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# The Effect of Flipchart-Based Health Education on Knowledge and Self-Efficacy Regarding High-Risk Pregnancy among Pregnant Women

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**ABSTRACT** Maternal mortality remains a major public health challenge in Indonesia, and limited knowledge of high-risk pregnancy is one of the factors that may delay appropriate decision-making and reduce women's confidence in managing pregnancy-related complications. This study aimed to examine the effect of flipchart-based health education on the knowledge and self-efficacy of pregnant women regarding high-risk pregnancy. A pre-experimental study with a one-group pretest-posttest design was conducted at the Kapas Health Center, Bojonegoro Regency. The population consisted of 302 pregnant women, and a sample of 51 participants was selected using the Lemeshow formula. The independent variable was health education delivered through flipchart media, while the dependent variables were knowledge and self-efficacy regarding high-risk pregnancy. Data were collected using structured questionnaires and analyzed using the Wilcoxon signed-rank test with a significance level of 0.05. The results showed a statistically significant improvement in knowledge after the intervention ( $p = 0.008$ ). Before the intervention, 27 participants (53%) had poor knowledge, 20 (39.2%) had adequate knowledge, and 4 (7.8%) had good knowledge. After the intervention, the proportion with poor knowledge decreased to 16 participants (31.4%), while 24 (47%) had adequate knowledge and 11 (21.6%) had good knowledge, indicating that 68.6% achieved adequate-to-good knowledge after the intervention. A significant improvement was also observed in self-efficacy ( $p = 0.000$ ). Prior to the intervention, 12 participants (23.5%) had low self-efficacy and 39 (76.5%) had high self-efficacy; after the intervention, all participants (100%) demonstrated high self-efficacy. In conclusion, flipchart-based health education was effective in improving both knowledge and self-efficacy among pregnant women regarding high-risk pregnancy. This approach may serve as a practical, low-cost, and accessible educational strategy for use in community health centers to support better maternal awareness, confidence, and decision-making.

**INDEX TERMS** Flipchart-Based Health Education, High-Risk Pregnancy, Pregnant Women, Knowledge, Self-Efficacy.

## I. INTRODUCTION

Maternal mortality remains a major public health challenge, particularly in low- and middle-income countries. Although global maternal mortality has declined over the past two decades, progress has slowed, and preventable deaths related to pregnancy and childbirth continue to occur at an unacceptable rate. In Indonesia, maternal mortality also remains a persistent concern, reflecting ongoing gaps in early detection, continuity of care, and timely management of pregnancy complications [1]–[4]. High-risk pregnancy refers to a pregnancy in which maternal, fetal, or neonatal morbidity and mortality are more likely to occur because of obstetric, medical, behavioral, or socioeconomic factors. These risks may arise from extreme maternal age, high parity, short birth intervals, chronic disease, previous obstetric complications, or inadequate use of antenatal services [4]–[6]. In this context, inadequate maternal knowledge about danger signs and risk factors may contribute to delayed help-seeking and poor

decision-making, thereby increasing the likelihood of adverse maternal outcomes.

Recent literature has increasingly emphasized maternal health literacy and antenatal education as key determinants of maternal preparedness and safe pregnancy behavior. Concept analyses and systematic reviews have shown that low maternal health literacy is associated with poorer understanding of health information, weaker decision-making capacity, and limited use of preventive maternal services [7], [8]. At the same time, systematic reviews and meta-analyses published in 2024–2026 indicate that antenatal education can improve childbirth preparedness, reduce fear and anxiety, strengthen self-efficacy, and support more positive maternal outcomes [9]–[13]. Methodologically, the current state of the art is shaped by a combination of systematic reviews, meta-analyses, cross-sectional studies, quasi-experimental educational interventions, and continuity-of-care models [8]–[17]. This body of evidence suggests that educational

interventions are most effective when they are structured, practical, culturally appropriate, and feasible for routine implementation in primary care settings.

Despite these advances, an important research gap remains. Much of the recent evidence focuses on general antenatal education, childbirth preparation classes, digital education, or broad maternal health literacy interventions rather than on flipchart-based education for high-risk pregnancy. In addition, many studies assess only a single outcome, such as knowledge, attitudes, or birth preparedness, without simultaneously examining self-efficacy, which is a crucial behavioral determinant of how pregnant women respond to pregnancy-related risks [10]–[18]. Flipcharts are potentially valuable in community health centers because they are inexpensive, visually engaging, easy to use in face-to-face counseling, and suitable for settings with limited digital resources. Recent studies have shown that flipchart-based education can improve knowledge, attitudes, and preventive actions among pregnant women in related maternal health topics, including anemia prevention and triple-elimination screening [18]–[20]. However, empirical evidence remains limited regarding whether flipchart-based health education can concurrently improve knowledge and self-efficacy about high-risk pregnancy, especially in Indonesian primary healthcare settings.

Therefore, this study aims to evaluate the effect of flipchart-based health education on the knowledge and self-efficacy of pregnant women regarding high-risk pregnancy at the Kapas Community Health Center, Bojonegoro Regency. This study offers four contributions:

1. It examines two interrelated outcomes, namely knowledge and self-efficacy, rather than assessing knowledge alone.
2. It extends recent maternal education research to the specific context of high-risk pregnancy in a community health center.
3. It provides evidence of the usefulness of a low-cost, practical visual medium that can be readily integrated into routine antenatal counseling.
4. It strengthens the evidence base for culturally appropriate educational strategies that support the early recognition of pregnancy risks and informed maternal decision-making.

The remainder of this article is organized as follows: Section II presents the research method; Section III reports the results; Section IV discusses the findings in relation to recent literature; and Section V concludes the study and outlines practical implications.

## II. METHOD

This study employed a pre-experimental design using a one-group pretest-posttest approach to evaluate the effect of flipchart-based health education on pregnant women's knowledge and self-efficacy regarding high-risk pregnancy. This design was selected because the study aimed to measure changes within the same group before and after a single educational intervention in a real primary health care setting, without allocation to separate intervention and control groups. As a prospective intervention study, baseline measurements were obtained before the educational session

and repeated after the intervention to assess the immediate effect of flipchart-based health education [21].

### A. STUDY DESIGN AND RATIONALE

The one-group pretest-posttest design enables direct comparison of outcome scores before and after an intervention in the same participants and is commonly used in preliminary health education research when the establishment of a control group is operationally difficult or not feasible [21]. In the present study, the independent variable was health education delivered through flipchart media, while the dependent variables were pregnant women's knowledge and self-efficacy regarding high-risk pregnancy. This design was considered appropriate because the study sought to identify short-term changes in maternal understanding and confidence following a structured educational session delivered in a community health care environment. Although this approach does not provide the same level of causal control as a randomized controlled design, it remains suitable for evaluating the immediate effectiveness of a practical educational intervention in routine service settings.

### B. STUDY SETTING

The research was conducted in the service area of Kapas Community Health Center, Bojonegoro Regency, East Java, Indonesia. Recruitment and implementation were carried out through antenatal care services and integrated health service posts (*posyandu*) affiliated with the health center, where pregnant women routinely attended pregnancy examinations. This setting was selected because primary health care facilities play an essential role in early detection, counseling, and referral for maternal conditions, including high-risk pregnancy [23], [26]. The study was conducted prospectively, and data collection procedures were completed before the results reported in January 2025. The use of a community health center setting also supports the practical relevance of the intervention, as flipchart-based education is designed to be applicable in routine maternal health services with limited resources.

### C. PARTICIPANTS AND SAMPLING METHOD

The source population consisted of 302 pregnant women registered in the Kapas Community Health Center coverage area. The required sample size was determined using the Lemeshow approach for health research, resulting in a minimum sample of 51 pregnant women [22]. Participant selection was then conducted using a probability-based random sampling approach from the eligible sampling frame available at antenatal care services and community health posts. Inclusion criteria were: (1) pregnant women who were willing to participate as respondents; (2) pregnant women who possessed a Maternal and Child Health (KIA) book; and (3) pregnant women who resided in the vicinity of the Kapas Community Health Center. Exclusion criteria included pregnant women who withdrew during the study period or who were uncooperative during the intervention and data collection process. It should be noted that randomization was applied at the participant selection stage only. Because the

study involved a single group receiving the same intervention, there was no random assignment into comparison arms, which is consistent with the characteristics of a pre-experimental design [21].

#### D. MATERIALS AND EDUCATIONAL INTERVENTION

The intervention used flipchart media as the core educational tool. The flipchart consisted of a sequence of illustrated panels accompanied by brief explanatory text designed to facilitate understanding of essential information related to high-risk pregnancy [24]. The educational content focused on the concept of high-risk pregnancy, common maternal risk factors, pregnancy danger signs, the importance of antenatal care, and appropriate decision-making or referral-seeking behavior when risks are identified. Flipchart media were selected because they are simple, low-cost, visually structured, and feasible for use in face-to-face counseling sessions in primary care settings [24], [25]. In addition, flipcharts are culturally adaptable and can be used effectively in maternal education delivered by health personnel in community-based services. All respondents received the same educational content to ensure consistency of intervention delivery.

#### E. DATA COLLECTION INSTRUMENTS AND PROCEDURE

Data were collected using structured questionnaires that measured two main outcomes: knowledge regarding high-risk pregnancy and self-efficacy in recognizing and responding to risk conditions during pregnancy. The same instrument set was used for both pretest and posttest administration to allow paired comparison of scores before and after the intervention. The research procedure was implemented in three stages. First, eligible respondents were recruited, provided with an explanation about the study, and asked to give informed consent. Second, participants completed the pretest questionnaire to assess baseline knowledge and self-efficacy. Third, flipchart-based health education was delivered in a counseling session by the researcher or trained health personnel. After the educational session, respondents completed the posttest questionnaire. This procedure enabled the study to evaluate the immediate effect of the intervention under comparable conditions for all participants [25], [26]. In addition to outcome data, respondent characteristics such as educational level, occupation, age, pregnancy history, gestational age, and previous exposure to information about high-risk pregnancy were also recorded to describe the study sample.

#### F. DATA ANALYSIS

All collected data were checked for completeness, coded, and entered into the statistical software package for analysis. Univariate analysis was used to describe respondent characteristics and summarize the distribution of knowledge and self-efficacy categories before and after the intervention. To examine differences between pretest and posttest scores within the same respondents, the Wilcoxon signed-rank test was applied. This test was selected because the study involved paired observations obtained from the same participants at two time points and the data were analyzed on an ordinal scale

[28]. The level of statistical significance was set at  $\alpha = 0.05$ . A p-value of less than 0.05 was interpreted as indicating a statistically significant difference between pre-intervention and post-intervention scores. This analytical approach is appropriate for evaluating nonparametric paired data in pretest-posttest educational research [21], [28].

#### G. ETHICAL CONSIDERATIONS

This study received ethical approval from the Health Research Ethics Committee of the Health Polytechnic of the Ministry of Health Surabaya under approval number EA/3074/KEPK-Poltekkes\_Sby/V/2024. Participation was entirely voluntary. Each respondent was informed about the study objectives, procedures, potential benefits, and the right to withdraw at any time without penalty. Confidentiality and privacy were maintained throughout the research process by using the collected data solely for academic purposes and by ensuring that participants' identities were not disclosed in the reporting of results. These measures were implemented to ensure that the study adhered to accepted ethical principles for research involving human participants.

### III. RESULTS

This study aims to evaluate the impact of health education interventions using flipcharts on the level of knowledge and self-efficacy of pregnant women regarding high-risk pregnancies.

**TABLE 1**  
Characteristics of Pregnant Women at Kapas Bojonegoro Community Health Center in January 2025

No	Characteristic	Frequency (f)	Percentage(%)
1	Highest level of education		
	a. Elementary School	2	3,9
	b. Junior High School	8	15,7
	c. Senior High School	38	55
	d. D3 (Diploma 3)	3	5,8
e. S1 (Bachelor's Degree)	10	19,6	
2	Job		
	a. Housewife	34	66,7
	b. Entrepreneur	-	-
	c. Private Sector	13	25,5
	d. Civil Servant/Police/Military	4	7,8
3	Mother's Age		
	a. Late Adolescence (17-25)	23	45
	b. Early Adulthood (26-35)	23	45
	c. Late Adulthood (36-45)	5	10
4	Information About Pregnancy		
	a. Pregnancy Number	23	45
	1) 1	23	45
	2) 2	4	7,8
	3) 3	1	2,2
	4) 4		
	b. Pregnancy Age	18	35,2
	1) 1-13 weeks	22	43,1
	2) 14-27 weeks	11	21,6
	3) 28-41 weeks		
5	Experience of receiving information about high-risk pregnancy		
	a. Yes	8	15,7
	b. No	43	84,3

### A. RESPONDENT CHARACTERISTICS

Based on the distribution of characteristics TABLE 1, the majority of pregnant women had a high school/vocational school education (55%) and most worked as housewives (66.7%). The age of respondents was dominated by the late adolescence and early adulthood groups, each accounting for 45%. Most respondents were in their first and second pregnancies (45%), with the majority of pregnancies in the second trimester (43.1%). In addition, most pregnant women had never received information or counseling about high-risk pregnancy (84.3%).

### B. STATISTICAL TEST RESULTS

TABLE 2

Distribution of Knowledge Frequency of Distribution of Knowledge Frequency of Pregnant Women Before and After Receiving Health Education Using Flipchart Media on High-Risk Pregnancy

Knowledge	Pre-test		Post-test		P
	Frequency (f)	Percentage (%)	Frequency (f)	Percentage (%)	
Good	4	7,8	11	21,6	0,008
Enough	20	39,2	24	47	
Less	27	53	16	31,4	
Sum	51	100%	51	100%	

According to the frequency distribution of pregnant women's knowledge TABLE 2 before and after of health education using flipcharts on high-risk pregnancy on the knowledge of pregnant women ( $p=0.008 < \alpha = 0.05$ ). The knowledge of pregnant women before receiving health education through flipchart media was categorized as insufficient in 27 people (53%). The knowledge of pregnant women after receiving health education using flipchart media showed that there were 35 people who had sufficient and good knowledge, with a percentage of 68.6%.

TABLE 3

Distribution of Knowledge Frequency of Distribution of Self Efficacy Frequency of Pregnant Women Before and After Receiving Health Education Using Flipchart Media on High-Risk Pregnancy

Self Efficacy	Pre-test		Post-test		P
	Frequency (f)	Percentage (%)	Frequency (f)	Percentage (%)	
Low	12	23,5	0	0	0,000
High	39	76,5	51	100	
Sum	51	100%	51	100%	

Based on the TABLE 3 before and after effect of flipchart media health education about high-risk pregnancy on the self-efficacy of pregnant women ( $p=0.000 < \alpha = 0.05$ ). The self-efficacy of pregnant women before receiving health education through flipchart media showed that 12 (23.5%) pregnant women had low self-efficacy. Meanwhile, the self-efficacy of pregnant women after receiving health education through flipchart media about high-risk pregnancy showed that all 51 pregnant women had high self-efficacy (100%).

### IV. DISCUSSION

This study was conducted to evaluate the effect of flipchart-based health education on pregnant women's knowledge and self-efficacy regarding high-risk pregnancy in a primary healthcare setting. The findings demonstrated that the intervention produced significant improvements in both

outcomes. Before the intervention, most respondents had limited knowledge of high-risk pregnancy, with 53% categorized as having poor knowledge and only 7.8% categorized as having good knowledge. Following the intervention, the proportion of respondents with adequate and good knowledge increased considerably, indicating that the educational strategy succeeded in improving participants' understanding of pregnancy-related risks. In parallel, self-efficacy also improved substantially. Before the intervention, 23.5% of respondents reported low self-efficacy, whereas after the intervention all respondents were categorized as having high self-efficacy. These findings suggest that flipchart-based health education is effective not only in increasing cognitive understanding but also in strengthening pregnant women's confidence in recognizing and responding to high-risk pregnancy conditions.

The improvement in knowledge may be explained by the characteristics of flipchart media itself. Flipcharts present information in a simple, structured, and visually supported format, allowing complex health concepts to be communicated more clearly and systematically. In the context of maternal health education, visual illustrations can make abstract information more concrete, thereby helping pregnant women understand danger signs, risk factors, and preventive measures more easily. This is particularly relevant in community health centers, where educational interventions must often be practical, low-cost, and easy to implement. Furthermore, because flipcharts are used in direct interaction between health workers and pregnant women, they also create opportunities for clarification, repetition, and reinforcement of key messages. These features likely contributed to the observed increase in knowledge after the intervention.

The findings are consistent with previous studies showing that structured antenatal education can improve maternal knowledge, especially regarding pregnancy danger signs, birth preparedness, and complication readiness [29]–[31]. Recent literature has emphasized that maternal education is most effective when information is delivered in accessible and culturally appropriate ways, rather than relying solely on verbal explanation or written material that may not match the educational background of the target population [32]. In this regard, flipchart-based education appears to be highly suitable for primary healthcare settings because it combines verbal counseling with visual support, making health messages easier to understand and remember. The present findings therefore strengthen existing evidence that simple educational media can serve as an important strategy for improving maternal health literacy, particularly among women who have had limited prior exposure to counseling on high-risk pregnancy.

At baseline, the low level of knowledge observed in this study may reflect the fact that most respondents had never received prior information about high-risk pregnancy. Limited exposure to maternal health education can reduce women's ability to identify warning signs and delays their readiness to seek appropriate care. This is an important issue because inadequate knowledge during pregnancy is closely associated with delayed recognition of complications and delayed decision-making. In high-risk pregnancy, such delays may

increase the likelihood of adverse maternal and fetal outcomes. Therefore, the increase in knowledge demonstrated in this study is not only statistically significant but also clinically meaningful, as improved understanding may help pregnant women recognize risk conditions earlier and seek timely assistance when necessary.

Although the intervention improved knowledge overall, not all respondents reached the highest category after the post-test. This suggests that educational media alone may not fully address all learning barriers. Several factors may explain this variation, including differences in educational level, parity, prior pregnancy experience, attentiveness during counseling, and individual differences in learning speed. Women with lower educational backgrounds may require repeated exposure and more individualized explanation to achieve optimal comprehension. Likewise, primigravida women may be less familiar with pregnancy-related health information and therefore need more time to internalize new concepts. These findings indicate that, while flipcharts are useful, their effectiveness may be maximized when combined with interactive discussion, repeated counseling sessions, and ongoing support from healthcare providers.

The increase in self-efficacy observed in this study is equally important. Self-efficacy refers to an individual's belief in her ability to perform actions necessary to manage a particular condition or situation. In the context of pregnancy, stronger self-efficacy may influence how confidently a woman responds to symptoms, communicates concerns, follows health advice, and makes decisions regarding care. The finding that all respondents demonstrated high self-efficacy after the intervention suggests that the educational session did more than simply transfer information; it also strengthened participants' confidence in their ability to manage pregnancy risks appropriately. This result is theoretically plausible because knowledge and self-efficacy are closely interrelated. When pregnant women understand what constitutes a high-risk condition and what actions should be taken, uncertainty is reduced and confidence tends to increase.

This interpretation is supported by previous studies showing that antenatal education can positively influence maternal confidence, psychological readiness, and health-related decision-making [33]–[35]. Educational interventions that provide clear, relevant, and comprehensible information enable women to feel more prepared and more capable of managing pregnancy-related challenges. Moreover, recent evidence suggests that self-efficacy plays an important role in maternal adaptation, coping, and quality of life, especially among women facing pregnancy complications [34]. In this study, the flipchart may have served as a practical educational stimulus that transformed abstract health risks into understandable messages, thereby making respondents feel more empowered and capable of taking preventive action. The findings therefore support the view that educational interventions should aim not only to increase knowledge but also to strengthen women's confidence in applying that knowledge in real situations.

Nevertheless, the magnitude of improvement in self-efficacy should be interpreted with caution. The finding that all respondents reached the high self-efficacy category immediately after the intervention may reflect a strong short-term motivational effect rather than a stable long-term outcome. Educational interventions often lead to immediate gains because participants have just received information, attention, and encouragement. However, confidence may decrease over time if it is not reinforced through repeated counseling, family support, or continued contact with healthcare providers. Thus, while the present findings are promising, they do not yet demonstrate whether the observed gains in self-efficacy would be sustained over a longer period. Future studies should therefore include follow-up assessments to determine whether the effect persists beyond the immediate post-intervention phase.

Several limitations of this study should also be acknowledged. First, the use of a one-group pretest-posttest design limits the ability to draw strong causal conclusions, as the study did not include a control group for comparison. Consequently, improvements in knowledge and self-efficacy cannot be attributed exclusively to the intervention with absolute certainty, since external influences, repeated testing, or short-term recall effects may also have contributed. Second, the sample was relatively small and drawn from a single community health center, which may limit the generalizability of the findings to other populations or healthcare settings. Third, the study focused only on immediate post-intervention outcomes and did not assess long-term retention or behavioral change. Although improved knowledge and self-efficacy are important precursors to action, they do not automatically translate into sustained maternal health practices. Future research should therefore adopt more rigorous designs, involve larger and more diverse samples, include control groups, and evaluate longer-term outcomes such as antenatal care adherence, early recognition of complications, and healthcare-seeking behavior [35], [36].

Despite these limitations, the present study has important practical implications. The findings indicate that flipchart-based health education can be used as a feasible, affordable, and culturally appropriate strategy to strengthen maternal knowledge and self-efficacy in primary healthcare settings. This is particularly relevant in resource-limited contexts, where digital interventions may not always be available or practical. Flipcharts are portable, inexpensive, reusable, and relatively easy for healthcare providers to incorporate into routine antenatal counseling. Their use may therefore help bridge communication gaps between health workers and pregnant women, especially among those with limited prior access to structured maternal health information. In a broader sense, improving pregnant women's understanding and confidence is an essential component of maternal health promotion, as emphasized in current maternal health recommendations and recent global reports on maternal mortality [36].

Overall, this study contributes to the growing body of evidence supporting accessible and context-sensitive health education for pregnant women. The results demonstrate that

flipchart-based counseling has the potential to improve two interrelated outcomes namely knowledge and self-efficacy within the specific context of high-risk pregnancy. This contribution is important because most educational interventions in maternal health tend to focus primarily on knowledge, whereas self-efficacy is equally relevant for encouraging timely recognition of risk and informed decision-making. Therefore, integrating flipchart-based education into routine antenatal services may represent a valuable strategy for enhancing maternal preparedness and promoting safer pregnancy outcomes. Further studies are needed to determine whether these improvements can be sustained over time and whether they ultimately contribute to measurable reductions in pregnancy-related complications and delays in seeking care.

## V. CONCLUSION

This study aimed to determine the effect of flipchart-based health education on the knowledge and self-efficacy of pregnant women regarding high-risk pregnancy at the Kapas Community Health Center. The findings demonstrate that the intervention was effective in improving both outcomes among the 51 respondents included in the study. With regard to knowledge, prior to the intervention most participants were categorized as having poor knowledge, accounting for 27 women (53%), while 20 women (39.2%) had adequate knowledge and only 4 women (7.8%) had good knowledge. Following the implementation of flipchart-based health education, the proportion of women with poor knowledge decreased to 16 (31.4%), while those with adequate knowledge increased to 24 (47%) and those with good knowledge rose to 11 (21.6%). Statistical analysis using the Wilcoxon signed-rank test confirmed that this improvement was significant ( $p = 0.008$ ). A similarly positive pattern was observed in self-efficacy. Before the intervention, 12 pregnant women (23.5%) had low self-efficacy and 39 (76.5%) had high self-efficacy; after the intervention, all 51 respondents (100%) were categorized as having high self-efficacy, with a statistically significant result ( $p = 0.000$ ). These findings indicate that flipchart-based education is not only effective in enhancing pregnant women's understanding of high-risk pregnancy, but also in strengthening their confidence in recognizing and responding to pregnancy-related risks. From a practical perspective, this study suggests that flipchart media can serve as a simple, affordable, and culturally appropriate educational tool for routine antenatal care, particularly in community health center settings where accessible and low-technology approaches are needed. The findings also imply that integrating structured flipchart-based education into maternal health promotion programs may support better awareness, preparedness, and decision-making among pregnant women. Nevertheless, because this study employed a one-group pretest-posttest design without a control group and assessed only short-term outcomes, future research is recommended to use more rigorous experimental designs, involve larger and more diverse samples, include comparison groups, and apply longer follow-up periods to evaluate the sustainability of knowledge and self-efficacy improvements as

well as their impact on actual maternal health behaviors and pregnancy outcomes

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## DATA AVAILABILITY

No datasets were generated or analyzed during the current study.

## AUTHOR CONTRIBUTION

Sri Hardi Wuryaningsih contributed to the conceptualization and design of the study, supervised the research process, and drafted the manuscript. Adin Mu'afiro contributed to the methodology, data analysis, and critical revision of the manuscript. Miadi contributed to data collection, data interpretation, and manuscript editing. Nimas Dhalita Audria Hanun contributed to the literature review, data management, and final proofreading of the manuscript. All authors read and approved the final version of the manuscript.

## DECLARATIONS

### ETHICAL APPROVAL

This study was approved by the Health Research Ethics Committee of the Health Polytechnic of the Ministry of Health Surabaya under ethical clearance number EA/3074/KEPK-Poltekkes\_Sby/V/2024. Written informed consent was obtained from all participating pregnant women prior to data collection. Participation was voluntary, and all respondents were informed of the study objectives, procedures, potential benefits, and their right to withdraw from the study at any time without penalty. Confidentiality and anonymity were maintained throughout the study, and all procedures were conducted in accordance with ethical standards for research involving human participants.

### CONSENT FOR PUBLICATION PARTICIPANTS.

Consent for publication was given by all participants

### COMPETING INTERESTS

The authors declare no competing interests.

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