Analysis of Clinical and Laboratory Data As A Basis For Targeting Interventions To Prevent Vertical Transmission In Pregnant Women

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ABSTRACT

The Triple Elimination Program aims to prevent mother-to-child transmission of HIV, syphilis, and hepatitis B through routine screening and early detection during pregnancy. This study aimed to analyze the clinical and laboratory characteristics of pregnant women undergoing Triple Elimination screening to identify groups requiring greater attention during antenatal care. This descriptive study used secondary data from the medical records of 75 pregnant women who underwent Triple Elimination screening at the Jayengan Community Health Center, Surakarta City. Variables analyzed included maternal age, education, occupation, gestational age, parity, nutritional status based on mid-upper arm circumference (MUAC), hemoglobin (Hb) level, and HIV, syphilis, and hepatitis B screening results. Most respondents were aged 20–35 years (84.0%), had completed high school education (72.0%), worked as housewives (73.3%), were in the first trimester (89.3%), and were primiparous (77.3%). The majority had normal nutritional status based on MUAC (97.3%) and normal Hb levels (80.0%). All participants tested non-reactive for HIV, syphilis, and hepatitis B. These findings indicate generally favorable maternal health. However, routine assessment of nutritional status and hemoglobin levels remains essential to identify pregnant women requiring closer monitoring and appropriate antenatal interventions, promoting optimal maternal and fetal health outcomes while supporting early detection and timely management.

Keywords triple elimination; pregnant women; clinical data; laboratory data.

INTRODUCTION

Vertical transmission of Human Immunodeficiency Virus (HIV), Syphilis, and Hepatitis B (HBV) from mother to child is a serious public health problem, with a detrimental impact on the child's survival and quality of life. These three infections can be transmitted during pregnancy, childbirth, or breastfeeding (1,2). To address this issue, the World Health Organization (WHO) initiated the Triple Elimination Program, which encourages countries to simultaneously commit to eliminating mother-to-child transmission of HIV, Syphilis, and HBV (1). Indonesia, through the Ministry of Health, has issued Guidelines for the Program for Preventing Mother-to-Child Transmission of HIV, Syphilis, and Hepatitis B as a national effort to achieve this elimination target (3,4).

Although the Triple Elimination screening program has been implemented, coverage in some areas still falls short of the national target. For example, in Cimahi City in 2021, HIV testing coverage was only 37.15%, Hepatitis B 55.26%, and Syphilis 35.20%. These figures highlight the challenges inherent in implementing effective and comprehensive screening. Factors such as pregnant women's knowledge of Triple Elimination, motivation, family support, and even their anxiety levels regarding screening have been identified as contributing to screening compliance (5–8).

Currently, Triple Elimination screening for pregnant women is generally implemented universally as part of antenatal care services without emphasizing the use of more integrated clinical and laboratory data. This approach is crucial in ensuring all pregnant women have access to HIV, syphilis, and hepatitis B testing (1,3,4). However, the data generated from this screening tends to be descriptive in nature and has not yet been fully utilized as a basis for strengthening more comprehensive maternal health interventions (9).

In the context of maternal health services, clinical and laboratory data play a crucial role not only in detecting infectious diseases but also in providing a comprehensive picture of the mother's health condition. Data such as nutritional status, hemoglobin levels, gestational age, and other obstetric characteristics can be used as a basis for more accurately identifying the need for maternal health interventions (10,11).

Therefore, it is necessary to strengthen the analysis of clinical and laboratory data obtained from the implementation of Triple Elimination screening, so that it not only functions as routine examination data, but can also be used to provide a more comprehensive picture of the health condition of pregnant women as a basis for planning and strengthening antenatal services (9,11,12).

METHODS

This is a descriptive, observational study with a cross-sectional design. It was conducted at the Jayengan Community Health Center, Serengan District, Surakarta City, from January to March 2026. The study aimed to describe clinical and laboratory data on pregnant women undergoing Triple Elimination screening.

The study population was all pregnant women undergoing Triple Elimination screening (HIV, syphilis, and hepatitis B) at the Jayengan Community Health Center during the study period. A sample of 75 pregnant women was selected using a total sampling technique based on inclusion and exclusion criteria. Inclusion criteria included pregnant women undergoing Triple Elimination screening and having complete clinical and laboratory data. Incomplete data or unavailable test results were excluded from the study.

Data were obtained from medical records and antenatal care registers. Variables analyzed included maternal characteristics (age, education, occupation, gestational age, and parity), nutritional status based on mid-upper arm circumference (MUAC), hemoglobin (Hb) levels, and HIV, syphilis, and hepatitis B (HBsAg) test results.

Data processing was carried out through editing, coding, cleaning, and tabulation. Univariate analysis was used, presented in the form of frequency distributions and percentages, to illustrate the clinical and laboratory characteristics of pregnant women undergoing Triple Elimination screening. The study obtained permission from the relevant agencies and maintained the confidentiality of respondents' identities by using anonymized data

RESULTS

Characteristics of Pregnant Women Undergoing Triple Elimination Screening

A total of 75 pregnant women who underwent Triple Elimination screening were included in this study.

Table 1. Sociodemographic characteristics of pregnant women undergoing Triple Elimination screening at Jayengan Primary Health Center, Surakarta (n = 75)

Variable	Category	n	%
Age (years)	<20	2	2.7
	20–35	63	84.0
	>35	10	13.3
Education Level	Elementary School	1	1.3
	Junior High School	13	17.3
	Senior High School	54	72.0
	Diploma (D3)	6	8.0
	Bachelor's Degree (S1)	1	1.3
Occupation	Unemployed	1	1.3
	Housewife	55	73.3
	Private Employee/Trader	15	20.0
	Civil Servant	4	5.3

The majority of respondents were aged 20–35 years (84.0%), followed by those aged >35 years (13.3%) and <20 years (2.7%). Most participants had completed senior high school education (72.0%) and were housewives (73.3%).

Regarding obstetric characteristics, most respondents underwent Triple Elimination screening during the first trimester of pregnancy (89.3%), while 8.0% and 2.7% were screened during the second and third trimesters, respectively. The majority of respondents were primiparous (77.3%).

Clinical Characteristics of Pregnant Women

Table 2. Clinical Characteristics of Pregnant Women Undergoing Triple Elimination Screening (n = 75)

Variable	Category	n	%
Gestational Age	First Trimester (0–12 weeks)	67	89.3
	Second Trimester (>12–24 weeks)	6	8.0
	Third Trimester (>24–40 weeks)	2	2.7
Parity	Nullipara	2	2.7
	Primipara	58	77.3
	Multipara	15	20.0
	Grand Multipara	0	0.0
Nutritional Status (MUAC)	Normal (≥23.5 cm)	73	97.3
	At Risk of CED (<23.5 cm)	2	2.7
Hemoglobin Level	Normal (>11.0 g/dL)	60	80.0
	Mild Anemia (10.0–10.9 g/dL)	8	10.7

Moderate Anemia (7.0–9.9 g/dL)	7	9.3
Severe Anemia (<7.0 g/dL)	0	0.0

Assessment of nutritional status based on Mid-Upper Arm Circumference (MUAC) showed that 73 respondents (97.3%) had normal nutritional status, while two respondents (2.7%) were classified as being at risk of Chronic Energy Deficiency (CED).

Hemoglobin assessment demonstrated that 60 respondents (80.0%) had normal hemoglobin levels. Mild anemia was identified in eight respondents (10.7%), while seven respondents (9.3%) had moderate anemia. No cases of severe anemia were observed.

Laboratory Findings of Triple Elimination Screening

Table 3. Triple Elimination Screening Results Among Pregnant Women (n = 75)

Screening Test	Reactive n (%)	Non-Reactive n (%)
HIV	0 (0.0)	75 (100.0)
Syphilis	0 (0.0)	75 (100.0)
Hepatitis B (HBsAg)	0 (0.0)	75 (100.0)

All respondents demonstrated non-reactive results for HIV, syphilis, and hepatitis B surface antigen (HBsAg). No reactive cases were identified during the study period.

Identification of Pregnant Women Requiring Additional Attention Based on Clinical and Laboratory Data

Although no reactive infectious disease cases were identified, clinical assessment revealed that 20.0% of respondents had anemia and 2.7% were at risk of Chronic Energy Deficiency (CED), indicating the presence of pregnant women who may require closer monitoring during antenatal care.

DISCUSSION

The majority of respondents were aged 20–35 years, representing the biologically optimal reproductive age. According to the World Health Organization, pregnancies occurring between 20 and 35 years are generally associated with lower maternal and neonatal risks than pregnancies at younger or older ages (1). Most participants had completed senior high school education, which may positively influence maternal health literacy, utilization of antenatal care services, and acceptance of routine screening programs. Previous studies have also reported that women with higher educational attainment are more likely to access maternal healthcare services and adhere to recommended antenatal examinations (5,7). Adequate educational attainment may also facilitate better understanding of counseling provided during antenatal care, thereby improving awareness of the importance of early infectious disease screening and regular pregnancy monitoring.

Most women underwent Triple Elimination screening during the first trimester of pregnancy. This finding is consistent with national and international recommendations that emphasize early antenatal care to facilitate timely identification of maternal conditions and early intervention to prevent adverse pregnancy outcomes, including mother-to-child transmission of infectious diseases (1,3,4). Early screening enables healthcare providers to initiate appropriate management, counseling, and follow-up when required, thereby reducing the risk of delayed diagnosis and improving maternal and neonatal outcomes. In addition,

screening during early pregnancy provides sufficient time for preventive interventions before delivery.

The majority of respondents had normal nutritional status based on MUAC measurements. Nevertheless, a small proportion were identified as being at risk of Chronic Energy Deficiency. Although relatively uncommon, maternal undernutrition remains clinically important because it has been associated with fetal growth restriction, low birth weight, and other adverse neonatal outcomes. These findings support previous studies identifying maternal undernutrition as an important determinant of poor pregnancy outcomes in low- and middle-income countries (2,10). Nutritional assessment therefore remains an essential component of antenatal care, as maternal nutritional status influences fetal growth, maternal immunity, and overall pregnancy outcomes. Early identification of women at nutritional risk allows timely nutritional counseling and appropriate interventions.

Hemoglobin assessment showed that one-fifth of the respondents had anemia, although no severe anemia cases were identified. Maternal anemia remains an important public health concern because it has been associated with increased risks of preterm birth, low birth weight, maternal fatigue, and postpartum complications. Routine hemoglobin monitoring and iron supplementation therefore remain essential components of antenatal care (11). The absence of severe anemia in this study may indicate that most participants had relatively adequate access to antenatal services and nutritional support. Nevertheless, even mild anemia requires appropriate management because persistent anemia during pregnancy may adversely affect both maternal well-being and fetal development.

No cases of HIV, syphilis, or hepatitis B infection were detected among the study participants. These findings suggest a favorable epidemiological situation regarding the infectious diseases targeted by the Triple Elimination Program in this population. Similar results have been reported in several Indonesian studies, where the prevalence of these infections among pregnant women attending routine antenatal care was relatively low (9,12). Nevertheless, universal screening remains necessary because vertical transmission can occur even in low-prevalence settings, and early diagnosis enables timely interventions to prevent transmission (1–4). Furthermore, the absence of reactive results in the present study should not be interpreted as evidence that screening is unnecessary. Instead, these findings reinforce the importance of maintaining universal screening strategies to ensure that infected individuals are identified promptly whenever cases occur.

Overall, although infectious disease screening yielded uniformly non-reactive results, the identification of anemia and nutritional risk highlights the broader value of integrating clinical and laboratory assessments into antenatal care. Triple Elimination screening not only supports the prevention of mother-to-child transmission of HIV, syphilis, and hepatitis B but also provides opportunities to detect non-infectious conditions requiring additional monitoring and intervention (3,4,9). A comprehensive approach combining infectious disease screening with nutritional and hematological assessment may contribute to improved maternal and neonatal health outcomes (11). Integrating these assessments into routine antenatal care may also strengthen risk stratification, facilitate individualized maternal care, and support evidence-based decision-making for healthcare providers. Future studies involving larger sample sizes and multiple healthcare facilities are recommended to better describe the epidemiological profile of pregnant women undergoing Triple Elimination screening and to evaluate factors associated with maternal clinical and laboratory characteristics.

CONCLUSION

This study described the clinical and laboratory characteristics of pregnant women undergoing Triple Elimination screening at Jayengan Primary Health Center, Surakarta. Most

participants were within the optimal reproductive age, underwent screening during the first trimester, and had normal nutritional status and hemoglobin levels, while a small proportion presented with anemia and were at risk of chronic energy deficiency. No reactive cases of HIV, syphilis, or hepatitis B were identified. These findings demonstrate that Triple Elimination screening provides valuable information beyond the detection of infectious diseases by enabling the identification of maternal conditions requiring further nutritional assessment and clinical management. Integrating routine clinical and laboratory assessments with universal Triple Elimination screening may strengthen comprehensive antenatal care and support improved maternal and neonatal health outcomes. However, the findings should be interpreted with caution because this study was conducted at a single primary health center with a relatively small sample size and descriptive design, limiting the generalizability of the results. Further multicenter studies with larger populations are needed to better characterize maternal clinical profiles and evaluate factors associated with adverse pregnancy outcomes.

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Conflicts of Interest: The authors declare no conflict of interest.

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