizes the need to integrate practice-based educational programs into maternal health services to help mothers adapt effectively to the health changes that occur during pregnancy. It is recommended that similar efforts continue to ensure the sustainability of effective health education for pregnant women and improve overall public health.

Keywords: Knowledge, Skills, Pregnant Women, Bolo Community Health Center

Introduction

Gestational Diabetes Mellitus (GDM) is a condition where the mother experiences intolerance to carbohydrates indicated by hyperglycemia which is first discovered during pregnancy (2) The prevalence of GDM has continued to increase over the past 20 years. Globally, 16.2% (21.3 million) while in Indonesia it is 1.9-3.6% and undiagnosed is 10-25%. (2). The number of DM sufferers in general in NTB Province in 2021 was 63,488 people and increased in 2022 to 64,544 people. The number of maternal deaths in NTB in 2020 was 174 people with causes of hypertension and metabolic disorders of 41 people. in Bima Regency the number of DM sufferers was 5,205 in 2021 and increased in 2022 to 5,285 people (3). Meanwhile, the number of pregnant women in 2023 and in the working area of the Bolo Health Center was 1,641 people with 486 maternal complications (Bolo Health Center in 2024).

DMG has an impact on increasing morbidity and mortality rates in infants and mothers, thus requiring serious (4), consistent, and comprehensive treatment across programs and sectors (11). Given the large impact caused by DMG, various efforts are needed to overcome this, including conducting scientific studies and research. This research was conducted to participate in contributing to efforts and finding comprehensive solutions by involving collaboration between universities (PKPT), and integration and collaboration of various disciplines, such as Nursing and Medicine.

This study aims to analyze the effectiveness of the "Kawara angi" method in detecting early GDM in pregnant women. This study is analytical with a quasi-experimental method, and the design is a pre-test and post-test with control group design. This design attempts to reveal the effectiveness of a treatment by involving a control group in addition to the experimental group (8). The experimental group was given the Kawara angi method and booklet treatment while the control group was only given a booklet, both groups were given a pre-test and post-test (9). This study consists of 3 stages, namely Stage 1 (preparation of instruments, enumerators and respondents), Stage 2 (implementation of research on the intervention and control groups) and Stage 3 (data analysis and reporting).

Utilization of all resources, facilities, infrastructure and community empowerment needs to be done for the prevention and early detection of DMG cases. One of the resources that can be done in Dana Mbojo (Dompu Regency, Regency and Bima Regency) is to utilize the local culture of Kawara angi as a health promotion method (12) in early detection of DMG disease. As, Yeni Nur Rahmayanti, found that there was an improvement in the role of the family in Managing Family Members With Diabetes Mellitus. After being given health promotion (11).

Kawara Angi" (reminding each other) for the Dana Mbojo community has a deep meaning, namely providing meaning, motivating, adding, and filling to lead to change, namely changes in mindset, attitude, behavior, principles, in life that can be upheld and realized (5). The Kawara Angi principle was developed as a method to provide enlightenment, increase knowledge and motivate to lead to change, namely changes in increasing knowledge and behavior that can be applied to prevent and optimize personal health (individuals) (7), especially to be willing and able to detect DMG early in pregnant women in Bima Regency. (16)

Method

Research Design

This study used a quasi-experimental design with a pre-test and post-test approach involving two groups: an intervention group and a control group. This design aimed to assess the effectiveness of the "Kawara Angi" method in improving the knowledge and skills of pregnant women in the Bolo Community Health Center (Puskesmas) area, Bima Regency.

Population and Sample

The population in this study was all pregnant women registered at the Bolo Community Health Center in 2023. Sampling was conducted using a purposive sampling method, where the inclusion criteria were pregnant women with a gestational age of more than 12 weeks, while the exclusion criteria were pregnant women with diagnosed medical complications. In this study, the total number of respondents was 60 people, who were divided into two groups, namely the intervention group and the control group, each consisting of 30 people.

Research Instruments

The instruments used in this study consisted of a questionnaire and an observation sheet. The questionnaire was designed to measure pregnant women's knowledge of Gestational Diabetes Mellitus (GDM), consisting of 20 questions categorized as good, adequate, and inadequate. The observation sheet was used to assess pregnant women's self-care skills during pregnancy, which were also categorized as good, adequate, and inadequate.

Research Procedures

The research procedure was carried out in three stages as follows:

1. **Preparation Stage**:
    - Preparation of research instruments, including questionnaires and observation sheets.
    - Implementation of training for enumerators to carry out data collection appropriately.
    - Administration of pre-test questionnaires to pregnant women in both groups to measure knowledge and skills before the intervention.
2. **Intervention Stage**:
    - The intervention group received education using the "Kawara Angi" method, which included interactive discussions, booklets, and demonstrations of self-care skills. These sessions lasted four weeks, twice weekly.
    - The control group was only given an information booklet without any additional educational treatment.
3. **Evaluation Stage**:

- After the intervention was completed, a post-test questionnaire was administered to all respondents to measure improvements in knowledge and skills.
- Data collection was carried out by enumerators independent of the intervention group to avoid bias.

Data analysis

Data obtained from the questionnaire and observation sheets were analyzed using statistical software (e.g., SPSS). A Shapiro-Wilk normality test was performed to evaluate data distribution. For comparative analysis between the intervention and control groups, the Wilcoxon Signed Rank test was used for non-parametric data and the independent T-test for normally distributed data. The significance level was set at $p < 0.05$.

Results and Discussion

Table 1. Characteristics of respondents based on age in the Bolo Community Health Center Work Area, Bima Regency, 2025 (n = 30)

Variables	Group			
	Control		**Intervention**	
	n	**%**	**n**	**%**
Age				
20-25	21	70	20	66.3
26-35	9	30	10	33.3
Total	30	100	30	100

Based on table 1. above, the majority of the age of the respondents in the control group were in the 20-25 year age group, namely 21 people (70%), for the intervention group there were 20 people (66.3%).

Table 2. Characteristics of respondents based on education level in the Bolo Community Health Center Work Area, Bima Regency, 2025 (n = 30)

Variables	Group			
	Control		**Intervention**	
	n	**%**	**n**	**%**
Level of education				
Elementary School	2	6.7	1	3.3
JUNIOR HIGH SCHOOL	3	10	2	6.7
SENIOR HIGH SCHOOL	18	60	18	60
DIPLOMA/BACHELOR'S DEGREE	6	20	9	30
POSTGRADUATE	0	0	0	0
Total	30	100	30	100

Based on table 2. above, the majority of respondents' education level is in the high school education category, namely 18 people (60%) for the control group and 18 people (60%) for the intervention group.

Table 3. Knowledge before and after intervention in the intervention and control groups of pregnant women in the Bolo Community Health Center Work Area, Bima Regency, 2025 (n = 30)

Variables	**Group**	**Good**	**Enough**	**Not enough**	**Total**
		n%	n%	n%	n%
Knowledge	**Intervention**				
	Pre	0 0	15 50	15 50	30 100
	Post	9 30	21 66.7	2 3.3	30 100

	Control				
	Pre	1 3.3	10 33.3	19 63.3	30 100
	Post	1 3.3	16 53.3	13 43.3	30 100

Based on Table 2 above, it is known that the level of knowledge of pregnant women in the intervention group before the intervention was mostly in the sufficient and poor categories, with 15 people (50%) in each. After the intervention, there was a significant increase in knowledge, with 9 people (30%) in the good category, 21 people (66.7%) in the sufficient category, and only 2 people (3.3%) in the poor category.

In the control group, before the intervention, the majority of respondents were in the "poor" category, 19 people (63.3%). After the study period without specific intervention, there was a slight increase, with 16 people (53.3%) falling into the "sufficient" category, although 13 people (43.3%) remained in the "poor" category.

Overall, the data showed that the increase in knowledge was much greater in the intervention group than in the control group.

The results of this study indicate that providing educational interventions has a significant impact on increasing the level of knowledge of pregnant women. In the intervention group, the increase in the number of respondents in the good knowledge category from 0% to 30% illustrates that the education provided is able to increase the capacity of pregnant women to understand the health material presented. This is consistent with health education theory which states that educational interventions carried out using interactive methods can significantly increase knowledge because information is processed through more effective cognitive pathways. (1).

In addition, the increase in the sufficient category from 50% to 66.7% in the intervention group indicates that education not only increases knowledge at a high level, but also improves basic knowledge that was previously not well understood by respondents. Education that is carried out directly, using media, and supported by interpersonal communication has proven effective in increasing the knowledge of pregnant women as reported in several previous studies. (2). Research by Laksmi et al. (2023) also proved that structured education increases the knowledge of pregnant women regarding maternal health by more than 40%. (3)

In contrast to the intervention group, the control group showed only a small increase, rising from 33.3% to 53.3% in the adequate category. Although there was improvement, this increase was not as large as in the intervention group because respondents did not receive special educational treatment. This increase likely came from indirect sources of information such as personal experience, family information, or routine antenatal care. However, these results still indicate that without intensive education, knowledge gains are not optimal. Similar findings were reported by Indrawati et al. (2022), who found that the knowledge of pregnant women who did not receive special education increased very minimally. (4)

Scientifically, educational interventions influence knowledge through several mechanisms: increasing conceptual understanding, retention of information through interesting delivery, and the mother's ability to relate new information to her current pregnancy experiences.(5)

Therefore, educational interventions have proven to be very important as part of antenatal care to increase the mother's capacity to understand her pregnancy condition and prevent the risk of complications.

Table 4. Respondents' skills before and after the intervention in the intervention group and control group of pregnant women in the Bolo Community Health Center Work Area, Bima Regency in 2025 (n = 30)

Variables	**Group**	**Good**	**Enough**	**Not enough**	**Total**
	n	n%	n%	n%	n%
Skills	**Intervention**				
	Pre	0 0	10 33.3	20 66.7	30 100
	Post	8 26.7	18 60	4 13.3	30 100
	Control				
	Pre	0 0	10 33.3	20 66.7	30 100
	Post	3 10	11 36.7	16 53.3	30 100

Based on the research results in Table 3, it is known that before the intervention, the skills of pregnant women in the intervention group were mostly in the poor (66.7%) and sufficient (33.3%) categories, with no respondents in the good category. After the intervention, there was a significant improvement, with 26.7% of respondents in the good category, 60% in the sufficient category, and only 13.3% still in the poor category.

In contrast, in the control group, before the intervention the majority of respondents were also in the poor category (66.7%), and after the intervention period without additional treatment, there was only a small increase with 10% of respondents in the good category, 36.7% in sufficient, and 53.3% still in the poor category.

These results indicate that the intervention was effective in improving pregnant women's skills, particularly in prenatal care practices. This improvement in skills may be due to the interactive educational methods used during the intervention, which allowed pregnant women not only to acquire knowledge but also to directly practice the skills taught, such as maintaining personal hygiene during pregnancy, performing prenatal exercises, and recognizing pregnancy danger signs.

This research aligns with the research findings of Fitriani et al. (2024) who stated that skills training using demonstration methods can improve pregnant women's ability to perform self-care and detect early pregnancy complications. Practice-based learning methods are considered more effective than lectures because they involve active participant participation (6).

According to Notoatmodjo's theory (2018), skills are the result of applying knowledge through repeated practice. If someone obtains the correct information and is accompanied by direct practice, their abilities or skills will improve significantly (7). In the context of this research, implementing interventions through a demonstrative approach can strengthen pregnant women's understanding and ability to practice healthy behaviors.

A similar study by Lestari and Wahyuni (2023) also showed a significant improvement in the skills of pregnant women after receiving small-group prenatal exercise training at a community health center. The results showed a 45% increase in skills compared to before the training (8). Furthermore, the Indonesian Ministry of Health (2023) emphasized the importance of a practice-based educational approach in the Maternal and Child Health (MCH) program to improve the ability of pregnant women to maintain their own and their fetus' health (9).

Thus, it can be concluded that educational interventions using a hands-on approach are effective in improving the skills of pregnant women, especially in areas with limited knowledge and experience. Efforts to improve the skills of pregnant women need to be continuously implemented by health workers, for example through prenatal classes, simulations, and educational home visits.

This data normality test determines the type of test to be used using Parametric tests and Non-Parametric tests. The number of samples is less than 50 using the Shapiro Wilk test and if the sample is more than 50 using the Kolmogorov-Smirnov test, with decision-making guidelines, if the significance value is greater than 0.05, then the data is normally distributed (using the paired sample T-test, if the significance value is less than 0.05 then the data is not normally distributed (using the Wilcoxon Signed Rank test).

Table 5. Differences in average knowledge and skills before intervention in the intervention and control groups in pregnant women in the Bolo Community Health Center work area, Bima Regency, 2025 (n = 30)

Variables	**Group**	**Mean**	**Elementary School**		***P value***
Pre-knowledge	Intervention	1.50	0.509		***0.491***
	Control	1.40	0.563		
Pre skills	Intervention	1.33	0.479		***1,000***
	Control	1.33	0.479		

Based on Analysisusing the Wilcoxon Signed Rank test,showed that before the intervention, there was no significant difference between the intervention and control groups in either the knowledge or skills of pregnant women. The p-value for knowledge was 0.491 ($p > 0.05$) and for skills was 1.000 ($p > 0.05$). This indicates that the initial conditions of the two groups were relatively homogeneous before the intervention.

This homogeneity of initial conditions is important because it indicates that the increase in knowledge and skills that occurred after the intervention in the intervention group can be believed to be caused by the treatment given, not by other external factors. According to Sugiyono (2023), the validity of quasi-experimental research is supported by the equality of initial characteristics between the intervention and control groups so that differences in post-intervention results can be attributed to the treatment given (10).

This finding aligns with the research of Rahmawati et al. (2024), who reported that before receiving health education, there was no significant difference in knowledge levels between the intervention and control groups of pregnant women. After the intervention, a significant increase was seen in the intervention group, indicating that the educational treatment was effective in increasing knowledge (11).

In addition, research by Lestari and Wahyuni (2023) also showed that at the pre-intervention stage, there was no difference in skills between the control and intervention groups with a p value > 0.05. However, after being given prenatal exercise training, the intervention group showed significant improvements in physical skills and self-awareness during pregnancy (12).

According to Notoatmodjo's (2018) theory of health behavior, before intervention, individuals are at the "not yet aware" or "partially aware" stage regarding certain health behaviors. Therefore, low and relatively similar levels of knowledge and skills across groups are normal conditions before education or training is conducted (13).

This homogeneous initial condition also shows that the research design has fulfilled one of the basic principles in experimental research, namely group equality before treatment, as suggested by Polit and Beck (2024) in nursing research design (14).

Thus, the analysis results in Table 5 show that there were no significant differences between the intervention and control groups before the intervention, either in terms of knowledge or skills. This condition strengthens the basis for comparing post-intervention results, allowing for a more objective evaluation of the treatment's effects.

Table 6. Differences in average knowledge and skills after intervention in the intervention and control groups in pregnant women in the Bolo Community Health Center work area, Bima Regency, 2025 (n = 30)

Variables	Group	Mean	Elementary School		*P value*
Post knowledge	Intervention	2.27	0.521		*0.001*
	Control	1.60	0.563		
Post skills	Intervention	2.13	0.629		*0.005*
	Control	1.57	0.679		

Based on Table 6, the results of the study indicate that after the intervention, there was a significant difference between the intervention group and the control group in both the knowledge and skills of pregnant women regarding early detection of Gestational Diabetes Mellitus (GDM). The p-value for knowledge = 0.001 ($p < 0.05$) and the p-value for skills = 0.005 ($p < 0.05$), which means that the intervention provided was effective in improving both variables in the intervention group compared to the control group.

The average knowledge score in the intervention group increased to 2.27 ± 0.521, while in the control group it only reached 1.60 ± 0.563. Meanwhile, the average skill score in the intervention group reached 2.13 ± 0.629, higher than the control group, which was 1.57 ± 0.679. These results indicate that the educational intervention provided was able to improve the cognitive (knowledge) and psychomotor (skills) abilities of pregnant women in recognizing and preventing GMG.

This increase can be explained by Notoatmodjo's theory (2018), which states that increased knowledge is the result of a learning process involving receiving information, understanding it, and applying it through direct experience (15). In this study, interactive intervention methods—for example, health education with discussions, visual media, and direct practice—are likely to play a role in strengthening pregnant women's understanding.

The results of this study are in line with the findings of Rahmawati et al. (2024) which showed that health education using audiovisual media about DMG significantly increased the knowledge of pregnant women in detecting early signs of DMG and encouraged better preventive behavior (16).

Research by Lestari and Wahyuni (2023) also supports these findings, where practice-based educational training improved pregnant women's skills in monitoring blood sugar levels and selecting appropriate foods to prevent GDM. This suggests that maternal skills can be improved if information is accompanied by practice or live demonstrations (17).

According to the Indonesian Ministry of Health (2024), GDM is a pregnancy complication that is increasingly common in Indonesia, with a prevalence of around 9–11% of all pregnancies. Prevention through improving the knowledge and skills of pregnant women is a key strategy in reducing the risk of complications for both the mother and the fetus (18). Therefore, the results of this study have important implications for maternal health care programs in community health centers.

Recent research by Putri et al. (2025) also showed that small-group training with a participatory approach can improve pregnant women's skills in self-care during pregnancy, including in preventing GDM. This approach is considered effective because it involves social interaction and support between participants, which strengthens the learning process (19).

Theoretically, these results can also be explained by the Health Belief Model (HBM) proposed by Becker, where increased knowledge will increase the perception of risks and benefits of preventive measures, thereby encouraging individuals to be more active in carrying out prevention (20). In this context, increasing the knowledge and skills of pregnant women can encourage them to adopt healthy behaviors during pregnancy, such as regulating their diet, engaging in light physical activity, and regularly checking their blood sugar levels.

Thus, the educational intervention provided has proven effective in improving both the cognitive and psychomotor aspects of pregnant women. Healthcare workers need to integrate this type of educational model into routine services, such as prenatal classes and early detection programs for GDM, to maximize its benefits.

Table 7. Differences in average knowledge before and after intervention in the intervention and control groups of pregnant women in the Bolo Community Health Center work area, Bima Regency, 2025 (n = 30)

Variables	Group	Mean	Elementary School	Z	P value
Pre-knowledge	**Intervention**	1.50	0.509	-4,413	***0,000***
Post knowledge		2.27	0.521		
Pre-knowledge	**Control**	1.40	0.563	-2,121	***0.034***
Post knowledge		1.60	0.563		

Table 7 shows a significant increase in average knowledge in both the intervention and control groups. In the intervention group, the average knowledge score increased from 1.50 before the intervention to 2.27 after the intervention, with a p-value of 0.000. This finding indicates that the educational intervention provided had a strong influence on improving the knowledge of pregnant women. This effectiveness can be attributed to the educational method, which was targeted, interactive, and relevant to the needs of pregnant women, thus enabling deeper understanding and better knowledge retention.

This significant increase in knowledge aligns with previous research showing that intervention-based health education can substantially improve pregnant women's understanding of pregnancy health, risk factors, and complication prevention. A study by Rahmani et al. (2023) reported that educational interventions significantly improved maternal knowledge, with scores increasing by up to 45% after the education session. (21). Similarly, a study by Lestari et al. (2022) found that structured education improved knowledge because the information was presented in a step-by-step, easy-to-understand manner. (22).

In the control group, despite not receiving any specific educational intervention, there was an increase in knowledge from an average of 1.40 to 1.60 with a p-value of 0.034. Although this increase was statistically significant, the magnitude of the change was much smaller than in the intervention group. This minor increase likely stemmed from general information obtained by respondents from other sources, such as routine antenatal visits, social media, or personal experience. This is supported by research by Sari and Wulandari (2023) which states that pregnant women can experience a natural increase in knowledge from

exposure to information in their environment, although it is not as effective as formal educational interventions. (23)

Overall, both the intervention and control groups experienced increased knowledge, but the increase was much more significant in the intervention group. This difference indicates that educational intervention is a major determinant factor in improving pregnant women's knowledge. This supports the results of global research which states that maternal education is an effective strategy to support maternal understanding and prevent pregnancy complications. (24). Adequate education is also associated with improved health behaviors and preparedness for childbirth. (25).

The findings of this study indicate that health education programs in antenatal care services need to be maintained and improved, especially in the working areas of community health centers, to ensure that pregnant women have sufficient knowledge in maintaining their own and their fetus' health.

Table 8. Average difference in skills before and after intervention in the intervention and control groups of pregnant women in the Bolo Community Health Center work area, Bima Regency, 2025 (n = 30)

Variables	Group	Mean	Elementary School	Z	P value
Pre skills	**Intervention**	1.33	0.479	-4,217	***0,000***
Post skills		2.13	0.629		
Pre skills	**Control**	1.33	0.479	-2,333	***0.020***
Post skills		1.57	0.679		

Table 8 shows a significant increase in skills in both the intervention and control groups. In the intervention group, the average skill score increased from 1.33 before the intervention to 2.13 after the intervention. The Wilcoxon Signed Rank test showed a p-value of 0.000, indicating that the educational intervention significantly improved the skills of pregnant women. This improvement indicates that the intervention not only increased knowledge but also successfully changed the mothers' practical abilities in carrying out the taught actions or behaviors.

Effective health education typically includes demonstrations, simulations, hands-on practice, and repetition of information, all of which significantly contribute to skill development. According to recent research by Hasanah et al. (2023), practice-based education can improve the skills of pregnant women by more than 50% because it involves motor stimulation and applied understanding.(26). Active learning methods make it easier for pregnant women to understand and remember the steps taught.

In the control group, despite not receiving any specific educational intervention, the average skill score increased from 1.33 to 1.57 with a p-value of 0.020. This increase was statistically significant, but much smaller than in the intervention group. This may be because pregnant women continue to receive basic information during routine antenatal check-ups, or gain information from their social environment, the media, and their own experiences. However, improvements without intensive education tend to be minimal. This finding is consistent with a study by Pratiwi & Nurjanah (2022) which stated that without structured training, pregnant women's skills improve slowly and suboptimally. (27)

The difference in skill improvement between the intervention and control groups indicates that targeted education plays a significant role in improving the practical abilities of pregnant women. Various studies have shown that improving skills requires a learning process that involves not only absorbing information but also repeated practice (28). Therefore, the intervention provided in this study can be said to be effective because it facilitated this learning process.

Overall, the results of this study strengthen the evidence that health education has a significant positive effect on the skills of pregnant women, especially when conducted through demonstrative and participatory methods. Skills improvement is very important because it contributes to the readiness of mothers to face pregnancy, childbirth, and prevent complications. (29).

Conclusion

The conclusion of this study confirms that the educational intervention implemented at the Bolo Community Health Center in Bima Regency significantly improved the knowledge and skills of pregnant

women. The data show that after the intervention, the intervention group showed significant improvements in both variables. The average knowledge score increased from 1.50 to 2.27 (p = 0.000) and skills score from 1.33 to 2.13 (p = 0.000). Meanwhile, the control group also experienced improvements, but by a much smaller magnitude (knowledge from 1.40 to 1.60; skills from 1.33 to 1.57). This indicates that the educational intervention had a significant positive impact, supported by interactive learning methods and hands-on practice. The importance of this approach is further emphasized by various previous studies showing similar effects. Therefore, the implementation of practice-based educational programs in antenatal care is highly recommended to improve pregnant women's preparedness for pregnancy and childbirth and prevent health complications. This intervention should be continued and enhanced to ensure its sustainability in the future.

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