

The effect of education using the emo demo ATIKA (Ati Telur Ikan - Liver Egg Fish) method on knowledge about anemia among pregnant women in Bantul Regency

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ABSTRACT

Background: Anemia in pregnant women has remained a global health challenge, with a prevalence of 27.7% in Indonesia (SKI 2023), and the highest number of cases in Bantul Regency was found at Sewon II Public Health Center. Anemia in pregnant women is generally caused by increased requirements for iron, vitamin B12, and folic acid during pregnancy. This condition occurs because the mother's blood volume increases by about 20–30%, so the body needs more hemoglobin, which is formed from these nutrients. Poor nutritional understanding and low adherence to iron tablet consumption were the main contributing factors, thus requiring innovative educational approaches such as the Emo Demo ATIKA method (liver, egg, fish) to raise nutritional awareness among pregnant women.

Objectives: to determine the effect of education using the emo demo atika method on knowledge about anemia in pregnant women in Bantul Regency.

Methods: This study employed a quasi-experimental design with a pretest-posttest nonequivalent control group involving 86 pregnant women in their second and third trimesters, divided into an intervention group (Emo Demo ATIKA) and a control group (lecture method). Data were analyzed using the Wilcoxon and Mann-Whitney tests.

Results: The results showed a significant increase in knowledge in both groups after the education ($p = 0.001$), with a higher improvement in the intervention group, and a significant difference between the two groups ($p = 0.001$).

Conclusions: Therefore, the Emo Demo ATIKA method was proven to be more effective than conventional method in increasing pregnant women's knowledge about anemia and is recommended as an innovative educational tool in healthcare facilities.

KEYWORD: anemia; emo demo atika; health education; knowledge; pregnant women.

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INTRODUCTION

Anemia remains a major public health problem. Millions of women of childbearing age and children under five years of age may currently experience fatigue, lethargy, or shortness of breath due to anemia. These debilitating symptoms undermine the well-being and productivity of human resources, especially women, which ultimately affects entire families, communities, and nations. According to the WHO's 2025 global anemia estimates, the prevalence of anemia among pregnant women aged 15-49 years is 35.5%, and the prevalence of anemia among non-pregnant women is 30.5%. Anemia causes adverse intergenerational consequences, including poor pregnancy and birth outcomes, higher mortality and morbidity risks, and poor cognitive and motor development in children. Africa and Southeast Asia are the regions with the highest prevalence of anemia in pregnant women worldwide(1).

In Indonesia, the results of the 2023 Indonesian Health Survey (SKI) reported that the prevalence of anemia in pregnant women reached 27.7%. The 35-44 age group recorded the highest rate at 39.6%, followed by the 25-34 age group at 31.4%. In the Province of D.I. Yogyakarta, the prevalence of anemia among pregnant women increased from 15.21% in 2018 to 19.01% in 2022. Meanwhile, in Bantul Regency, the prevalence showed a fluctuating trend, with the highest rate in 2021 at 18.99% and decreasing to 15.89% in 2022. Based on data from the Bantul District Health Office in 2024, out of

27 community health centers, Sewon II Community Health Center ranked highest with 103 pregnant women suffering from anemia out of a total of 1,002 pregnant women (10.27%). Anemia in pregnant women is generally caused by increased requirements for iron, vitamin B12, and folic acid during pregnancy. This condition occurs because the volume of a woman's blood increases by approximately 20-30%, so the body requires more hemoglobin, which is formed from these nutrients (2). Iron intake and nutrition during pregnancy are critical aspects that require attention from healthcare providers to reduce mortality and morbidity rates due to anemia in pregnant women, which remains a global issue to this day (3). Factors contributing to this condition include low levels of knowledge, compliance, self-motivation, family support, and the importance of meeting iron requirements during pregnancy(4).

Efforts to prevent anemia during pregnancy have been made through the distribution of iron tablets and nutrition education. However, the compliance rate of pregnant women in consuming TTD is still low. In a study conducted in Yogyakarta in 2020, the compliance rate of pregnant women in consuming iron tablets was only 69% (5). In addition, a lack of understanding about healthy eating patterns and sources of iron-rich foods also poses an obstacle in efforts to combat anemia (6). To overcome this problem, a more innovative and interactive educational approach is needed. One

method that can be used is Emotional Demonstration (Emo Demo). Emo Demo is a participatory health education method that uses visual aids and an emotional approach to convey health messages in a simple, enjoyable, and memorable way. One implementation of this method is Emo Demo ATIKA (Liver, Eggs, Fish), which aims to enhance pregnant women's understanding of the importance of consuming iron-rich foods.

This study is important because the educational approach using the Emo-Demo ATIKA method is considered more effective in increasing awareness and knowledge among pregnant women than conventional methods. The results of the study at the Singandaru Community Health Center in Serang City show that education using the Emo Demo ATIKA method can increase pregnant women's nutritional knowledge by up to 30% and motivate behavioral changes toward healthy food consumption. This study to determine the effect of education using the emo demo atika method on knowledge about anemia in pregnant women in Bantul Regency.

MATERIALS AND METHODS

This study used a quasi-experimental design with a pretest-posttest nonequivalent control group. There were two groups: the intervention group, which received education using the Emo-Demo ATIKA method, and the control group, which received education using the conventional lecture method. Measurements were taken before (pretest)

and after the intervention (posttest) using the same questionnaire.

The study was conducted at Sewon II Health Center and Pleret Health Center in June 2025. These two health centers are located in areas with the highest prevalence of anemia in Bantul District. The population consisted of all pregnant women in their second and third trimesters registered during that month, with a total population of 123 people at Sewon II Health Center and Pleret Health Center. The sample was determined using the Slovin formula with a margin of error of 10%, resulting in 43 respondents in each group (total 86 respondents), selected through purposive sampling based on inclusion and exclusion criteria. The independent variable was the educational method (Emo-Demo ATIKA and lecture), while the dependent variable was the level of knowledge of pregnant women about anemia. Data collection was conducted through pretest and posttest questionnaires. The questionnaire was adapted from a questionnaire used in a previous study by Arifiyanti in 2022. The questionnaire had been tested for validity and reliability by the previous researcher. All items were declared valid and reliable with a calculated r -value > table r -table and a Cronbach's alpha coefficient of 0.798 (>0.60) (7). The main instruments in the intervention were the Emo-Demo ATIKA module, Lesson Plan for Extension Activities, and educational games such as rice and ATIKA cards, as well as questionnaires.

Data analysis used the Wilcoxon test to examine differences between pretest and posttest scores within each group, and the Mann-Whitney test to compare differences in knowledge change between the intervention and control groups. Research ethics adhered to the principles of beneficence, non-maleficence, autonomy, and justice. This study has received ethical approval from the Alma Ata University Ethics Committee with number KE/AA/V/10112557/EC/2025.

RESULTS AND DISCUSSION

RESULTS

Univariate Analysis

The characteristics of the respondents included age, highest level of education, and occupation. The total number of respondents in this study was 86 pregnant women in their second and third trimesters at two community health centers in Bantul Regency.

In the **Table 1** respondent characteristics show that there were 86 respondents in this study, divided into two groups, namely the intervention group and the control group, each consisting of 43 people. All respondents in the intervention group received education using the Emo Demo ATIKA method, while the control group received education using the lecture method.

Based on age, the majority of respondents were in the 20-35 age range, with 28 respondents (65.1%) in the intervention group and 27 respondents (62.8%) in the control group. This age range also constitutes the group with the highest level of knowledge

in the “adequate” category in the pretest results, as shown in **Table 2**.

Table 1. Frequency distribution of respondents in the intervention group and control group

Characteristics	Intervention group		Control group	
	Σ	%	Σ	%
Method				
Emo Demo ATIKA	43	100	-	-
Conventional	-	-	43	100
Total	43	100	43	100
Age				
<20	8	18.6	4	9.3
20-35	28	65.1	27	62.8
>35	7	16.3	12	27.9
Total	43	100	43	100
Education				
Elementary School	4	9.3	8	18.6
Junior High School	9	20.9	12	27.9
Senior High School	19	44.2	19	44.2
Diploma	5	11.6	2	4.7
Graduate	6	14	2	4.7
Postgraduate	-	-	-	-
Total	43	100	43	100
Job				
Housewife	34	79	35	81.4
farmers/planters/laborers	3	7	4	9.3
Entrepreneur	4	9.3	3	7
Employee/Civil Servant	2	4.7	1	2.3
Total	43	100	43	100

Source: Primary Data, 2025

This indicates that the productive age group has a better initial knowledge base before receiving education and, psychologically and sociologically, this productive

age group tends to be more open and receptive to new information and has optimal cognitive capacity to process education. At the productive age, individuals typically demonstrate more mature thinking and better adaptation to health information(8).

Table 1 shows that, in terms of education, the largest proportion of respondents were high school/vocational school graduates, which means that, in general, they have adequate basic literacy skills to absorb educational material. In general, respondents with a high school education background also demonstrated sufficient knowledge on the pretest, and some achieved the “good” category on the posttest, indicating that secondary education has provided a sufficient foundation for understanding health information. However, further analysis shows that respondents with a bachelor's degree have a higher level of knowledge compared to other educational levels, with all S1 respondents falling into the “adequate” category in the pretest and improving to the “good” category in the posttest. This underscores that education significantly influences an individual's knowledge, as those with

higher educational levels are generally more capable of accessing and processing health information(9).

Table 1 shows that, in terms of employment, the majority of respondents work as housewives, while a small proportion work as laborers, entrepreneurs, private employees, and civil servants.

Table 2 shows that in the intervention group, there was an increase in knowledge after being given education on the Emo Demo ATIKA method. Before the intervention, the majority of respondents were in the adequate (69.8%) and poor (30.2%) categories, but after the intervention, this increased to 90.7% in the good category and 9.3% in the adequate category. Meanwhile, in the control group that received lecture-based education, there was also an increase after the lecture-based education was provided. Respondents in the “good” category increased from 0% to 55.8%, and those in the 'adequate' category increased to 44.2%, with no respondents in the “poor” category. The increase in knowledge was achieved through a series of stages, starting from the pretest, the provision of education, to the posttest. Pretest

Table 2. Frequency distribution of knowledge in the intervention group and control group

Knowledge	Intervention Group				Control Group			
	Pretest		Posttest		Pretest		Posttest	
	Σ	%	Σ	%	Σ	%	Σ	%
Insufficient	13	30.2	-	-	17	39.5	-	-
Adequate	30	69.8	4	9.3	26	60.5	19	44.2
Good	-	-	39	90.7	-	-	24	55.8
Total	43	100	43	100	43	100	43	100

Source: Primary Data, 2025

data was used to describe the initial knowledge level of respondents, while posttest data was used to measure changes in knowledge after education was provided. The comparison of these two data sets served as the basis for evaluating the success of the intervention, including the elimination of the “poor” category that previously existed(10).

These findings indicate that education plays an important role in improving pregnant women's understanding of anemia. Previously, there were no respondents in the good knowledge category, but after education, the majority of respondents improved to that category. The disappearance of the poor category also indicates that education has succeeded in improving the previously low level of knowledge among respondents(11).

These results are also supported by research conducted by Suleni (2024), which shows that before receiving education, all respondents had knowledge in the sufficient and poor categories, and none were in the good category. After receiving education, most respondents improved to the good category, and there were no longer any respondents in the poor category. This proves that targeted educational activities can improve knowledge levels(12).

In general, human knowledge is obtained through the eyes and ears. During demonstrations, most of the senses used are sight and hearing. A person who understands, realizes, and comprehends the importance of the stimuli that are seen, felt, heard, and attracted to those stimuli will

experience an increase in their cognitive abilities (13). By increasing knowledge, individuals become aware of the need to behave in accordance with the knowledge they have acquired(14).

Bivariate Analysis

Table 3 shows that before education, the majority of respondents were in the adequate category (69.8%) and the poor category (30.2%). After education, most respondents moved to the good category (90.7%) and the rest to the adequate category (9.3%).

Table 3. Changes in Knowledge in the intervention group

Knowledge	Intervention Group			
	Pretest		Posttest	
	Σ	%	Σ	%
Insufficient	13	30.2	-	-
Adequate	30	69.8	4	9.3
Good	-	-	39	90.7
Total	43	100	43	100
Z	-5.984			
P value	0.001			

Source: Primary Data, 2025

The Wilcoxon test results showed a Z-value of -5.984 and a p-value of 0.001 (p < 0.05), indicating a significant difference between knowledge levels before and after education. This suggests that the Emo Demo ATIKA method is effective in improving the knowledge category of pregnant women. The results of this study align with the 2021 study by Muyassaroh Y et al., which showed that the Emo-Demo ATIKA game effectively improved knowledge, attitudes, and pre-

ventive behaviors regarding anemia among pregnant women, with a p-value of 0.001 for all three (15). There has been an increase in knowledge using the Emo Demo educational method because the Emo Demo method has a number of advantages that support its effectiveness in conveying information. This method is designed to be highly participatory, combining interactive games and reducing the use of oneway lectures in delivering health information. Its aim is to evoke emotional reactions and encourage behavioral reflection among participants. Its effectiveness is evident in the steps that encourage active participation, the clear delivery of key messages, and the variety of engaging activities, thereby significantly increasing knowledge compared to the control group(16).

Table 4. Changes in knowledge in the control group

Knowledge	Control Group			
	Pretest		Posttest	
	Σ	%	Σ	%
Insufficient	17	39.5	-	-
Adequate	26	60.5	19	44.2
Good	-	-	24	55.8
Total	43	100	43	100
Z	-5.427			
P value	0.001			

Source: Primary Data, 2025

Table 4 shows that in the control group that received lecture-based education, there was also an increase in the knowledge category. Before education, the majority of respondents were in the adequate (60.5%) and poor (39.5%) categories. After education,

most moved to the good category (55.8%) and the rest remained in the adequate category (44.2%). The results of the Wilcoxon test showed a Z-value of -5.427 and a p-value of 0.001 ($p < 0.05$), indicating a significant difference between knowledge levels before and after education.

The results of this study are in line with Hidayat's 2024 study on the Effect of Health Education on Anemia Prevention on the Knowledge Level of Pregnant Women in Jatimulya Village, which showed that providing health education through lectures and question-and-answer sessions is effective in improving pregnant women's knowledge about anemia prevention. The study used a pretest-posttest design, and the results showed a significant increase in knowledge after the education session(17).

There has been an increase in knowledge using the lecture method of education because lectures are able to convey material systematically and in a way that is easy for participants to understand. This method allows instructors to convey information directly and in a structured manner, so that participants can grasp the main points more clearly. Lectures are also considered efficient because they can reach many people in a short time, making them a practical method for group instruction activities(18).

Table 5 shows the results of the Mann-Whitney test on the pretest data, indicating that there was no significant difference between the intervention group and the

control group (p value = 0.368) and a Z value of (-0.900). This suggests that the initial knowledge levels of both groups were relatively equivalent before the intervention was administered. This finding is important because, although the intervention group had a higher proportion of highly educated pregnant women compared to the control group, the pretest results showed that the initial knowledge levels were not significantly different. Thus, the potential bias due to educational differences can be minimized, allowing the differences in posttest results to be more closely associated with the effectiveness of the educational methods provided.

Table 5. Distribution of pre-test knowledge results and Mann-Whitney test result

Knowledge	Intervention		Control	
	Pretest		Pretest	
	Σ	%	Σ	%
Insufficient	13	30.2	17	39.5
Adequate	30	69.8	26	60.5
Good	-	-	-	-
Total	43	100	43	100
Mann-Whitney	838.5			
Z	-0.9			
P value	0.368			

Source: Primary Data, 2025

Table 6 shows the results of the Mann-Whitney test on posttest data between the intervention group and the control group. The analysis results show that the intervention group using the Emo Demo ATIKA method had a p-value of <0.001 ($p < 0.05$) and a Z-value (-3.633), indicating a significant difference between the two groups. This indicates that the intervention group experienced a

higher increase in knowledge. Therefore, it can be concluded that the Emo Demo ATIKA method is more effective than the lecture method in improving the knowledge category of pregnant women.

Table 6. Distribution of pre-test knowledge results and Mann-Whitney test result

Knowledge	Intervention		Control	
	Posttest		Posttest	
	Σ	%	Σ	%
Insufficient	-	-	-	-
Adequate	4	9.3	19	44.2
Good	39	90.7	24	55.8
Total	43	100	43	100
Mann-Whitney	602			
Z	-3.633			
P value	0.001			

Source: Primary Data, 2025

DISCUSSION

The increase in knowledge among the intervention group was more effective because, in applying the Emo Demo ATIKA method, pregnant women received education through emotional and visual demonstrations that were engaging, making it easier for them to understand the material in a more tangible and enjoyable way. After receiving education about anemia and nutrition, pregnant women participated in the interactive Emo Demo ATIKA game, which made them more active in discussions and able to remember key concepts related to anemia prevention. Additionally, this method directly involves pregnant women in the learning process, making them more motivated and enthusiastic about prioritizing their own health and

that of their fetus. With a more interactive and emotionally engaging learning environment, pregnant women become more confident in applying health messages in their daily lives, resulting in a more significant impact on their knowledge improvement compared to the control group(19).

Meanwhile, in the control group using the lecture method, although the lecture method is one of the most widely used educational methods in health promotion activities because information can be conveyed clearly and structurally and is also practical to apply to large target groups and requires relatively less preparation and costs. However, the lecture method also has several shortcomings, one of which is low two-way interaction, so that participants tend to be passive and less involved in the learning process. Additionally, the use of this method often leads to audience boredom and reduced motivation, especially if the presentation is too lengthy. As a result, participants' memory and understanding of the material may diminish, thereby preventing the optimal achievement of the objectives for knowledge and health behavior change(20).

This is in line with research conducted by Nafilah and Palupi, which found that the Emo-Demo method is more effective than the lecture method. This is because lectures are a commonly used method, but they are unable to touch a person's feelings or emotions, whereas changing knowledge and perceptions requires activities that can touch a person's emotions(21).

Another study conducted by Intiyati et al. found that the Emo Demo method was more effective than the lecture method in improving knowledge, attitudes, and behavior. The LSD test results showed that for the variables of knowledge, attitude, and behavior, the Emo Demo group had a significant difference compared to the control group (LSD value = 0.010). This indicates that the emotional approach used in Emo Demo is more effective in stimulating greater change than lectures. The emotional approach in Emo Demo, which involves direct communication and utilizes psychological elements such as feelings and needs, has proven effective in promoting positive behavioral change. Therefore, Emo Demo is recommended as an outstanding intervention method in educational programs(22).

The effectiveness of the Emo Demo method is also supported by research conducted by Rosita et al., which found that the Emo Demo method resulted in higher knowledge improvement scores compared to the use of leaflets. This is because, in its implementation, the Emo Demo method uses illustrations and direct interaction with participants, making the information delivery process more engaging and easier to understand. Thus, this method is not only superior to the lecture method but has also proven to be more effective than conventional educational media such as leaflets (23). This is further reinforced by the pretest results shown in **Table 5**, where there was no significant difference between the inter-

vention and control groups before the education was provided. This means that the initial knowledge levels of both groups were equivalent, even though the intervention group had a higher proportion of highly educated pregnant women.

Therefore, it can be concluded that the significant increase in knowledge in the intervention group was solely due to the educational intervention using the Emo Demo ATIKA method, not because of differences in background characteristics, such as education. In other words, these results are unbiased, and the effectiveness of the Emo Demo ATIKA method can be objectively proven.

CONCLUSION AND RECOMMENDATION

Education using the Emo Demo ATIKA method has been proven to be more effective than lectures in increasing pregnant women's knowledge about anemia. Significant increases in knowledge occurred in both groups, but were higher in the intervention group. The participatory and emotional approach of this method makes the material easier to understand and remember.

Therefore, the Emo Demo ATIKA method is recommended as an innovative educational medium in health facilities. Healthcare workers are encouraged to integrate this method into nutrition promotion during pregnancy. Further research is recommended to assess its impact on long-term behavioral changes.

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