

Effectiveness of Educational Calendar on Pregnant Women's Attitudes Toward Anemia: A Pre-Experimental Study

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ARTICLE INFO

Article history

Submitted: 5 May 2026

Review: 5 May 2026

Accepted: 5 June 2026

Keywords:

Anemia; Pregnant Women; Educational Calendar; Attitude; Health Education.

ABSTRACT

Background: A high prevalence of anemia in pregnancy has occurred for 2 years in the working area of a Puskesmas Purwokerto Selatan. Anemia can cause complications during pregnancy. Educational calendars can improve pregnant women's knowledge and attitudes towards anemia.

Objective: To analyze the effectiveness of educational calendars on the attitudes of pregnant women with anemia.

Method: This study employed a pre-experimental design with a one-group pretest-posttest type, conducted from March-April 2026 involving 15 pregnant women with anemia determined using a total sampling technique. Instrument used questionnaires and an educational calendar that had been tested for the feasibility of media and materials. Data were analyzed using univariate and bivariate with Paired Sample t-test.

Results: The pre-test revealed that 66.67% of participants had good attitudes. After getting an educational calendar intervention for 30 minutes, a posttest conducted on the same day showed an increase to 93.33%, resulting in a difference of 26.67%. Paired sample t-test showed a significance value of $p=0.004$.

Conclusion: Educational calendar effectively improves pregnant woman's attitudes, with an increase of the mean value of 6.27 and a p-value of 0.004 (<0.05). Educational calendar can be an alternative tool to support efforts in reducing the cases of anemia during pregnancy.



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INTRODUCTION

Anemia among pregnant women remains a serious global health problem. World Health Organization (WHO) data reveal that 80% of countries worldwide experience a moderate to severe burden of anemia in pregnant women aged 15-49 years. In 2023, the incidence of anemia in pregnancy over a decade reached 35.5% (Verbunt et al., 2025) The working area of Puskesmas Purwokerto Selatan had the highest prevalence of pregnant women with anemia in 2023 and 2024 in Banyumas (DinKes, 2025). Anemia in pregnant women can reduce the blood's ability to transport oxygen throughout the body, resulting in symptoms of fatigue, lethargy, shortness of breath, dizziness, and the risk of pregnancy complications, including premature birth, miscarriage, low birth weight, impaired fetal growth, stunting, and maternal and infant mortality (Verbunt et al., 2025).

Health education is important to increase pregnant woman's knowledge and protect them from pregnancy complications caused by anemia through the development of positive attitudes (Chillo et al., 2025). Health education can also improve knowledge, attitudes, and behavior (Permatasari et al., 2021). In this study, education focused on pregnant women because

knowledge plays an important role in attitude towards managing anemia during pregnancy. Moreover, another study revealed that health education could improve the pregnant women's knowledge related to health behaviors during pregnancy, particularly in adherence to healthy food choices (Elsharkawy et al., 2022).

Management interventions can be carried out through counseling using educational calendars. This study is important as it provides new knowledge about the attitudes of pregnant women with anemia. Educational calendar interventions are still limited and have not been widely researched. The repeated use of calendars in daily activities can help shape pregnant women's understanding and attitudes regarding anemia during pregnancy.

Educational calendars are effective in increasing knowledge of pregnant women (Malik Asikin et al., 2025). Educational calendars can be an alternative medium for reminding pregnant women to address anemia in order to prevent complications during pregnancy (Nguyen et al., 2021). Another study also revealed the effectiveness of an educational calendar to increase knowledge (Rahmasari et al., 2025).

This study aims to contribute to the prevention of pregnancy complications and provide innovative educational media to deliver health information in order to improve pregnant women's understanding and attitudes toward anemia.

METHOD

This quantitative research employed a pre-experimental design with the one-group pretest-posttest approach. The design was selected because the population and sample were fewer than 30 respondents, which did not meet the criteria for a control group study. The attitude assessment used three categories, namely good (76-100%), moderate (56-75%), and poor (<56%), based on the Likert scale ranging from strongly disagree (1) to strongly agree (5). The population and sample consisted of 15 pregnant women. The limited number of samples was due to some factors, such as respondents relocating to another area, giving birth before the estimated delivery date, and unwillingness to participate in the study. Although the sample size was relatively small, a study by (Ali Bin-Hady et al., 2020) demonstrated that a pre-experimental study conducted at Hadhramout University, Yemen, involving 15 students produced statistically significant results ($p = 0.005$). The inclusion criteria for respondents in this study were pregnant women with anemia in the working area of Puskesmas Purwokerto Selatan, willingness to participate, consumption of iron supplementation tablets, and no history of blood disorders such as thalassemia.

As the population of the study was fewer than 100 respondents, this study used a total sampling as suggested by (Sugiyono, 2023). This study was conducted from March 29 to April 8, 2026, with a door-to-door method. The instrument used an educational calendar and questionnaires adopted from Ni Luh Wayan Okta Sriantika (2019), which had been tested for validity and reliability. The study was conducted in accordance with the code of ethics with number KEPK/UMP/181/III/2026, and all respondents were informed and willing to participate without coercion. The researcher distributed pre-test questionnaires before the intervention. The intervention was education using an educational calendar about anemia in pregnancy for 30 minutes. Then, the post-test questionnaire was administered on the same day. Data analysis used univariate and bivariate, with a normality test (Sig. >0.05) as a requirement before conducting a paired sample t-test with a p-value <0.05.

RESULTS

The respondent characteristics cover age, parity, education level and economic status of pregnant women with anemia in the working area of Puskesmas Purwokerto Selatan as presented in the following table:

Table 1. Frequency distribution sample

Variable	f	%
Age		
High risk : < 20 and > 35 years	4	26,7
Low risk : 20-35 years	11	73,3
Parity		
High risk : Nulipara and Multipara	11	73,3
Low risk : Primipara	4	26,7
Education level		
Primary education	2	13,3
Secondary education	9	60
Higher education	4	26,7
Economic status (Income)		
< regional minimum wage	8	53,3
> regional minimum wage	7	46,7

The table shows that 73.3%. of the respondents aged 25-35 years. The parity at risk was 73.3%, with 7 nulliparous and 4 multiparous. The highest level of education was secondary school (60%), and 53.3% had an economic status below the regional minimum wage.

Table 2. Frequency distribution of attitudes during the pre-post test

Category	<i>Pre-Test</i>		<i>Post Test</i>	
	n	%	n	%
Good	10	66,67	14	93,33
Moderate	5	33,33	1	6,67
Poor	0	0,00	0	0,00
Total	15	100	15	100

The pre-post test results showed an increase of 22.67% for the attitudes of pregnant women with anemia. The respondents' attitudes were measured using a pretest (before) and a posttest (after) to determine the effectiveness of the educational calendar using bivariate analysis. The result can be seen in the following table.

Table 3. Normality Test

Variable	N	Sig.
<i>Pre-test</i>	15	0.317
<i>Post-test</i>	15	0.739

In this study, a normality test was conducted as a prerequisite before performing the paired sample t-test. As the number of respondents was fewer than 50, it used the Shapiro-Wilk test with a significance level (alpha) of 5% or 0.05; if the Sig. value was >0.05, the data were considered to be normally distributed. Table 4.5 shows that the Sig. values for both the pretest and posttest variables were >0.05, indicating normal data distribution.

Table 4. Paired Sample T-test

Variable	Mean	P-Value
Pre-test	78,13	0,004
Post-test	84,40	

The table above shows an increase in the mean value of 6.27, with a p-value of 0.004 (<0.05). This indicates that the educational calendar can be an effective medium to increase pregnant women's attitude and knowledge towards anemia.

DISCUSSION

Respondent Characteristics by Age

Table 1 indicates that the respondent was dominated by those aged 25-35 years (73.3%). This age range is considered the most common period for pregnancy, childbirth, and breastfeeding, as women are mentally prepared and more capable of caring for themselves and their babies. This finding is consistent with the previous study (Nyongesa et al., 2023) that pregnancies over the age of 30 years are associated with a higher risk of anemia, resulting in a maternal mortality risk that is 2 to 4 times greater compared to pregnancies in women aged <20 years and 20-24 years. This can be age-related declines in reproductive health functions, resulting in less optimal nutrient absorption for the pregnant woman and fetus, leading to anemia. Anemia is a condition characterized by decreased hemoglobin (Hb) levels and a lower-than normal number of red blood cells to meet the body's needs (Wang et al., 2025). Anemia in pregnancy occurs when Hb levels are <11 g/dL (Tirore et al., 2024). Anemia is categorized into three types: mild (10-10.9 g/dL), moderate (7-9.9 g/dL), and severe (<7 g/dL) (Abd Rahman et al., 2022).

Respondent Characteristics by Parity

This study showed that the majority of respondents had high-risk parity, namely 73.3% of the sample. This included 7 nulliparous women (those who had never given birth) and 4 multiparous women (those who had given birth more than twice). This is in line with (Li et al., 2025) that multiparous women had a higher risk of anemia and other pregnancy complications, such as premature birth, macrosomia, gestational diabetes, placenta previa, and even fetal death. This may be due to reduced body iron reserves during previous pregnancy, childbirth, and breastfeeding periods. On the other hand, it differs from previous studies showing that multiparous women had a lower risk of anemia due to physiological adaptations from prior pregnancy (Admass et al., 2025)

Respondent Characteristics by Education Level

Table 1 shows that the majority of pregnant women (60%) had secondary education. A previous study by (Abd Rahman et al., 2022) revealed that pregnant women with primary to secondary education were at risk of anemia due to a lack of knowledge in selecting foods consumed during pregnancy. Another study found that women with an elementary school education level have a high incidence of anemia (Balis et al., 2022), despite the fact that family meal planning, childcare, and parenting require adequate maternal educational support. Pregnant women with higher educational levels can regulate balanced dietary patterns. Appropriate nutritional intake can help fulfill essential nutrient requirements and contribute to the prevention and proper management of anemia during pregnancy.

Respondent Characteristics Based on Economic Status

Table 1 shows that the majority of respondents (53.3%) had an economic status below the regional minimum wage. This indicates that economic conditions influence nutritional needs during pregnancy. Women with low to middle economic status have a higher risk of anemia due to limited ability to meet adequate nutritional intake requirements during pregnancy (Alsubaie et al., 2026). However, 46.7% of pregnant women with anemia had an economic status above the

regional minimum wage. This finding, which shows a relatively similar proportion of anemia cases among women with both low and high economic status, contradicts (Abou-Rizk et al., 2021). The study explained that higher economic status and good knowledge may reduce the risk of anemia due to better food choices and healthier lifestyles.

Attitudes of Pregnant Women with Anemia Before and After the Educational Calendar Intervention

Table 2 shows a difference in pre-post test results related to pregnant women's attitudes, with an increase of 22.67%. This increase may be due to the intervention using an educational calendar. This is in line with a previous study by (Wu et al., 2021) that education can improve attitudes and behaviors regarding a person's health. This study focused on the influence of surrounding people and educational calendars to improve pregnant women's attitudes towards anemia. The findings are also in line with (Liu et al., 2022) that changes in attitudes and behavior showed a significant difference before and after the intervention, with a p-value of 0.001.

Effectiveness of Educational Calendars on Pregnant Women's Attitudes

Table 4 shows an increase in the mean score of 6.27, with a p-value of 0.004 (<0.05). This indicates that educational calendars are effective media for improving the attitudes of pregnant women with anemia in the working area of Puskesmas Purwokerto Selatan. Therefore, educational calendar media can be implemented in health services to increase pregnant women's knowledge and attitudes toward anemia during pregnancy. This finding is consistent with (Elsharkawy et al., 2022) that health education can change pregnant women's behavior and attitudes. In this study, the calendar was used as direct educational media, enabling respondents to repeatedly read the information during their daily activities, as it was placed within the home environment. Besides, its attractive visual design helped support the development of understanding and positive attitudes among pregnant women. This study is also in line with a previous study by (Prasetyanti & Fitriasnani, 2020) that calendar-based media were effective in improving respondents' knowledge and attitudes, with p-values of 0.001 and 0.003 (<0.05), respectively.

This study also aligns with (Nguyen et al., 2023) that calendar-based educational media resulted in changes in attitudes and behaviors related to nutritional intensification among women in the intervention control group, with a pretest–posttest increase of 45 points. (Indrayani et al., 2022) supported that health education through calendar media was effective in improving knowledge, with a p-value of 0.031 (<0.05). The similarity between previous studies and the findings of this study may be attributed to the function of calendars as tools used daily for time management, which have been innovatively adapted as media for delivering health information. Therefore, calendar media are effective in helping improve knowledge regarding the management of anemia during pregnancy as they are closely integrated into everyday life, not easily misplaced, frequently seen, and therefore easier to remember.

On the other hand, (Quraisy et al., 2022), who used a quasi-experimental one-group pretest–posttest design with total sampling and data analysis using the Wilcoxon test, found that health education delivered through lecture methods using calendar media did not show significant improvement in pregnant women's knowledge (p-value 0.66). The difference between the findings of the previous study and the present study may be due to the smaller sample size used in the earlier research, namely, fewer than 15 respondents.

The novelty of this research lies in the use of calendar media as an innovative educational tool in puskesmas, which previously relied primarily on leaflets for educating pregnant women with anemia. The calendar format used in this study was more efficient for reading because it is frequently used as a daily reference for checking days, dates, months, and years, making it less likely to be misplaced compared to other educational media.

However, this study has some limitations. First, this study was conducted in a short period due to the need to accommodate discomfort experienced by pregnant women during counseling sessions, such as fatigue and physical exhaustion. Second, this study involved a relatively small

number of respondents without a control group because some respondents relocated, gave birth before the completion of the study, or were unwilling to participate.

Based on the discussion above, the findings indicate that educational calendars can serve as an effective tool for delivering health information through counseling and discussion to improve positive attitudes toward managing anemia during pregnancy.

CONCLUSION

Based on the discussion and findings of this study, the educational calendar is proven effective to improve the attitudes of pregnant women with anemia in the working area of Puskesmas Purwokerto Selatan, with a mean increase in attitude scores of 6.27 and a p-value of 0.004 (<0.05). Therefore, the educational calendar may serve as an alternative tool in Puskesmas Purwokerto Selatan to support efforts in reducing the incidence of anemia during pregnancy.

RECOMMENDATION

Future studies need to involve a larger number of respondents and to establish trust with participants prior to the study in order to encourage cooperative participation throughout the research process. Moreover, future studies need to expand the research area to include broader working regions, allowing for wider respondent coverage and more comprehensive findings.

AUTHOR'S DECLARATION

Funding

Personal expenses

Availability of data and materials

All data are available from the authors.

Competing interests

The authors declare no competing interest.

ACKNOWLEDGEMENT

The service area of Puskesmas Purwokerto Selatan operators, health center midwives, village midwives and cadres who helped run the research. Thank you for being willing and sincere in helping to complete this research.

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