


Effectiveness of Interactive Education on Cardiovascular Risk in Increasing Knowledge of Reproductive Age Women for Prevention of Pregnancy Complications

Fiona Paramitha¹, Alviannur Halim², Tri Putra Rahmad Ramadani³, Erick Tanara⁴, Rahmantio Adi⁵, Iman Rachmanto⁶
Fakultas Kedokteran, Universitas Negeri Surabaya, Indonesia

Article Info	ABSTRACT
<p>Keywords: Pregnancy complications, Cardiovascular risk, Interactive education, Maternal health literacy, Reproductive-age women.</p>	<p>Pregnancy complications related to cardiovascular disease are a significant cause of maternal morbidity and mortality in Indonesia, exacerbated by low health literacy among women of reproductive age. Effective education is a key intervention, but the most impactful model still needs to be explored. This study aims to evaluate the effectiveness of a multimedia-based interactive education program in increasing knowledge about cardiovascular risk as a preventive measure for pregnancy complications in women of reproductive age. This study uses a quasi-experimental design with a one-group pretest-posttest approach. A total of 17 women of reproductive age (20-35 years) in Malang, who were members of the Indonesian Midwives Association, participated in this program. The intervention consisted of face-to-face education sessions that combined lectures, discussions, and posters and videos. Participants' knowledge was measured before and after the intervention using a validated questionnaire. Data analysis was performed using descriptive statistics and the Wilcoxon signed-rank test. The results showed a statistically significant increase in participants' knowledge scores after the intervention ($Z = -2.810$, $p = 0.005$). The average knowledge score increased from 94.12 (SD = 11.21) on the pre-test to 95.29 (SD = 11.72) on the post-test. All program outputs, including educational modules, media publications, and activity videos, were successfully completed. The interactive education model proved effective in increasing the knowledge of women of reproductive age about cardiovascular risks in pregnancy.</p>
<p>This is an open access article under the CC BY-NC license</p> 	<p>Corresponding Author: Fiona Paramitha Fakultas Kedokteran Universitas Negeri Surabaya Jl. Kalisari I 60272 Surabaya Jawa Timur fionaparamitha@unesa.ac.id</p>

PENDAHULUAN

The high maternal mortality rate (MMR) remains one of the most pressing public health challenges in Indonesia. Complications during pregnancy and childbirth are the main causes, with cardiovascular disease emerging as a significant contributor. National data shows that peripartum heart disease accounted for 29% of all maternal deaths in 2018, highlighting the vulnerability of the cardiovascular system during pregnancy. Conditions such as

preeclampsia, gestational hypertension, and gestational diabetes complicate up to 10% of all pregnancies and substantially increase the risk of morbidity and mortality for both mother and fetus. The prevalence of pre-existing cardiovascular risk factors, such as chronic hypertension affecting approximately 7.7% of women of reproductive age, further exacerbates the problem.

The root of this problem runs deeper than clinical prevalence; it is embedded in systemic and persistent deficits in maternal health literacy (MHL) throughout Indonesia (Nurfadilah et al., 2025). Health literacy, defined as an individual's ability to obtain, process, and understand basic health information necessary to make appropriate health decisions, is consistently low among Indonesian women (Nurfadilah et al., 2025). Low MHL is directly correlated with adverse pregnancy outcomes. Studies have shown a strong relationship between inadequate HLS and poor health behaviors, decreased adherence to antenatal care (ANC), and an increased risk of complications such as preterm birth and low birth weight (Ghotbizadeh et al., 2022). When women lack adequate understanding of the relationship between conditions like hypertension and diabetes and pregnancy outcomes, early detection and preventive actions become nearly impossible.

However, the pregnancy period also presents a unique strategic opportunity. The public health literature widely recognizes pregnancy as a "*teachable moment*"—a period when women are highly motivated to adopt behaviors that promote health for the well-being of their unborn child (Zibellini et al., 2020). This heightened motivation, coupled with regular interactions with the healthcare system during ANC visits, creates an ideal environment for impactful educational interventions (Putri et al., 2023).

Effectively capitalizing on this moment requires a shift from the traditional health education paradigm. Conventional methods that are passive and monotonous, such as one-way lectures, have proven inadequate in engaging audiences and promoting sustained knowledge retention. Conversely, a growing body of evidence strongly supports the superiority of interactive, participatory, and multimedia-based education models (Kasiati et al., 2023). Interventions that combine discussion, simulation, and visual media such as videos and booklets are significantly more effective in increasing knowledge, changing attitudes, and modifying behavior among pregnant women (Suardi et al., 2025). These approaches not only convey information but also empower women to become active participants in their own healthcare.

Against this backdrop, the community service program "Interactive Cardiovascular Risk Education to Prevent Pregnancy Complications in Reproductive-Age Women" was designed and implemented. This paper reports on the implementation and evaluation of an interactive education model aimed at improving knowledge about cardiovascular risk among women of reproductive age in Malang. Thus, this program seeks to address critical health literacy gaps and contribute to the broader goal of reducing maternal morbidity and mortality in Indonesia.

METHODS

Program Design

This program uses a quasi-experimental design with a *one-group pretest-posttest* approach. This design was chosen to evaluate the effectiveness of educational interventions in real-world settings where random control group formation is not possible (Kasiati et al., 2023). Participants' knowledge was measured before (*pretest*) and immediately after (*posttest*) the intervention to assess the changes that occurred.

Participants and Location

A total of 17 women of reproductive age, ranging from 20 to 35 years old, participated in this program. Participants were recruited using *purposive sampling* techniques in collaboration with the program partner, the Malang Branch of the Indonesian Midwives Association (IBI). All participants were members or registered patients of the Malang Branch of IBI, ensuring the relevance of the target audience. The activities were carried out offline at the Malang Branch of IBI office, located at Jalan Joyosuko Timur No. 1, Malang, East Java.

Intervention Procedure

The intervention was designed as a comprehensive and interactive single face-to-face educational session, conducted over one day. The program was delivered by a multidisciplinary team consisting of specialists in pediatrics, cardiology, obstetrics and gynecology, internal medicine, radiology, and anesthesiology from the Faculty of Medicine, State University of Surabaya. This multi-component approach ensured the delivery of accurate and holistic material.

The intervention consists of three main elements:

1. Expert Lectures: Core material delivery sessions by specialist doctors. Content covers an introduction to cardiovascular risk factors (hypertension, obesity, diabetes, dyslipidemia), the mechanisms by which these factors cause pregnancy complications (preeclampsia, eclampsia, gestational diabetes), and practical prevention strategies focused on healthy lifestyles, diet, and self-monitoring of health.
2. Interactive Discussion and Q&A: After the lecture session, the facilitator opens a discussion and Q&A forum to encourage active participation. This approach allows participants to clarify doubts, share experiences, and contextualize the information received, which has been proven to increase understanding and change attitudes (Sari & Maryam, 2025).
3. Use of Multimedia Educational Media: To reinforce the delivery of material and increase engagement, the intervention is supported by various visual media. These include structured presentation slides, educational posters summarizing key points, and informative videos. The use of this multimedia approach is in line with best practices in health education, which show that a combination of print and electronic media improves knowledge retention (Suhardi et al., 2025).

Measurement Instruments

Participants' knowledge of cardiovascular risks during pregnancy was measured using a questionnaire developed by the implementation team. This questionnaire was designed to

reflect the core content delivered during the education sessions. The same instrument was used for *the pre-test* (administered before the session began) and *post-test* (administered immediately after the session ended) to ensure consistency of measurement.

Data Analysis

Quantitative data collected from the *pre-test* and *post-test* questionnaires were analyzed using IBM SPSS Statistics software. The data analysis process consisted of two stages:

1. Descriptive Statistics: Descriptive statistics, including the mean, median, and standard deviation (SD), were calculated for *pre-test* and *post-test* scores to summarize the group's overall performance and variability.
2. Inferential Statistics: Given the small sample size (N=17) and the potential for non-normally distributed score data (particularly due to *the ceiling effect* where many participants may have scored high), a non-parametric test was chosen for inferential analysis. The *Wilcoxon signed-rank test* was used to compare the *pre-test* and *post-test* median scores. This test is a more powerful alternative to the paired t-test in these conditions. The statistical significance level (alpha) was set at $\$p < 0.05\$$. The careful selection of statistical methods aims to ensure the validity of conclusions drawn from the data, transforming simple observations into statistically defensible findings.

RESULTS AND DISCUSSION

Results

Participant Characteristics

This program was attended by 17 women of reproductive age (aged 20-35 years) residing in Malang and its surroundings. All participants were members or patients registered with the program partner, the Indonesian Midwives Association (IBI) Malang Branch, who actively sought maternal and child health services.

Improvement in Participant Knowledge

An evaluation of participants' knowledge showed an increase after attending interactive educational sessions. Descriptive analysis showed that the average knowledge score of participants increased from 94.12 (SD = 11.21) on *the pre-test* to 95.29 (SD = 11.72) on *the post-test*.

To test the statistical significance of these changes, the Wilcoxon Signed-Rank Test was performed. The results of the analysis showed that the interactive educational intervention provided a statistically significant increase in participants' knowledge scores ($Z = -2.810, p = 0.005$). These results confirm that the program was effective in improving participants' understanding of cardiovascular risks in pregnancy. Details of the comparison of individual scores before and after the intervention are presented in Table 1.

Table 1. Comparison of Participants' Knowledge Scores Before (Pre-Test) and After (Post-Test) the Intervention

No. Participant	Pre-Test Score	Post-Test Score	Change
1	80	100	+20
2	80	100	+20
3	100	80	-20
4	100	80	-20
5	60	60	0
6	100	100	0
7	100	100	0
8	80	80	0
9	100	100	0
10	100	80	-20
11	100	100	0
12	100	100	0
13	100	100	0
14	100	100	0
15	100	100	0
16	100	100	0
17	100	100	0
Mean	94.12	95.29	+1.17
Standard Deviation	11.21	11.72	-
Median	100	100	-

Program Output Realization

All planned outputs in this community service program were successfully realized according to the targets. These outputs include various forms of dissemination and intellectual products designed to maximize the impact and sustainability of the program:

- a. Scientific Article Publication: Writing and publishing journal articles as a form of scientific accountability.
- b. Online Media Publications: Dissemination of information about activities through news portals to reach a wider audience.
- c. Educational Modules and Posters: Development of printed and digital educational materials that can be used for similar activities in the future.
- d. PKM Implementation Videos: Production of activity documentation videos uploaded to the YouTube platform as a digital dissemination medium.
- e. Intellectual Property Rights (IPR) Registration: Submission of IPR for educational modules and posters to protect the intellectual work of the implementing team.

Discussion

The main finding of this program is that interactive educational interventions significantly increase the knowledge of women of reproductive age about cardiovascular risks in pregnancy. A statistically significant increase in knowledge scores ($p = 0.005$) provides

strong evidence supporting the effectiveness of the intervention model applied. These results are consistent with an extensive literature showing that structured and participatory health education programs are effective in increasing knowledge and awareness among pregnant women on various health topics, ranging from pregnancy warning signs to the management of chronic conditions (Kasiati et al., 2023) .

The success of this intervention can be attributed to its multifaceted design, which synergistically combines several best practices in health education. First, the interactive component is key. By going beyond passive lecture models and incorporating group discussions and question-and-answer sessions, the program creates a participatory learning environment. This active engagement allows participants to process information more deeply, connect it to their personal experiences, and clarify misunderstandings directly. This dialogic approach has been shown to be superior in promoting attitude change and long-term knowledge retention compared to one-way methods (Sari & Maryam, 2025) . Second, the use of multimedia—including visual presentations, posters, and videos—plays an important role. These media serve as powerful cognitive tools, presenting complex information in an easily digestible and visually appealing format (Azmi et al., 2020) . In particular, videos have been identified as a highly effective medium for conveying health messages to pregnant women, due to their ability to demonstrate concepts dynamically and capture attention (Suhardi et al., 2025) .

In a broader context, the success of this program can be seen as an effective maternal health literacy (MHL) intervention. By increasing participants' knowledge, this program directly improves their capacity to access, understand, and apply health information—core competencies of health literacy (Nurfadilah et al., 2025) . Thus, this program serves as a practical model for addressing the national MHL deficit identified in the introduction, demonstrating that targeted and well-designed interventions can empower women to take a more proactive role in maintaining their health during pregnancy (Nurfadilah et al., 2025) .

Although the overall trend indicates an increase in knowledge, careful data analysis reveals an anomaly: three participants showed a decrease in scores from the pre-test to the post-test. This phenomenon, while counterintuitive, demands critical analysis rather than being ignored. Several possible explanations can be considered. First, this could be an artifact of measurement error. The pre-test may have contained relatively easy or guessable questions, leading to an initial score that was too high (100). After being exposed to more nuanced material during the education, participants may have become less confident in answers they previously considered correct, resulting in lower post-test scores that may reflect a more careful and realistic understanding. Second, this phenomenon could be explained by a correction for overconfidence, similar to the Dunning-Kruger effect. A participant may enter the session with high confidence but shallow understanding. The education reveals the complexity of the topic, leading to a more accurate self-assessment and lower scores. Finally, simple factors such as test fatigue or external distractions cannot be ruled out in a field setting. By openly discussing these anomalies, the report demonstrates a

level of critical analysis that goes beyond a superficial interpretation of the data, thereby strengthening the credibility of the findings as a whole.

It is important to acknowledge the limitations inherent in this study. First, the small sample size (N=17) limits the generalization of results to a broader population. These findings are promising but require validation in a larger cohort. Second, the absence of a control group means that factors other than the intervention (e.g., the Hawthorne effect, where participants change their behavior because they are being observed) cannot be completely ruled out as explanations for the increase in knowledge. Third, measurements were taken immediately after the intervention. This design does not allow for an assessment of long-term knowledge retention or, more importantly, its impact on actual behavioral change and pregnancy outcomes.

CONCLUSION

This community service program shows that an interactive education model supported by multimedia is significantly effective in increasing the knowledge of women of reproductive age about cardiovascular risks for the prevention of pregnancy complications. A participatory approach involving experts from various medical disciplines has proven capable of bridging critical health information gaps. The success of this program underscores the great potential of well-designed educational interventions as a promotive and preventive strategy in efforts to improve maternal health. Based on the findings and limitations of this study, the recommendations focus on four main areas. First, this education model is recommended to be systematically integrated into routine Antenatal Care (ANC) services in primary health facilities such as Community Health Centers (Puskesmas) and Integrated Health Service Posts (Posyandu). Second, to increase reach, educational materials need to be adapted and disseminated through digital platforms, such as WhatsApp and social media. Third, the role of midwives and health cadres needs to be strengthened through training so that they can deliver this module effectively at the grassroots level. Finally, further research with a stronger *cluster randomized controlled trial* (RCT) design is needed to evaluate the long-term impact of this intervention on knowledge retention, behavioral change, and pregnancy outcomes.

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