

# BMJ Open Pregnant women's retention and associated health facility characteristics in the prevention of mother-to-child HIV transmission in Indonesia: cross-sectional study

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## ABSTRACT

**Objectives** Despite the national effort to integrate the Prevention of Mother-to-Child Transmission (PMTCT) programme into antenatal care clinics in Indonesia, the rate of mother-to-child HIV transmission remains high. This national study was conducted to describe PMTCT programme performance and to identify health facility characteristics associated with this performance in order to inform programme planning and policy development.

**Design** A retrospective cross-sectional study in December 2017.

**Setting** All health facilities providing PMTCT programmes in Indonesia.

**Participants** All health facilities registering at least one woman in antenatal care in 2017.

**Intervention** PMTCT data extraction from the national reporting system on HIV/AIDS and government reports.

**Outcomes** Women retention in the PMTCT programme for at least 3 months and associated health facility characteristics.

**Results** A total of 373 health facilities registering 6502 HIV-positive women in antenatal care were included in the analysis. One-third of women (2099) never started antiretroviral treatment. Of the 4403 women who started, 2610 (57%) were retained; 462 (10%) were not retained; and the retention status of 1252 (28%) women referred out of the health facilities was unknown. Compared with primary health centres, hospitals were more likely to retain women (OR=2.88, 95% CI 2.19 to 3.79). The odds of retention were higher in hospital types A and B (OR=3.89, 95% CI 3.19 to 4.76), located within concentrated HIV epidemic areas (OR=2.09, 95% CI 1.83 to 2.38) and a high-priority area for the HIV programme (OR=1.83, 95% CI 1.60 to 2.09). We observed no differential retention between women who initiated PMTCT under different options (B+/non-B+).

**Conclusions** We observed low retention of HIV-positive pregnant women in the PMTCT programme in Indonesia in 2017. Additional efforts are needed to improve women's retention in the PMTCT programme. Retention could be increased through the delivery of PMTCT programmes by replicating strategies implemented at hospital types A and B located in concentrated HIV epidemic areas where an HIV programme is a high priority.

## Strengths and limitations of this study

- This is the first study to report on Prevention of Mother-to-Child Transmission (PMTCT) programme performance in Indonesia since its official implementation in 2004.
- This study is among the few studies investigating health facility characteristics associated with HIV-positive women's retention in the PMTCT programme, with a sufficiently powered sample size.
- The use of secondary data in this analysis limited types of health facility characteristics entered in the Poisson regression analysis.
- National HIV/AIDS Information System recorded women's retention in the PMTCT programme until childbirth; therefore, it does not reflect women's retention postpartum.

## INTRODUCTION

Mother-to-child transmission (MTCT) is the most common cause of HIV in children below 15 years of age. Globally, MTCT accounts for 90% of HIV in children,<sup>1,2</sup> infecting 1.8 million children.<sup>3</sup> Despite the global effort to reduce HIV in children, there were 160 000 new HIV infections among children in 2018, which is far from achieving the elimination of MTCT.<sup>3</sup>

Without interventions, the rate of MTCT is higher in low-income and middle-income countries (25%–35%) than in industrialised countries (14%–25%). However, industrialised countries have successfully reduced the risk to less than 1%<sup>4</sup> through combined prevention consisting of antiretroviral treatment, elective caesarean sections and avoidance of breast feeding. In 2017, the UNAIDS estimated that countries with higher HIV burdens, including Uganda and Botswana, have reduced the MTCT risk to less than 5% (4.1%–4.8%). Meanwhile, MTCT risk in

Indonesia was estimated at 26.6%, which is currently the highest in the world.<sup>5</sup>

From 2004, Indonesia has integrated the Prevention of Mother-to-Child Transmission (PMTCT) programme into antenatal care clinics as a part of the national HIV programmes. In 2017, there were 664 health facilities providing PMTCT programmes all over Indonesia. However, despite the national effort, the number of new HIV infections due to perinatal transmission remains unchanged.<sup>2</sup> Since its implementation, there was no publication describing women's retention in the PMTCT programme in Indonesia. Also, no literature investigated the associations between health facility characteristics and women's retention in the PMTCT programme. The study aimed to describe women's retention in the PMTCT programme in Indonesia and health facility characteristics associated with their retention.

## METHODS

### Study design and population

A retrospective cross-sectional study was conducted on health facilities providing the PMTCT programme in 2017. We calculated women's retention in the PMTCT programme for at least 3 months at a single point in time during December 2017. All health facilities registering at least one HIV-positive pregnant woman and reporting through the National System Information for HIV/AIDS (SIHA) between January and December 2017 were eligible. SIHA is the Indonesian monitoring system for HIV programmes. It enables data verification and validation between the Ministry of Health, Provincial/District Health Offices and the health facilities.<sup>6</sup>

### Sampling

In 2017, 373 health facilities in Indonesia registered at least one HIV-positive pregnant woman in antenatal care and regularly reported PMTCT programme indicators through SIHA.

### Data collection

PMTCT data of 6502 HIV-positive women registered for antenatal care at 373 health facilities were extracted from SIHA. Types of PMTCT data extracted included the number of HIV-positive pregnant women who registered for antenatal care, were eligible for antiretroviral treatment, were started ARV treatment, were still on ARV treatment, stopped ARV treatment, died on ARV treatment and were lost to follow-up for 3 months consecutively. Health facility characteristics were extracted from the Ministry of Health (MoH) report on data and information of Indonesian Health Profile 2017<sup>7</sup> as presented in table 1.

### Outcomes and variables

SIHA recorded women's retention for at least 3 months in the PMTCT programme until childbirth.<sup>6</sup> In the Poisson regression analysis, the dependent variable, women's

**Table 1** Characteristics of health facilities reporting PMTCT outcomes in 2017

Health facility characteristics	Category	n (%)
Type	PHC	71 (19)
	Hospital	302 (81)
Class	PHC and hospital class D	96 (26)
	Hospital class C	119 (32)
	Hospital classes A and B	158 (42)
Epidemic	Concentrated	339 (91)
	Generalised	34 (9)
Priority	Low	55 (15)
	Medium	90 (24)
	High	228 (61)
Option	Other than B+	60 (16)
	Option B+	313 (84)

PHC, primary healthcare centre; PMTCT, Prevention of Mother-to-Child Transmission.

retention, was categorised into a dichotomic variable, 'retained' (yes/no). Independent variables, health facility characteristics (table 1), are categorised as follows<sup>8–11</sup>:

- Type of health facilities: primary healthcare centres (PHCs) or hospitals.
- Class of health services: hospitals providing (1) broad specialist and subspecialist services or (2) limited subspecialist services, (3) hospitals providing limited specialist and subspecialist services; and (4) hospitals providing general medical and dental services or health centres providing basic general medical and dental services, health coaching and public health functions at subdistrict level (PHC).<sup>8</sup>
- HIV epidemic based on WHO classification: concentrated (HIV prevalence over 5% in one or more defined subpopulations but among pregnant women is less than 1%) or generalised (establishment of HIV in the general population with HIV prevalence among pregnant women exceeds 1%).<sup>9</sup>
- HIV programme priority: high (generalised epidemic or concentrated epidemic areas with more than 11 000 population living with HIV), medium (concentrated epidemic areas with between 4000 and 11 000 population living with HIV, or low (concentrated epidemic areas with less than 4000 population living with HIV,<sup>10</sup> and
- PMTCT policy: option B+ (all HIV-positive pregnant women are eligible for ARV treatment) or other PMTCT options (only pregnant women with advance clinical status are eligible for ARV treatment).<sup>11</sup>

In data analysis, we grouped several health facilities based on similarities in characteristics to meet the minimum sample requirement for conducting regression analysis. These combined categories were hospital type D and PHCs (both only provide general services), hospital

type C (provides subspecialised services), and hospital types A and B (both offer specialised services).

### Statistical analysis

Data analysis was conducted using IBM SPSS Statistics V.24.  $\chi^2$  test was done for assessing differences between health facility characteristics and PMTCT retention. Poisson regression was used to evaluate the associations of health facility characteristics: type of health facility, class of health facility, PMTCT option, HIV epidemic, HIV programme priority and PMTCT retention. Results were statistically significant if the *p* value is <0.05.

### Patient and public involvement

We designed this study using participants' experience in the PMTCT programmes in Indonesia. In interviews we conducted in 2016, HIV-positive women and health workers reported variations in PMTCT programme deliveries between health facilities. We plan to disseminate the results to the policy makers, health workers and HIV-positive women in a discussion forum.

## RESULTS

### Women's enrolment in the PMTCT programme

Among 6502 HIV-positive pregnant women, 2099 (32%) were ineligible for ARV treatment, while 4403 (68%) were eligible for ARV treatment. Of eligible women, more than a quarter (1252) were referred out of the health facilities or the PMTCT programme at childbirth. Therefore, their postpartum retention was not recorded in the PMTCT indicators. A small percentage of women (2%) died while on ARV treatment, while 2610 (59%) were retained in the PMTCT programme for at least 3 months (table 2).

As presented in table 2, the majority of women (2517) retained in ARV treatment were in hospitals rather than in primary health centres (93). Of those women, 1874

(72%) were in class A and class B hospitals. Women living in a generalised HIV epidemic accounted for nearly 76% of women retained in the PMTCT programme in 2017, while less than 10% (286) were from concentrated HIV epidemic areas. A larger proportion of women retained in the PMTCT programme were located at health facilities within high-priority areas for the HIV programme (2152, 70%) and implementing option B+ policy (2637, 86%).

Women's retention was significantly different (*p*<0.001) with respect to type of health facility, class of health facility, HIV epidemic and programme priority.

### Health facility characteristics and PMTCT retention

Health facility type, class, HIV epidemic and HIV programme priority were significantly associated with women's retention in the PMTCT programme (*p* value<0.05). In our model, secondary healthcare facilities (OR=2.88, 95% CI 2.19 to 3.79), facilities providing health service classes A and B (OR=3.89, 95% CI 3.19 to 4.76), within generalised HIV epidemic areas (OR=2.09, 95% CI 1.83 to 2.38) and with high HIV programme priority (OR=1.83, 95% CI 1.60 to 2.09) were more likely to have higher PMTCT retention scores (table 3).

Based on these results, we concluded that 74% ((2.88)/(1+2.88)) of women enrolled in the hospitals were more likely to continue in the PMTCT programme until childbirth compared with women enrolled in primary health centres.

A higher probability of retention level was also shown by the health facilities providing health service classes A and B than class D, and women who started PMTCT in class A and B facilities were 80% ((3.89)/(1+3.89)) more likely to be retained in the programme.

Furthermore, women seeking treatment at health facilities where the HIV epidemic was generalised were

**Table 2** Comparison of health facility characteristics and PMTCT outcomes

Health facility characteristics	Category	Total women (N)	Women retained (n)	Women retained (%)	P value
Type	PHC	157	93	59.2	0.000
	Hospital	2915	2517	86.3	
Class	PHC and hospital class D	283	193	68.2	0.000
	Hospital class C	693	543	78.4	
	Hospital classes A and B	2096	1874	89.4	
Epidemic	Generalised	2691	2324	86.4	0.000
	Concentrated	381	286	75.1	
Priority	Low	291	246	84.5	0.000
	Medium	628	529	84.2	
	High	2153	1835	85.2	
Option	Other than B+	435	388	89.2	0.504
	Option B+	2637	2222	84.3	

PHC, primary healthcare centre; PMTCT, Prevention of Mother-to-Child Transmission.

**Table 3** Poisson regression analysis between health facility characteristics and art retention

Health facility characteristics	Category	OR	95% CI	P value
Type	Hospital	2.88	2.19 to 3.79	0.000
	PHC*	1	.	.
Class	Hospital classes A and B	3.89	3.19 to 4.76	0.000
	Hospital class C	1.46	1.18 to 1.79	0.000
	PHC and hospital class D*	1	.	.
Epidemic	Generalised	2.09	1.83 to 2.38	0.000
	Concentrated*	1	.	.
Priority	High	1.83	1.60 to 2.09	0.000
	Medium	1.42	1.22 to 1.65	0.000
	Low*	1	.	.
Option	Option B+	1.04	0.93 to 1.16	0.504
	Non-option B+*	1	.	.

P value of <0.05 for statistical significance.

\*References for the regression model.

68%  $((2.09)/(1+2.09))$  more likely to remain in the programme than women in a concentrated HIV epidemic.

Medium to high HIV programme priority was also associated with women's retention in PMTCT programmes, increasing the likelihood by 65%  $((1.83)/(1+1.83))$  and 59%  $((1.42)/(1+1.42))$  in comparison with women enrolled in health facilities with low programme priority.

## DISCUSSION

Prevention of MTCT of HIV remains a major public health challenge in low-income and middle-income countries where multifactorial issues influence retention and loss to follow-up in PMTCT programmes.

In this study, the level of retention in the PMTCT programme for at least 3 months among 3072 HIV-positive pregnant women until childbirth was 59%, lower than the 70% retention of 1062 women reported in Uganda and much lower than 88% 6-month retention in a smaller study of 268 women in Cameroon.<sup>12 13</sup> Women's retention postpartum in Indonesia might be lower than 59% when the motivation to prevent vertical HIV transmission had decreased after childbirth, as reported elsewhere.<sup>14</sup>

A high percentage of women (2099, 32%) were ineligible and therefore never started ARV treatment until childbirth, which imposes further perinatal HIV transmissions if the maternal viral load is high.<sup>15</sup> There were also 1252 (28%) HIV-positive women whose retention in ARV treatment were unknown due to transfer to other health facilities or childbirth. Previous studies reported a lower retention among women during the transfer process and postpartum.<sup>12 16</sup> These women were therefore at risk of transmitting HIV to their children if they did not continue their ARV treatment.

Our study found significant associations between health facility characteristics and women's retention in ARV

treatment. Women were more likely to retain in the ARV treatment if they enrolled in the PMTCT programme in hospitals rather than in primary health centres, particularly hospitals classes A and B that were located in a generalised HIV epidemic area and had a high priority for an HIV programme.

## Type of health facility

Our finding that women were more likely to be retained in PMTCT programmes based in specialised hospitals is consistent with a Haitian study that found women were less likely to be retained in primary health centres due to the poor quality of the services.<sup>17</sup> This is different from other studies in Swaziland and northeast Ethiopia,<sup>16 18</sup> which found that women's retention in the PMTCT programme was lower at secondary care facilities or hospitals. The difference might be explained by the reasons for women's low retention when these studies are compared with our study. In Southern Swaziland, women's attrition at the hospital was due to poor understandings of PMTCT long-term benefits for mothers and breastfeeding infants. Meanwhile, in Indonesia, this might be related to community stigma and discrimination toward HIV.<sup>19</sup> Primary health centres are usually located within the local community area, while hospitals are mainly located in the district or city area, outside of the local community area. Consistent with a review of evidence related to PMTCT,<sup>20</sup> fear of stigma and discrimination in the community is one of the main reasons for LTFU in the PMTCT programme in Indonesia and other countries, including Mozambique.<sup>19 21</sup> Women reported that the risk of being identified as HIV positive by the community members was much higher if seeking care at the primary health centres, and therefore they were less likely to be retained in the PMTCT.<sup>19 21</sup> On the other hand, attending the PMTCT programme at hospitals



minimised the risk of community stigma and discrimination, and therefore promoted a higher PMTCT retention.

### Class of health facility

Overall, the comprehensiveness of health services and capacity of health facilities is indicated by the class of health facility assigned by the MoH, the Republic of Indonesia. Types B and A are awarded to hospitals with more comprehensive health specialist and subspecialist services, adequate human resources, medical equipment and infrastructure requirements, including beds and building.<sup>8</sup> Both types are also education hospitals, and they receive PMTCT referrals from lower-class hospitals (C and D) and primary health centres.<sup>22</sup> This finding that the higher class health facilities were more likely to retain women in the PMTCT programme is consistent with other studies highlighting the positive impact of the bigger patient capacity of health facilities and adequate staffing on PMTCT retention.<sup>12 23</sup>

### HIV epidemic

Higher PMTCT retention was found in health facilities where the HIV epidemic was generalised. This result is consistent with a study of PMTCT in 23 countries where the PMTCT programme was more successful in countries with generalised HIV epidemics.<sup>24</sup> Greater awareness and knowledge among the health workers and women about HIV and prevention of transmission from mother to child could explain higher retention in these regions.<sup>19 25</sup> Also, HIV care for women in a generalised HIV epidemic area might be more intensive than for women in a concentrated epidemic area, which could result in better retention.<sup>24</sup>

### HIV programme priority

The classification of HIV programme priority was based on the total number of HIV-positive people identified in a region, regardless of its epidemic. In this study, 13 regions were categorised as high-priority HIV programme areas, including Papua as the only region documenting a generalised HIV epidemic in Indonesia.<sup>10</sup> Our study found higher retention among women enrolled in health facilities where the HIV programme was a high priority. This could be due to the Indonesian government's intensified effort to improve PMTCT services in targeted areas through training of health workers alongside the provision of free-of-cost HIV drugs.<sup>11</sup>

This study is the first to describe PMTCT programme performance in Indonesia since its official implementation in 2010. This study is one of the very few quantitative studies investigating associations between healthcare characteristics and women's retention in antiretroviral treatment in PMTCT programmes. Our sample size of over 4000 women who started ARV treatment is much larger than the samples of two previous quantitative studies on PMTCT retention.<sup>12 13</sup> Moreover, this study has national coverage, which allows the generalisation of the results across the Indonesian context. Lastly, the use of regression analysis made it possible to identify the health

facility characteristics associated with ART retention in Indonesian PMTCT programmes.

However, we also acknowledge several limitations of our study that require further research. First, despite the large sample size of women in this study, our modelling did not include all possible confounding factors, such as demographic characteristics of women and health workers, which are likely to be different in different parts of the country and contribute to the results in unknowable ways. As reported by a study in Uganda,<sup>26</sup> demographic factors such as younger age and lower education of the women contributed to higher LTFU in PMTCT programmes.<sup>27</sup>

Furthermore, the use of routine PMTCT data collected by the MoH, which are not designed for research purposes, somewhat limited our options for analysis as several relevant, contextual healthcare-related variables, such as the ratio between women and health workers, strategies implemented by the health facilities to ensure women's retention, external support received by the health facilities to implement the programme, or technical aspects of PMTCT monitoring, were absent.

### CONCLUSIONS

Indonesia has increased its efforts to reduce transmission of HIV by making PMTCT programmes available at many health facilities throughout the nation. Nevertheless, to eliminate new HIV infections in children, more efforts are needed to ensure the success of the PMTCT programme. Future efforts need to more effectively promote HIV-positive pregnant women's retention in the PMTCT programme until childbirth and postpartum, and a reporting system that incorporates women's retention after referrals and postpartum needs to be initiated. Routine data could also differentiate between referrals made by health workers and those made by women, along with the reasons for referrals. This information is essential, considering a high proportion of women in our study (28%) were in this category. The national PMTCT programme might benefit from documenting strategies adopted by hospital types A and B that were located in generalised HIV epidemic areas where HIV programme was a high priority.

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**Contributors** CL developed the study design and coordinated with the health government of the Republic of Indonesia for data collection, performed data cleaning, carried out data analysis and then drafted this manuscript. MKel, MKer and EH provided input for data analysis methodology and verified statistical analysis results, which were then revised by CL. All authors consented to the final version of the manuscript before submission to the publisher.

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**Data availability statement** We have included all data relevant to the study in the article.

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