

Effectiveness of Health Education in Improving Pregnant Women's Knowledge of Triple Elimination Screening for HIV, Syphilis, and Hepatitis B

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ABSTRACT

Background: Triple elimination screening for HIV, syphilis, and hepatitis B among pregnant women is a strategic program in maternal and child health services to prevent intrauterine and mother-to-child transmission. The success of this program is determined not only by the availability of testing services but also by pregnant women's level of knowledge regarding the benefits, procedures, and timing of triple elimination screening.

Objective: This study aimed to assess the effectiveness of health education in improving pregnant women's knowledge of triple elimination screening for HIV, syphilis, and hepatitis B.

Methods: This study used a pre-experimental design with a one-group pretest-posttest approach. The study sample consisted of 196 pregnant women. Data were collected through interviews using a structured questionnaire to assess pregnant women's knowledge. Respondent characteristics were analyzed descriptively. Knowledge was assessed before and after health education using a score ranging from 0 to 100. Differences in mean scores were analyzed using the paired sample t-test with a significance level of 0.05.

Results: Most respondents were aged 20-35 years (144 respondents; 73.5%), came from Gulak Galik Village (91 respondents; 46.4%), were unemployed (182 respondents; 92.9%), and underwent screening in the first trimester (150 respondents; 76.5%). Triple elimination screening results showed no reactive HIV or syphilis cases, whereas reactive HBsAg was found in 4 respondents (2.0%). The mean knowledge score increased from 57.59 ± 10.11 before education to 81.02 ± 11.11 after education.

Conclusion: There was a statistically significant difference in mean knowledge scores based on the paired sample t-test ($t = 49.37$; $p < 0.001$).

KEYWORDS: health education, pregnant women, knowledge, screening, triple elimination, HIV, syphilis, hepatitis B.

INTRODUCTION

Pregnant women are among the populations at risk of acquiring human immunodeficiency virus (HIV), syphilis, and hepatitis B infection. The risk of mother-to-child transmission is 20%-45% for HIV/AIDS, 69%-80% for syphilis, and more than 90% for hepatitis B. These three infections share similar transmission routes, including sexual contact, blood exposure, and vertical transmission from mother to fetus during pregnancy. Transmission of HIV, syphilis, and hepatitis B from infected mothers to children may result in morbidity, disability, and mortality (Ministry of Health of the Republic of Indonesia, 2021).

The World Health Organization has established the triple elimination policy as an effort to address these conditions. This policy has also been adopted in Indonesia through the issuance of Minister of Health Regulation Number 52 of 2017 by the Ministry of Health. This initiative aims to ensure that even when a pregnant woman is infected with HIV, syphilis, or hepatitis B, transmission to her child can be prevented. According to the WHO, preventive activities such as HIV, hepatitis B, and syphilis testing during antenatal care (ANC) can reduce transmission rates to 5%, compared with the expected rate of 15% in the absence of such interventions.

In Indonesia, the Ministry of Health reported that the national percentage of pregnant women documented as having undergone hepatitis B testing had reached only 50.5%. This remains far below the target stipulated in Ministerial Decree Number 52 of 2017 on the elimination of mother-to-child transmission of human immunodeficiency virus, syphilis, and hepatitis B, which requires all pregnant women (100%) to be tested for HIV, syphilis, and hepatitis B. Fourteen provinces reported coverage above 50%, with the highest achievements observed in Central Kalimantan (70.8%) and West Sumatra (68.6%). The lowest coverage was reported in North Sumatra (14.1%), followed by West Kalimantan (17.8%) and North Maluku (24.7%) (Ministry of Health of the Republic of Indonesia, 2022).



The implementation of integrated antenatal care services with triple elimination screening has been carried out in public health centers in Lampung Province, particularly in Bandar Lampung City. Based on data from the Bandar Lampung City Health Office in 2023, among 19,729 pregnant women who attended antenatal visits, only 18,153 (92.01%) underwent triple elimination screening, and not all women received the examination during their first ANC visit. Of those examined, 17,954 pregnant women had non-reactive results, whereas 199 pregnant women had reactive results (Bandar Lampung City Health Office, 2023).

According to Lawrence Green's theory, factors that influence health-related behavior include predisposing factors, which are manifested in knowledge, attitudes, motivation, education, age, parity, and other elements (Notoatmodjo, 2016). A study by Riana Septiyani (2023) at Cibeber Public Health Center, Cimahi City, in 2022 found an association between knowledge (p -value = 0.004) and motivation (p -value = 0.002) with attendance for triple elimination examinations. Wiandara (2022), in the working area of Cipatujah Public Health Center, Tasikmalaya Regency, also found that education, knowledge, parity, and attitudes among pregnant women were associated with compliance with triple elimination examination visits.

Pregnant women's knowledge is an important aspect of acceptance of triple elimination screening. Mothers who understand the benefits of screening, the risks of transmission, and the consequences of infection for the infant tend to be more prepared to undergo testing and follow-up. Conversely, limited information may lead to doubt, fear, or the perception that screening is unnecessary when the mother feels healthy. In fact, HIV, syphilis, and hepatitis B may occur without symptoms; therefore, detection cannot rely solely on clinical complaints. Based on this background, this study was conducted to assess the effectiveness of health education in improving pregnant women's knowledge of triple elimination screening for HIV, syphilis, and hepatitis B.

MATERIALS AND METHODS

This study used a pre-experimental design with a one-group pretest-posttest approach and was conducted in the working area of Sumur Batu Public Health Center, Bandar Lampung City, in June 2024. The study population consisted of pregnant women who received antenatal care services from January to June 2024 and were targeted for triple elimination screening for HIV, syphilis, and hepatitis B. The sample consisted of 196 pregnant women selected using total sampling. The inclusion criteria were pregnant women who underwent triple elimination screening, participated in health education, and had complete pre-test and post-test scores.

The independent variable in this study was health education on triple elimination screening for HIV, syphilis, and hepatitis B. The dependent variable was pregnant women's knowledge of triple elimination screening. Health education was delivered through direct counseling, interactive discussion, and the use of simple educational media such as leaflets or slides. The educational content covered the definition of triple elimination, the objectives of screening, infections being tested, routes of mother-to-child transmission, impacts on the mother and infant, timing of examination, screening procedures, interpretation of test results, and follow-up when results were reactive.

Data collection was performed through several stages: obtaining informed consent, administering the pre-test, delivering health education, and administering the post-test. The instrument was a structured questionnaire on triple elimination screening. The questionnaire covered aspects such as definition, benefits, types of diseases tested, risk of transmission, timing of examination, and follow-up of screening results. Scores were converted into a range of 0-100. All data were then recapitulated for descriptive and inferential analyses.

Univariate analysis was used to describe respondent characteristics, triple elimination screening results, and the distribution of knowledge scores. Bivariate analysis using the paired sample t-test was performed to compare the mean knowledge scores before and after health education. Statistical significance was set at $p < 0.05$

RESULTS

A. Sociodemographic and Obstetric Characteristics of Respondents

A total of 196 pregnant women met the inclusion criteria in this study. The sociodemographic and obstetric characteristics analyzed included maternal age, village or urban ward of origin, service area, occupation, gravidity status, and trimester of pregnancy at the time of screening, as shown in Table 1.

Table 1. Sociodemographic and Obstetric Characteristics of Respondents

Characteristic	Category	n	%
Maternal age	<20 years	2	1.0
	20-35 years	144	73.5
	>35 years	50	25.5
Village/urban ward	Gulak Galik	91	46.4
	Sumur Batu	55	28.1
	Pengajaran	50	25.5
Service area	Within the service area	192	98.0
	Within the city	4	2.0
Occupation	Unemployed	182	92.9
	Private employee	3	1.5
	Farmer/fisher	6	3.0
	Entrepreneur	1	0.5
	Others	4	2.0
Gravidity status	Primigravida / G1	106	54.1
	Multigravida / G2-G4	84	42.9
	Grand multigravida	5	2.6
	/ >=G5		
	Not recorded	1	0.5
Trimester of pregnancy at screening	First trimester / <=12 weeks	150	76.5
	Second trimester / 13-27 weeks	38	19.14
	Third trimester / >=28 weeks	8	4.1

Most respondents were in the 20-35-year age group, totaling 144 women (73.5%). Based on area of origin, the largest proportion came from Gulak Galik, with 91 respondents (46.4%). Most respondents were unemployed (182 respondents; 92.9%) and underwent screening in the first trimester (150 respondents; 76.5%).

Triple elimination screening found no reactive HIV or syphilis results among respondents; however, 4 pregnant women (2.0%) had reactive HBsAg results. These findings are presented in Table 2.

Table 2. Triple Elimination Screening Results

Type of examination	Result	n	%
HIV	Reactive	0	0.0
	Non-reactive	196	100.0
Syphilis	Reactive	0	0.0
	Non-reactive	196	100.0
HBsAg	Reactive	4	2.0
	Non-reactive	192	98.0

These results emphasize that hepatitis B testing remains necessary in antenatal services because reactive cases are still being identified.

B. Knowledge Scores Before and After Health Education

The mean knowledge score before education was 57.59 ± 10.11 . After health education was provided, the mean score increased to 81.02 ± 11.11 . Descriptively, the mean increase was 23.43 points, as shown in Table 3.

Table 3. Knowledge Scores Before and After Health Education

Measurement	n	Mean	SD	Minimum	Maximum
Pre-test	196	57.59	10.11	33	81
Post-test	196	81.02	11.11	56	100

C. Paired Sample T-Test Results

To determine whether there was a statistically significant difference in the mean knowledge scores before and after health education, a paired sample t-test was performed. The results are shown in Table 4.

Table 4. Paired Sample T-Test Results

Variable	Mean pre-test	Mean post-test	Mean difference	t	p-value
Pregnant women's knowledge	57.59	81.02	23.43	49.37	<0.001

The paired sample t-test showed a t-value of 49.37 with $p < 0.001$. Therefore, there was a statistically significant difference in the mean knowledge scores before and after health education.



DISCUSSION

The results of this study showed an increase in pregnant women's knowledge scores after receiving health education on triple elimination screening. The mean score increased from 57.59 to 81.02, with a difference of 23.43 points. This improvement occurred because education provided more targeted and systematic information. The findings suggest that before education, pregnant women tended to perceive blood testing as a routine component of antenatal care. After education, however, they were able to understand that triple elimination screening is intended to detect intrauterine infections that may be transmitted to the infant. From the perspective of health literacy, clear and comprehensible information helps individuals obtain, understand, and use health information to make more appropriate decisions (Nutbeam, 2000).

Knowledge is an important component in the formation of health behavior. Pregnant women who know the benefits of screening, the risk of transmission, and the effects of infection on the infant are more likely to accept testing. Conversely, low knowledge may lead women to perceive that testing is unnecessary when they have no symptoms (WHO, 2025b; WHO, 2025c; WHO, 2026).

The statistical test showed a significant difference in mean scores before and after health education. Thus, health education can be regarded as an intervention with the potential to improve pregnant women's understanding of preventing mother-to-child transmission of HIV, syphilis, and hepatitis B. Wiantini et al. (2023) reported that triple elimination health education significantly affected pregnant women's knowledge and motivation in undergoing screening. Similar findings were reported by Siahaan and Sembiring (2026), who found increased knowledge and attitudes among pregnant women after receiving health education on triple elimination.

The findings of this study support the concept of health promotion, in which education is an important effort to improve health literacy. A qualitative study in Bali showed that maternal acceptance of services for the elimination of mother-to-child transmission of HIV, syphilis, and hepatitis B was influenced by service experience, communication with health workers, family support, access to services, and maternal understanding of the benefits of testing (Armini et al., 2024). This is relevant to the triple elimination framework, which emphasizes the importance of integrated antenatal services, including screening, education, counseling, treatment, referral, and follow-up for pregnant women (World Health Organization [WHO], 2024; WHO, 2025a).

Health education can improve pregnant women's knowledge and position screening as an important component of intrauterine infection prevention. The WHO triple elimination framework encourages the integration of maternal and child health services, HIV services, sexually transmitted infection services, hepatitis services, immunization, and referral systems so that prevention of vertical transmission can be implemented more effectively (WHO, 2024; WHO, 2025a).

The results of this study are also consistent with the objectives of Minister of Health Regulation of the Republic of Indonesia Number 52 of 2017 concerning the elimination of mother-to-child transmission of human immunodeficiency virus, syphilis, and hepatitis B. This regulation emphasizes the need for early detection and management of HIV, syphilis, and hepatitis B infection among pregnant women to prevent vertical transmission. Evaluation of the triple elimination program in Indonesia indicates that the program still requires strengthening to increase screening coverage among pregnant women during antenatal visits and to reduce infection among children (Ministry of Health of the Republic of Indonesia, 2017; Azhali et al., 2023).

Nevertheless, several studies indicate that education alone is not sufficient as the only determinant of the success of the triple elimination program. Azhali et al. (2023) showed that the triple elimination program in Bandung increased the number and coverage of screened pregnant women, but program implementation still required service strengthening to achieve elimination targets. Wulandari et al. (2024) also found that education was statistically proven to improve pregnant women's knowledge; however, the overall effectiveness of the triple elimination program still requires support from a strong health service system. Similarly, Wardiana et al. (2022) reported that complete coverage of HIV, syphilis, and hepatitis B testing among pregnant women in a tertiary hospital in eastern Indonesia remained low at 14.1%, far below the WHO target. Low screening coverage is not always caused by poor maternal knowledge but may also be influenced by the readiness of health facilities, examination flow, service availability, recording systems, and case follow-up. Therefore, increasing pregnant women's knowledge should be accompanied by strengthening integrated antenatal service systems.

In this study, reactive HBsAg results were found in 4 pregnant women (2.0% of respondents). Although no reactive HIV or syphilis results were identified, the detection of reactive HBsAg indicates that health workers must continue to prepare preventive measures for newborns to avoid intrauterine infection and mother-to-child transmission of HIV, syphilis, and hepatitis B. The WHO states that hepatitis B infection acquired during infancy has a higher risk of progressing to chronic infection; therefore, prevention through identification of maternal status and administration of hepatitis B vaccine to infants is essential for preventing transmission (WHO,



2026). This study also found that 76.5% of respondents underwent triple elimination screening in the first trimester. This is advantageous because earlier pregnancy screening allows more time for counseling, referral, treatment, and follow-up (WHO, 2025a; Wulandari et al., 2024).

The characteristics of respondents, most of whom were unemployed pregnant women, should be considered in designing educational programs. Several educational strategies may be implemented, such as pregnancy classes, integrated health posts, or routine antenatal visits using materials that are easy to understand. The involvement of husbands and family members may also serve as a reinforcing factor for support of triple elimination testing. Armini et al. (2024) showed that family factors and the quality of interaction with health workers are important components of acceptance of screening for mother-to-child transmission of HIV, syphilis, and hepatitis B.

More broadly, the results of this study are relevant to challenges in implementing triple elimination in Indonesia. Although antenatal services are widely available, coverage of HIV, syphilis, and hepatitis B testing among pregnant women is not always optimal. Wulandari et al. (2024) reported that in 2022, the coverage of testing among pregnant women in Indonesia still showed gaps, namely 39% for HIV, 14% for syphilis, and 28% for hepatitis B. These data indicate that high antenatal visit coverage is not always followed by complete triple elimination testing. Therefore, strengthening service integration, education, referral systems, recording, and health communication remains highly necessary (Azhali et al., 2023; Wulandari et al., 2024).

This study has several limitations. First, the one-group pretest-posttest design did not include a control group; therefore, external factors that may have influenced changes in knowledge could not be fully eliminated. Second, this study assessed knowledge but did not evaluate changes in attitudes, intentions, or actual behavior of pregnant women in undergoing screening. Nevertheless, the results provide preliminary evidence that health education has the potential to serve as a simple, applicable, and relevant intervention to improve pregnant women's knowledge of triple elimination screening.

CONCLUSION

The characteristics of the study respondents showed that most pregnant women were aged 20-35 years, unemployed, came from within the public health center service area, and underwent screening in the first trimester. The screening results showed no reactive HIV or syphilis cases, whereas reactive HBsAg was found in 4 pregnant women, equivalent to 2.0%.

Health education was effective in improving pregnant women's knowledge of triple elimination screening for HIV, syphilis, and hepatitis B. The mean knowledge score increased from 57.59 before education to 81.02 after education, with a mean difference of 23.43 points. The paired sample t-test showed a statistically significant difference with $p < 0.001$.

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