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Factors associated with receiving late HIV testing among women delivering at Hung Vuong Hospital, Ho Chi Minh City, Vietnam, 2014

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Abstract

HIV testing during pregnancy facilitates timely antiretroviral treatment for HIV-positive women. This study identifies reasons for late HIV testing among pregnant women delivering at a hospital in Ho Chi Minh City. We conducted a case-control study in which 160 cases were women who were tested for HIV late (i.e., at labor and delivery) and 160 controls were women who were tested during antenatal care (ANC). In multivariable logistic regression analysis, six variables were associated with late HIV testing: age less than 30 years, nine or fewer years of education, working as a homemaker or worker/farmer, living 20km or more from the hospital, having received ANC at private clinic/hospital only, and not believing that HIV testing is important during pregnancy. We recommend that national programs should provide additional effort for HIV testing during pregnancy to young women, less educated women, homemakers, and those receiving ANC at private clinics and hospitals.

Keywords

HIV testing; Pregnancy; PMTCT; Vietnam

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Informed consent: Informed consent was obtained from all individual participants included in the study.

INTRODUCTION

In Vietnam, there are approximately 1.5 million pregnant women annually, among whom the prevalence of HIV infection was estimated to be 0.3% in 2014 (1–3). HIV sentinel surveillance between 2010 and 2013 showed that the prevalence of HIV among pregnant women in Vietnam was stable, from 0.23% to 0.26%, while there was a downward trend in Ho Chi Minh City (HCMC), from 0.63% to 0.13% (4). According to the Vietnam National Guidelines on the Diagnosis and Treatment of HIV/AIDS at the time of this study, pregnant women should have an HIV test during antenatal care (ANC) at community health centers or hospitals so that those who test positive for HIV can receive timely antiretroviral (ARV) prophylaxis or antiretroviral treatment (ART) (5). Most women in Vietnam receive ANC, as the national coverage of ANC was 85.1% in 2015 while the respective figure in Ho Chi Minh City was 90.5% (6). Free ARVs are available for HIV-positive pregnant women at government health centers in order to prevent mother-to-child transmission of HIV and for their own health. Late HIV testing, defined as HIV testing at the time of admittance to hospital for delivery, will delay ARV uptake and greatly reduce the effectiveness of ARV regimens for the prevention of mother-to-child transmission (PMTCT).

Although the vertical HIV transmission rate has decreased in recent years (from 8% in 2011 to 4.5% in 2012 in southern Vietnam, and from 3% in early 2012 to 1.2% in late 2012 in Ho Chi Minh City (HCMC) (7)), the proportion of pregnant women in southern Vietnam receiving late testing for HIV is still unacceptably high at 31% (8). The proportion of pregnant women who received late HIV testing for HIV, as documented from the national routine report in 2014, was 41% in Vietnam, 38% in southern Vietnam, and 22% in HCMC (9). HCMC has the highest proportion of pregnant women who were tested for HIV during ANC (78%) compared to other provinces in southern Vietnam (An Giang 76%, Ba Ria-Vung Tau 73%, Can Tho 67%, and Dong Nai 67%) (9). Because there were still so many women who received late testing for HIV, the national objective of having no child born with HIV by 2015 (10) was not achieved. Fifty-eight infants were born with HIV in Vietnam in 2015, and 32 (55%) were born in southern Vietnam (11).

Several studies in Vietnam, Botswana, Uganda, and Rwanda have identified some factors associated with late HIV testing, such as distance from the hospital (12–14), low education level, employment as a farmer or worker, low income (12), lower economic status (14), low or lack of knowledge about HIV or PMTCT (15), poverty, fear of discrimination due to positive HIV status, and family violence (16, 17). Furthermore, women who receive ANC at private clinics may be less likely to receive an HIV test during pregnancy compared to women who receive ANC at public clinics and hospitals, because the PMTCT program and HIV testing are mostly implemented in public health care facilities (18).

In 2012, at Hung Vuong Hospital, a large obstetric hospital in Ho Chi Minh City, approximately 20% of pregnant women admitted to the hospital for labor and delivery did not provide documentation of HIV testing (19). Given the widespread availability of HIV testing for pregnant women at public clinics and hospitals, it has been unclear why so many women had not had an HIV test before coming for delivery. This study is aimed at

identifying the reasons for late HIV testing among a population of pregnant women coming to a public hospital in HCMC.

METHODS

Study design

This is a hospital-based, case-control study at Hung Vuong Hospital, one of the two main obstetric hospitals in southern Vietnam and located in HCMC. The hospital manages approximately 3,500 deliveries per month, of whom 25 are among HIV-positive pregnant women. These women account for nearly 31% of HIV-positive pregnant women in southern Vietnam, where the HIV prevalence among pregnant women was 0.17% in 2012 (8). Most women delivering at Hung Vuong Hospital come from HCMC; a smaller proportion come from southern provinces surrounding the city. Since Hung Vuong Hospital is a tertiary obstetrical service site, many difficult cases are referrals for ANC and labor and delivery from districts and provincial hospitals, including HIV-infected pregnant women coming for PMTCT treatment.

Subjects and sampling

Study subjects were women admitted to Hung Vuong Hospital for delivery of their babies from May 9 through June 30, 2014; were aged 18 years or older; spoke Vietnamese; and provided informed consent for study participation. All pregnant women who were admitted to the hospital for delivery went through the routine admission procedures, including standard blood tests if necessary. HIV screening test and counseling were conducted if testing had not been done during the current pregnancy or if the woman's HIV status was unknown as per Vietnam Ministry of Health guidelines.

Cases were defined as receiving late HIV testing (testing at the time of labor and delivery). Controls were defined as receiving HIV testing during ANC and prior to coming to the hospital for labor and delivery. As part of routine hospital procedures, all women were asked to provide documentation of HIV test results from ANC. Women who reported that they had not been tested for HIV during ANC, or who did not know or remember if they had been tested, were considered cases and received HIV testing in the hospital at the time of labor and delivery.

Controls were pregnant women who were the next admission following each recruited case and who produced documentation of HIV testing during the current pregnancy prior to admittance to hospital for delivery. Women who said that they had been tested but who could not produce the documentation were excluded from the study because there was insufficient evidence of whether they had been tested for HIV; they were then tested for HIV in the hospital per routine procedures. Women who remembered being tested for HIV during ANC but did not bring documentation could send a family member to retrieve the documentation.

Women who met any of the following criteria were also excluded from the study: unable to provide informed consent (pregnancy complications, woman extremely sick in intensive care unit, mental illness); unable to understand and/or to be interviewed in Vietnamese; and reported having had an HIV-positive test during a previous pregnancy but currently not on

ART or in the PMTCT program. This latter exclusion criterion was added as most HIV-positive pregnant women are put on ART or included in the PMTCT program, so non-participation could indicate that they declined to be enrolled in the programs due to personal issues.

Although study eligibility and case/control status were determined before the woman delivered, eligible women were only approached about study participation after they had delivered their babies. Each woman who was eligible was approached in the post-delivery room by a trained nurse who first asked if she would be interested in participating in a brief survey. If the woman agreed, the nurse would then describe the study, procedures, risks and benefits using the informed consent form. All women who gave informed consent immediately participated in a one-time interviewer-administered questionnaire that took approximately 30 minutes.

With regard to sample size, we used the Epi Info 7 sample size calculation tool (StatCalc) from <http://wwwn.cdc.gov/epiinfo/7/index.htm>. The sample size estimation for the main predictor ranged between 135 and 145 for each group with the assumption of statistical analysis power=80%, alpha=0.05, unmatched case-control ratio=1, percent of controls exposed (high-level PMTCT knowledge)=45%, and OR=2. Assuming that 10% of participants would not agree to participate in the study, we added 10% to the calculated sample size. The final sample size ranged between 149 and 160 in each group. Thus, the total sample size of 320 (160 cases and 160 controls) was used.

Measurements

The covariates used in the model included the following socio-demographic characteristics: age, educational level, ethnicity, place of residence, occupation, socio-economic status (monthly income; ownership of a house, a car, motorbike, and other valuable property), marital status, estimated distance from the respondent's residence to the hospital, and perceptions about personal HIV status. We defined high-level HIV knowledge as correctly answering five questions: (1) persons can reduce their risk by using condoms every time they have sexual intercourse; (2) persons can reduce their risk by having sex with just one partner who is not infected and who has no other partners; (3) a healthy-looking person can be HIV-positive, (4) HIV cannot be transmitted by mosquito bites, and (5) HIV cannot be transmitted by sharing food with someone with AIDS. We defined high-level knowledge about PMTCT as correctly answering three questions indicating awareness that HIV can be transmitted from (1) an infected pregnant woman to her unborn child or (2) an infected mother to her child by breastfeeding, and that (3) the risk of mother-to-child transmission of HIV can be reduced by the mother taking special drugs during pregnancy.

Other variables were measured as follows: Low perception that HIV testing is important during pregnancy was measured by asking the question, "Do you think that it is important to take an HIV test during pregnancy?" Perception of infection risk was measured by asking the question, "Do you think you have a risk of being infected with HIV?" Disclosure of HIV status was measured by asking, "Have you ever told anyone about your HIV status?" Frequently abused verbally by spouse was measured by asking the question, "During this pregnancy, has your spouse ever verbally abused you?" Physically abused during the last

year was measured by asking the question, “Has your spouse ever acted with physical violence toward you?”

Statistical Analysis

Data were entered twice in order to ensure accurate data entry, using the EpiData software (version 3.1 – <http://www.epidata.dk/links.htm>). STATA software (version 13, StataCorp LP) was used for data cleaning and analysis. Baseline characteristics of cases and controls were summarized using frequencies and percentages for nominal and categorical variables. Chi-square tests were used to compare these characteristics between the two groups, except where Fisher’s exact tests were appropriate. Bivariate logistic regression analyses were used to examine potential associations between each variable and our outcome case-control status. Variables with levels of significance $p \leq 0.20$ in bivariate analysis, or $p > 0.20$ but statistically significant in the literature, were included in a multivariable logistic regression model.

Ethical considerations

The protocol was reviewed and approved by the Science and Ethics Committee of the lead author’s home institution and by the U.S. Centers for Disease Control and Prevention. All women who participated in the study provided informed consent. Regardless of study participation, all women delivering at Hung Vuong Hospital received counseling for health care and nutrition from health workers. In addition, study participants received a one-time payment of 100,000 VND (~5 USD) for their time in participating in the study, an amount typically given to research participants in Vietnam. Women who participated in the study and tested positive for HIV were referred to the hospital’s PMTCT program to receive appropriate care and treatment as per the national guidelines.

RESULTS

A total of 3,744 pregnant women were admitted to Hung Vuong Hospital from May 9 through June 30, 2014. Of these women, 3,580 (95.6%) provided documentation of HIV testing during ANC. Of the 164 who did not provide documentation, three reported prior HIV testing, and were therefore excluded. Of the 161 (4.3%) women without documentation who were eligible to be considered cases, 160 agreed to participate in the study. To recruit 160 controls, the study staff approached the first woman who was admitted after each recruited case and had received an antenatal HIV test.

Of the 320 study participants, the mean (sd) age of women in the study was 28 (5.9) years (range 18–43). For purposes of analysis, women were categorized into age groups based on quartiles; the middle two quartiles were similar so they were combined. The resulting three age groups were: 18–22 years, 23–30 years, and 31 years and older. Almost half of participants had more than nine years of education (45%), and most participants were Kinh ethnicity (93%) and were residents of HCMC (68%). There were only two HIV-infected women who participated in the study; both were cases. Their infants were followed for two months and found negative for HIV by PCR. Five percent of participants reported having

husbands who injected illicit drugs (5.6% among cases, 4.4% among controls, Fisher's exact test p -value= 0.8). No study participants reported ever using injection drugs.

In bivariate analysis, sociodemographic characteristics that were associated with receiving late HIV testing included: age 18–22 and 23–30 years; having an education level of nine or fewer years; working as homemakers, workers or farmers; having monthly income of less than four million VND; having the first marriage at the age of 19 or younger; being currently unmarried; being a resident of provinces outside of HCMC; and living 20 km or more from Hung Vuong Hospital (Table 1). Obstetrical and ANC factors significantly associated with receiving late HIV testing ($p<0.01$) included: not having planned for the current pregnancy; having received ANC only at private clinics/hospitals; and not having received HIV counseling during ANC. None of the participants in the control group reported receiving no ANC; whereas 19.4% of cases had received no ANC ($p<0.001$). Among the knowledge and perception measures, the following were statistically associated with receiving late HIV testing ($p<0.001$): low general knowledge about HIV (defined as incorrectly answering any of the five questions according to the national indicator); insufficient knowledge of prevention of mother-to-child HIV transmission (PMTCT; defined as incorrectly answering any of the three questions according to the national indicator); and a lack of understanding that HIV testing is important during pregnancy.

In multivariable logistic regression analysis, the 18 variables significant at $p < 0.20$ and one variable significant at $p=0.25$ (physically abused during the last year) in bivariate analyses were entered into the multivariable model. Six independent predictors ($p<0.05$) of having late HIV testing included those belonging to age groups 22 and under, and 23–30 years compared to those 31 and above; having an education level of nine or fewer years; working as homemakers and workers/farmers; living 20km or more from Hung Vuong Hospital; having received ANC at private clinics/ hospitals only; and not believing that HIV testing is important during pregnancy (Table 2).

DISCUSSION

In this study, a number of factors were associated with late HIV testing after being admitted to the hospital for delivery. Women who had received late HIV testing tended to be younger, less educated, and more likely to have attended private clinics and to live farther away from Hung Vuong Hospital. These results are consistent with several studies in Vietnam that showed that living farther away from the hospital was associated with late testing (12), no ANC HIV testing (13), and refusing HIV testing (20).

The observation that women who received ANC at public clinics/hospitals were more likely to have had an HIV test during the pregnancy than women who attended private clinics/hospitals may reflect the results of the national PMTCT program. This program was established in 2000 in Vietnam (21) and offers opt out HIV testing to all pregnant women who receive ANC at public clinics and hospitals. In addition, ART prophylaxis for HIV-positive women and their babies is provided by the government at no cost. Most of the public health sector, including hospitals, integrated the PMTCT program into their health care activities (22). Therefore, the public health sector provides more HIV counseling and

testing for pregnant women than the private health sector, where PMTCT is not a compulsory activity.

Women in this study who had higher education levels (more than nine years) or believed HIV testing to be important during pregnancy were more likely to have had an HIV test during pregnancy than women with lower levels of education or women who did not believe that HIV testing is important during pregnancy. Furthermore, women who worked in the academic or business sectors were more likely to have had an HIV test during pregnancy than women who were homemakers. These results are consistent with other studies of women in Vietnam, which reported that having less education, working as a farmer or worker, and having low income were associated with not being tested for HIV during pregnancy (12). Higher socioeconomic status and having high PMTCT knowledge scores were associated with having had an HIV test (23).

The results of this study also indicated that older women were more likely to have had an HIV test during pregnancy than younger ones. Women aged 23–30 were more than twice as likely, and those aged 31 and older were almost eight times as likely, to have had an HIV test during their pregnancy than women aged 18–22. However, these findings contradict several studies in Vietnam and Africa, which found that younger women were more likely to have had an HIV test than older women (14, 20), or that there was no association between age and HIV test among recently delivering mothers (13), or among pregnant women (24–26). The lack of consistency of this study with other studies may be due to the studies being conducted at different times and in different settings, e.g. rural vs. urban, Asia vs. Africa, current vs. past. This study was conducted in 2014, when the PMTCT program had been promoted for over 15 years in Vietnam. Furthermore, it was conducted in Hung Vuong Hospital, a large obstetric hospital in HCMC, where most of the patients come from urban areas. Age may also be correlated with education and socio-economic status. Therefore, older women may have had more “cumulative exposure” to PMTCT information, education communication, and HIV counseling from health care providers.

Although it was not a goal of our study, we found that of all 3,744 pregnant women who were admitted to Hung Vuong Hospital during the study period in 2014, only 164 (4.4%) could not provide documentation of HIV testing during ANC. This is significantly lower than the 20% of pregnant women admitted to Hung Vuong Hospital in 2012 who had not been tested for HIV during ANC, and much lower than the 31% of pregnant women in southern Vietnam who received late testing for HIV in 2011 (8). One reason for the decrease in the proportion of women receiving late HIV testing at delivery is the national objective of having no child born with HIV by 2015. As a result of this objective, clinics and hospitals such as Hung Vuong Hospital have implemented their own activities to encourage women to have an HIV test and to facilitate HIV testing during ANC.

This study has several limitations potentially related to sampling and bias. First, although our findings may be representative of women living in HCMC and its surrounding communities (which represent 88% of pregnant women in southern Vietnam), they are not representative of pregnant women throughout southern Vietnam. Additionally, there were some challenges in identifying cases and controls. According to the protocol, a woman had

to have documentation of her HIV test results in order to be classified as a control. However, three women stated that they had had an HIV test, but that they had lost the documentation. These women had to be excluded from the study as there was no proof of their HIV testing status, although this number was likely too small to affect the total results. Furthermore, the variables of knowledge and perceptions were collected after all women in the study had delivered their babies and received HIV testing. Therefore, those measures may not accurately reflect the women's knowledge and perceptions at the time they became pregnant and received ANC, so they may not actually be predictors of the outcome of interest for this study. Finally, the questionnaire did not include questions about previous access to sexual and reproductive health services. The percentage of unplanned pregnancies among cases and controls were 38.8% (62/160) and 19.4% (31/160) ($p < 0.001$), respectively, indicating that women were not likely receiving sufficient information about contraception. Even though contraceptives and family planning services are made available in Vietnam from the grass-root level (commune health stations) to upper levels (district hospitals, provincial hospitals and gynecological and obstetric hospitals), women may not always take advantage of it.

In recent years, Ho Chi Minh City has been trying to decrease vertical transmission of HIV from mother to child by increasing the number of pregnant women who are testing for HIV during ANC and providing PMTCT services for women who test positive. The results of this study provide information for improving the PMTCT program in Vietnam. In order to increase HIV testing among pregnant women, the National AIDS Program should work more closely with private clinics and hospitals to provide HIV testing during ANC, as well as to ensure referrals to care for any women who test positive for HIV. The PMTCT program in the southern provinces outside of Ho Chi Minh City should also be continually improved so that women in these areas are consistently tested for HIV during pregnancy. This is a current objective of the National AIDS Program. Furthermore, it's critical that Vietnamese women have access to sexual and reproductive health services so that they have more control over their reproductive lives and can achieve their desired fertility. This will also yield major public health benefits by lowering maternal and infant morbidity and mortality (27). Since a certain percentage of the study population's husbands/partners were reported to be IDUs, there is a need for harm reduction programs in Vietnam to include sexual reproductive health education, condoms and sex partner education. On provision of counseling for pregnant women, counselors should also explore the drug use status of their partners to make possible referrals to voluntary counseling and testing or methadone maintenance therapy programs. Finally, educational information about PMTCT and HIV should be emphasized in the community through the mass media, physicians and counselors, in order to reach young women who have little education or who work as homemakers.

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Characteristics and bivariate analysis of predictors related to receiving late HIV testing during pregnancy among pregnant women delivering at Hung Vuong Hospital, Ho Chi Minh City, Vietnam, 2014 (n=320)

Table 1

Characteristics	Received late HIV testing		Unadjusted Analyses			
	Yes, Cases (n=160) n (%)	No, Controls (n=160) n (%)	OR	95% CI	z-score ^d	p-value ^d
Sociodemographic characteristics						
Age, in years						
18–22	55 (34.4)	14 (8.8)	9.35	(4.51, 19.39)	6.00	<0.001
23–30	76 (47.5)	77 (48.1)	2.35	(1.37, 4.02)	3.11	0.002
31–43	29 (18.1)	69 (43.1)	ref			
Education 9 yrs	103 (67.8)	68 (43.3)	2.75	(1.73, 4.38)	4.27	<0.001
Kinh ethnicity	145 (90.6)	152 (95.0)	0.51	(0.21, 1.24)	−1.49	0.14
Resident of provinces	64 (40.0)	38 (23.8)	2.14	(1.32, 3.47)	3.09	0.002
Occupation						
Homemaker	68 (42.5)	36 (22.5)	5.39	(2.97, 9.78)	5.54	<0.001
Worker/farmer	65 (40.6)	47 (29.4)	3.94	(2.21, 7.02)	4.66	<0.001
Academic/business	27 (16.9)	77 (48.1)	ref			
Monthly income < 4 million VND	126 (78.8)	68 (42.5)	5.01	(3.07, 8.20)	6.43	<0.001
First marriage at age 19 years	50 (32.3)	25 (15.9)	2.51	(1.46, 4.33)	3.32	0.001
Currently not married	18 (11.3)	4 (2.5)	4.94	(1.63, 15.0)	2.83	0.005
Living 20 km from Hung Vuong Hospital	96 (60.0)	57 (35.6)	2.71	(1.72, 4.26)	4.32	<0.001
Obstetrical history						
More than one pregnancy	98 (61.3)	114 (71.3)	0.64	(0.40, 1.02)	−1.89	0.059
More than one delivery	83 (51.9)	91 (56.9)				
At least one miscarriage/stillbirth	21 (13.1)	32 (20.0)	0.60	(0.33, 1.10)	−1.64	0.10
At least one abortion	33 (20.6)	36 (22.6)				
Antenatal care (ANC) counseling during current pregnancy						
Current pregnancy not planned	62 (38.8)	31 (19.4)	2.63	(1.59, 4.36)	3.76	<0.001
Attending antenatal care						
Private clinic/hospital only	76 (47.5)	50 (31.3)	3.15	(1.94, 5.12)	4.65	<0.001
None	31 (19.4)	0	n/a			

Characteristics	Received late HIV testing			Unadjusted Analyses		
	Yes, Cases (n=160) n (%)	No, Controls (n=160) n (%)	OR	95% CI	z-score ^d	p-value ^d
Other (public only or public and private)	53 (33.1)	110 (68.8)	ref			
Having no HIV counseling	135 (84.4)	61 (38.1)				
Knowledge and perceptions						
Low-level general HIV knowledge ^b	143 (89.4)	122 (76.3)	2.62	(1.41, 4.87)	3.04	0.002
Low-level PMTCT knowledge ^c	105 (65.6)	62 (38.8)	3.02	(1.91, 4.76)	4.75	<0.001
Low perception that HIV testing is important during pregnancy	22 (13.8)	1 (0.6)	25.35	(3.37, 190)	3.14	0.002
Perception of infection risk	26 (16.3)	36 (22.5)	0.67	(0.38, 1.17)	-1.41	0.16
Disclosure of HIV status	46 (28.7)	52 (32.5)				
Physical and emotional abuse within family						
Frequently abused verbally by spouse	29 (18.8)	24 (15.2)				
Physically abused during last year	8 (5.0)	4 (2.5)	2.05	(0.61, 6.96)	1.15	0.25

OR odds ratio, CI confidence interval.

^a z-score and p-value based on Wald-test of logistic regression.

^b All 5 questions answered correctly.

^c All 3 questions answered correctly.

Table II

Multivariable logistic regression of predictors related to receiving late HIV testing among women delivering at Hung Vuong Hospital, Ho Chi Minh City, Vietnam, 2014

Characteristics	Adjusted analysis			
	AOR	95% CI	z-score ^a	p-value ^a
Age in years				
31 and above	Ref			
22 and under	7.76	(2.80, 21.49)	3.94	<0.001
23–30	2.96	(1.42, 6.14)	2.91	0.004
Education level				
High school and higher (> 9 years)	Ref			
Secondary and lower (0–9 years)	2.35	(1.22, 4.51)	2.56	0.01
Occupation				
Academic/professional	Ref			
Homemaker	2.95	(1.32, 6.59)	2.63	0.008
Worker/farmer	2.52	(1.16, 5.48)	2.33	0.02
First marriage at 19 years or younger	0.60	(0.25, 1.43)	−1.15	0.25
Current pregnancy not planned	1.98	(0.99, 3.99)	1.92	0.055
Lives 20 km or more from Hung Vuong Hospital	2.69	(1.46, 4.97)	3.16	0.002
Attending antenatal care during this pregnancy				
Public only or public and private clinic/ hospital	Ref			
Private clinic/ hospital only	3.30	(1.80, 6.08)	3.85	<0.001
None	n/a			
Did not believe HIV testing important during pregnancy	8.99	(1.09, 73.9)	2.04	0.04

AOR adjusted odds ratio, adjusted for all other variables in the model, CI confidence interval

^a z-score and p-value based on Wald-test of logistic regression

Note: The full model consists of 18 variables, i.e. age, education, Kinh ethnicity, resident of provinces, occupation, income, first marriage age, currently married, living 20 km from Hung Vuong Hospital, pregnancy time, miscarriage/stillbirth time, current pregnancy with plan, attending antenatal care, general HIV knowledge, PMTCT knowledge, perception about HIV testing during pregnancy, perception of infection risk, and physically abused by husband.