



## Counseling and Changes in Pregnant Women's Perceptions Toward PMTCT Service Utilization in Papua, Indonesia: A One-Group Pretest–Posttest Study

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### ABSTRACT

**Background:** Papua has one of the highest HIV burdens among pregnant women in Indonesia. Limited utilization of Prevention of Mother-to-Child Transmission (PMTCT) services is influenced by stigma, inadequate knowledge, and negative perceptions regarding HIV prevention during pregnancy. Counseling may improve pregnant women's perceptions toward PMTCT service utilization. This study aimed to evaluate changes in pregnant women's perceptions toward PMTCT service utilization following counseling intervention in Jayapura, Papua.

**Methods:** A quantitative pre-experimental study with a one-group pretest–posttest design was conducted among 172 pregnant women attending antenatal care at Rodinda Independent Midwifery Practice, Jayapura, Papua, Indonesia. Data were collected using a structured questionnaire assessing perceived susceptibility, perceived severity, perceived benefit, and perceived barrier related to PMTCT service utilization. Data were analyzed using the Wilcoxon signed-rank test.

**Results:** Most pregnant women utilized PMTCT services during pregnancy (76.8%). Positive perceptions increased after counseling across all domains, including perceived susceptibility (44.8% to 68.6%), perceived severity (47.7% to 70.3%), perceived benefit (59.9% to 75.6%), and perceived barrier (75.6% to 87.2%). Statistically significant differences in perception scores before and after counseling were observed across all domains ( $p < 0.001$ ).

**Conclusion:** Counseling intervention was associated with positive changes in pregnant women's perceptions toward PMTCT service utilization. Counseling-based education may support efforts to improve PMTCT awareness and acceptance among pregnant women in high HIV-burden settings.

**Keywords:** *antenatal care; pmtct; pregnancy*

### INTRODUCTION

Human Immunodeficiency Virus (HIV) infection remains a major global public health problem, particularly among women of reproductive age.<sup>[1]</sup> One of the most serious consequences of HIV infection is mother-to-child transmission (MTCT), which can occur during pregnancy, childbirth, or breastfeeding.<sup>[2]</sup> According to the World Health

Organization (WHO), approximately 1.3 million women living with HIV become pregnant each year worldwide<sup>[2,3]</sup>. Without appropriate interventions, the risk of HIV transmission from mother to child ranges from 15% to 45%; however, this risk can be reduced to below 5% through comprehensive Prevention of Mother-to-Child Transmission (PMTCT) services<sup>[2,3]</sup>. Globally, PMTCT programs have

prevented an estimated 4.4 million new HIV infections among children between 2000 and 2024.<sup>[4]</sup> Therefore, PMTCT programs are considered essential strategies for reducing pediatric HIV infections and improving maternal and child health outcomes worldwide.<sup>[5]</sup>

In Indonesia, PMTCT efforts continue to be implemented through HIV screening among pregnant women and the provision of antiretroviral therapy (ART).<sup>[6]</sup> However, the coverage of these services remains suboptimal. The Ministry of Health reported that only approximately 55% of pregnant women underwent HIV testing, while a proportion of pregnant women living with HIV had not received adequate ART treatment.<sup>[7]</sup> This condition increases the risk of HIV transmission from mother to child during pregnancy, childbirth, and breastfeeding.<sup>[8,9]</sup> The Papua region has the highest prevalence of HIV-positive pregnant women in Indonesia, particularly in Highland Papua (1.88%), Papua Province (1.16%), and Central Papua (0.71%).<sup>[10]</sup> Papua remains one of the regions with the highest HIV burden in Indonesia, highlighting the urgent need to strengthen PMTCT services for pregnant women in order to reduce the risk of vertical HIV transmission.<sup>[11]</sup> Recent studies and reports have shown that PMTCT utilization in Papua continues to face multiple barriers, including stigma, limited knowledge, inadequate access to healthcare services, and low uptake of HIV screening and treatment services among pregnant women.<sup>[12,13]</sup> A 2025 study also reported that the prevalence of HIV among pregnant women in Papua was higher than in many other provinces in Indonesia.<sup>[14]</sup> These findings suggest persistent gaps in PMTCT service utilization, which may increase the risk of undetected maternal HIV infection and vertical transmission to infants.

Rodinda Independent Midwifery Practice (IMP) is one of the private maternal healthcare facilities in Jayapura

City, serving approximately 1,038 pregnant women over the past year (2023). A preliminary assessment conducted among 30 pregnant women revealed that the majority (70%) had limited understanding and negative perceptions regarding the importance of PMTCT services during pregnancy. These findings indicate that pregnant women's perceptions toward PMTCT services remain a significant challenge in maternal HIV prevention efforts.

Low perception and limited understanding of PMTCT services among pregnant women may contribute to poor utilization of HIV screening and treatment services during pregnancy.<sup>[15]</sup> Several previous studies have shown that inadequate knowledge, low risk perception, stigma, and negative perceptions regarding HIV and PMTCT services may contribute to poor utilization of HIV screening and treatment services among pregnant women.<sup>[16,17]</sup> Studies conducted in Ghana, South Africa, and other low- and middle-income countries reported that limited understanding of PMTCT and negative perceptions toward HIV services were associated with lower uptake of HIV testing and adherence to PMTCT programs during pregnancy.<sup>[18,19]</sup> Negative perceptions regarding HIV testing, fear of stigma, limited awareness of the benefits of PMTCT, and misconceptions about HIV transmission can reduce pregnant women's willingness to access PMTCT services.<sup>[20]</sup> Therefore, improving pregnant women's perceptions toward PMTCT is essential to increase the utilization of maternal HIV prevention services and reduce the risk of vertical HIV transmission.

Counseling has been widely recognized as an effective educational approach to improve knowledge, perceptions, and health-seeking behaviors among pregnant women.<sup>[21]</sup> Through counseling, pregnant women can receive accurate information regarding HIV transmission, the benefits of early HIV

testing, and the importance of antiretroviral therapy during pregnancy.<sup>[22]</sup> Previous studies have demonstrated that counseling interventions can improve awareness, perceptions, and acceptance of PMTCT services among pregnant women by increasing HIV-related knowledge, reducing misconceptions, and strengthening understanding of HIV prevention during pregnancy.<sup>[23–25]</sup> Although previous studies have explored PMTCT utilization and HIV-related counseling among pregnant women, evidence regarding counseling interventions aimed at improving pregnant women's perceptions toward PMTCT service utilization in high HIV-burden settings such as Papua remains limited. In addition, few studies have been conducted in independent midwifery practice settings, which play an important role in maternal healthcare services in Indonesia.

However, evidence regarding counseling interventions to improve pregnant women's perceptions of PMTCT service utilization in Papua remains limited. Therefore, this study aimed to evaluate the effect of counseling on improving pregnant women's perceptions of PMTCT service utilization at Rodinda Independent Midwifery Practice in Jayapura, Papua, Indonesia.

## METHODS

This study employed a quantitative pre-experimental design using a one-group pretest–posttest approach to assess changes in pregnant women's perceptions toward PMTCT service utilization following a counseling intervention. The study was conducted from July to December 2024 at Rodinda IMP, Jayapura City, Papua, Indonesia. The study population consisted of all pregnant women who attended antenatal care (ANC) visits at Rodinda IMP between January and March 2024, with a total population of 350 pregnant women. The minimum required sample size was calculated to be 172 participants. Pregnant

women attending their first ANC visit (K<sub>1</sub>). Additional inclusion criteria included pregnant women residing within the service coverage area of Rodinda IMP and those willing to participate in the study. Pregnant women referred from other healthcare facilities or attending only temporary visits were excluded from the study.

This study employed a one-group pretest–posttest design to evaluate changes in pregnant women's perceptions before and after the counseling intervention. Data collection involved both primary and secondary data sources. Secondary data, including maternal characteristics and reproductive history, were obtained from maternal and child health (MCH) records. Primary data were collected using a structured questionnaire designed to assess pregnant women's perceptions toward PMTCT service utilization before and after counseling. The questionnaire was developed based on previous PMTCT and maternal HIV studies and consisted of several domains related to knowledge, perceived benefits of PMTCT, stigma, perceived susceptibility to HIV transmission, and willingness to utilize HIV screening services during pregnancy. Responses were measured using a Likert-scale format. Prior to data collection, the questionnaire was reviewed for content validity by public health and maternal health experts and underwent pilot testing among pregnant women outside the study setting. The instrument demonstrated acceptable internal consistency reliability, with a Cronbach's alpha coefficient of >0.70.

The counseling intervention was delivered individually by trained healthcare personnel and focused on HIV transmission, the importance of PMTCT services, benefits of early HIV testing, antiretroviral therapy during pregnancy, and prevention of vertical HIV transmission. Perception assessments were conducted before the counseling session

(pretest) and after the intervention (posttest).

Data were analyzed using STATA version 16. Descriptive statistics were used for univariate analysis. Since the perception score data were not normally distributed, differences between pretest and posttest scores were analyzed using the Wilcoxon signed-rank test. Statistical significance was determined at  $p < 0.05$ . This study has several methodological limitations. The use of a one-group pretest–posttest design without a control group limits the ability to establish causal relationships between the counseling intervention and observed changes in perception scores. In addition, testing effects and external influences during the study period may have contributed to the observed changes. Therefore, the findings should be interpreted as preliminary evidence regarding changes in perceptions following counseling rather than definitive causal effects. Ethical approval for this study was obtained from the Ethics Committee of the Faculty of Public Health, Universitas Cenderawasih (No. 145/KEPK-FKM UC/2024). All participants provided informed consent prior to participation in the study.

## RESULT

A total of 172 pregnant women participated in this study. Most respondents were aged 20–35 years (82.6%) and had completed senior high school or higher education. More than half of the participants had a monthly income of  $\geq$  IDR 6,000,000 (62.8%) and were of non-Papuan ethnicity (59.9%). Regarding reproductive characteristics, most respondents had experienced more than two pregnancies (54.7%), while the majority reported no history of abortion (94.2%). Most pregnant women utilized PMTCT services during pregnancy (76.8%), with more than half accessing services at  $\leq 4$  months of gestation (55.8%) (Table 1).

**Table 1.** Characteristic of Study Participants (n=172)

| Variables                                   | n   | %    |
|---------------------------------------------|-----|------|
| <b>Age Group (years)</b>                    |     |      |
| <20                                         | 8   | 4.7  |
| 20-35                                       | 142 | 82.6 |
| >35                                         | 22  | 12.8 |
| <b>Monthly income (IDR)</b>                 |     |      |
| <3,000,000                                  | 18  | 10.5 |
| 3,000,000-5,999,999                         | 46  | 26.7 |
| $\geq 6,000,000$                            | 108 | 62.8 |
| <b>Education</b>                            |     |      |
| Junior high school or lower                 | 16  | 9.3  |
| Senior high school                          | 78  | 45.3 |
| College/University                          | 78  | 45.4 |
| <b>Ethnicity</b>                            |     |      |
| Papua                                       | 69  | 40.1 |
| Non-Papua                                   | 103 | 59.9 |
| <b>Gravidity</b>                            |     |      |
| $\leq 2$ pregnancies                        | 78  | 45.3 |
| >2 pregnancies                              | 94  | 54.7 |
| <b>Parity</b>                               |     |      |
| $\leq 2$ births                             | 90  | 52.3 |
| >2 irths                                    | 82  | 47.7 |
| <b>History of abortion</b>                  |     |      |
| None                                        | 162 | 94.2 |
| $\geq 1$                                    | 10  | 5.8  |
| <b>PMTCT Service Utilization</b>            |     |      |
| Utilized                                    | 132 | 76.8 |
| Did not utilize                             | 40  | 23.2 |
| <b>Gestational Age at PMTCT utilization</b> |     |      |
| $\leq 4$ months                             | 96  | 55.8 |
| >4 months                                   | 76  | 44.2 |

Improvements in pregnant women's perceptions toward PMTCT service utilization were observed after counseling across all perception domains. The proportion of respondents with positive perceived susceptibility increased from 44.8% before counseling to 68.6% after counseling. Similar increases were also identified for perceived severity (47.7% to 70.3%), perceived benefit (59.9% to 75.6%), and perceived barrier (75.6% to 87.2%) (Table 2).

**Table 2.** Changes in Pregnant Women's Perceptions Toward PMTCT Service Utilization Before and After Counseling (n = 172)

| Perception Domains              | Before Counseling | After Counseling |
|---------------------------------|-------------------|------------------|
|                                 | n (%)             | n (%)            |
| <b>Perceived Susceptibility</b> |                   |                  |
| Positive                        | 77 (44.8)         | 118 (68.6)       |
| Negative                        | 95 (55.2)         | 54 (31.4)        |
| <b>Perceived Severity</b>       |                   |                  |
| Positive                        | 82 (47.7)         | 121 (70.3)       |
| Negative                        | 90 (52.3)         | 51 (29.7)        |
| <b>Perceived Benefit</b>        |                   |                  |
| Positive                        | 103 (59.9)        | 130 (75.6)       |
| Negative                        | 69 (40.1)         | 42 (24.4)        |
| <b>Perceived Barrier</b>        |                   |                  |
| Positive                        | 130 (75.6)        | 150 (87.2)       |
| Negative                        | 42 (24.4)         | 22 (12.8)        |

Statistically significant improvements in all perception domains were observed following counseling intervention ( $p < 0.001$ ). Median scores for perceived susceptibility increased from 15 to 18, perceived severity from 14 to 17, perceived benefit from 19 to 22, and perceived barrier from 13 to 16 following the counseling intervention (Table 3).

**Table 3.** Comparison of Perception Scores Before and After Counseling Using Wilcoxon Signed-Rank Test ( $n = 172$ )

| Perception Domains       | Before Counseling | After Counseling | p-value |
|--------------------------|-------------------|------------------|---------|
|                          | Median (min-max)  | Median (min-max) |         |
| Perceived Susceptibility | 15 (5-20)         | 18 (9-22)        | <0.001  |
| Perceived Severity       | 14 (8-20)         | 17 (10-23)       | <0.001  |
| Perceived Benefit        | 19 (12-24)        | 22 (17-26)       | <0.001  |
| Perceived Barrier        | 13 (8-17)         | 16 (10-20)       | <0.001  |

## DISCUSSION

PMTCT services are recognized as a key strategy for preventing vertical HIV transmission and reducing pediatric HIV infections, particularly in high HIV-prevalence regions such as Papua, Indonesia.<sup>[2,27]</sup> The present study found that most pregnant women utilized PMTCT services during pregnancy; however, the average gestational age at first utilization occurred between four and five months of pregnancy. This finding suggests that many pregnant women may not access HIV screening during the recommended first trimester period,

potentially delaying early HIV detection and timely initiation of preventive interventions. Delayed utilization of PMTCT services among pregnant women has also been reported in previous studies conducted in Ethiopia and several other low- and middle-income countries (LMICs), where Sociocultural barriers such as HIV stigma, fear of disclosure and discrimination, and limited male partner involvement remain persistent challenges affecting PMTCT service uptake in low-resource settings.<sup>[28–30]</sup> Similar barriers may also contribute to delayed PMTCT uptake in Papua, where social stigma and limited awareness regarding HIV remain substantial public health challenges.

Following the counseling intervention, significant improvements were observed across all perception domains, including perceived susceptibility, perceived severity, perceived benefit, and perceived barrier. These findings indicate that counseling may contribute to more positive perceptions toward PMTCT service utilization among pregnant women. Counseling interventions may improve women's understanding regarding HIV transmission risks, increase awareness of the benefits of early HIV testing, and reduce misconceptions related to PMTCT services. Previous studies have demonstrated that counseling interventions during antenatal care can improve HIV-related knowledge, increase awareness, and enhance acceptance of PMTCT services among pregnant women.<sup>[29–32]</sup> From the perspective of the Health Belief Model, counseling may influence maternal health behavior by strengthening perceived susceptibility and perceived severity regarding HIV transmission, while simultaneously increasing perceived benefits and reducing perceived barriers toward PMTCT utilization. In addition, individualized counseling allows healthcare providers to deliver culturally sensitive communication and personalized education, which may be

particularly important in socially vulnerable populations and high HIV-burden settings such as Papua.

Although previous studies have explored PMTCT counseling in maternal healthcare settings, evidence regarding perception-based counseling interventions in independent midwifery practice settings remains limited. Therefore, this study contributes preliminary evidence regarding changes in pregnant women's perceptions toward PMTCT service utilization following counseling intervention in a private maternal healthcare setting in Papua, Indonesia.

The findings suggest that integrating structured PMTCT counseling into routine antenatal care services may help improve maternal awareness and acceptance of HIV screening during pregnancy. In high HIV-burden settings such as Papua, strengthening counseling capacity among frontline maternal healthcare providers may contribute to earlier PMTCT engagement and improved maternal access to HIV prevention services. Future studies using controlled or longitudinal designs are needed to evaluate whether improvements in perceptions may translate into sustained behavioral changes and long-term PMTCT utilization outcomes.

Despite several limitations, this study has several important strengths. The study was conducted in Papua, one of the regions with the highest HIV burden in Indonesia, where evidence regarding PMTCT interventions among pregnant women remains limited. In addition, this study evaluated a counseling-based intervention in an independent midwifery practice setting, which represents an important frontline maternal healthcare service in Indonesia. Furthermore, the use of a pretest–posttest approach allowed assessment of changes in pregnant women's perceptions following the intervention. The findings provide preliminary evidence regarding the potential role of counseling in improving

pregnant women's perceptions toward PMTCT service utilization in resource-limited and high HIV-burden settings.

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## CONCLUSION

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Counseling intervention was associated with significant improvements in pregnant women's perceptions toward PMTCT service utilization across all perception domains. Positive changes were observed in perceived susceptibility, perceived severity, perceived benefit, and perceived barrier following counseling. These findings highlight the potential role of counseling in strengthening pregnant women's understanding and acceptance of PMTCT services in high HIV-burden settings such as Papua, Indonesia.

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