


## ORIGINAL ARTICLE

# Study on Factors Related to HIV Among Women in West Kalimantan, Indonesia

## Studi Faktor-Faktor yang Berhubungan dengan HIV pada Perempuan di Kalimantan Barat, Indonesia

Nany Hairunisa<sup>1</sup>, Isra Sabrina<sup>2</sup>, Husnun Amalia<sup>3</sup>, Yasmine Mashabi<sup>4</sup>, Nashita Amira Zaina<sup>5</sup>, Emad Yousif<sup>6</sup>

<sup>1</sup>Department of Occupational Medicine, Faculty of Medicine, Universitas Trisakti, Jakarta, Indonesia

<sup>2</sup>General Practitioner, Tidore Island Hospital, North Moluccas, Indonesia;


<sup>3</sup>Department of Ophthalmology, Faculty of Medicine, Universitas Trisakti, Jakarta, Indonesia

<sup>4</sup>Department of Clinical Pathology, Faculty of Medicine, Universitas Trisakti, Jakarta, Indonesia

<sup>5</sup>Medical Programme, Faculty of Medicine, Universitas Trisakti, Jakarta, Indonesia

<sup>6</sup>Departement of Chemistry, Collage of Science, Al-Nahrain University, Baghdad, Iraq

 nanyhairunisa@trisakti.ac.id

 <https://doi.org/10.56186/jbk.89-107>

### ABSTRACT

#### Background

According to national data, West Kalimantan is one of the ten top provinces that reported AIDS cases, ranked eighth. Until December 2019, based on data recorded in the Provincial Health Office that reported to the Indonesia Ministry of Health, the AIDS case rate in West Kalimantan was 49.35, showing over the national AIDS case rate (38.93). In this study, an unmatched case-control determines the factors associated with HIV/AIDS among women in West Kalimantan, Indonesia.

#### Methods

The study was conducted among 90 women who tested positive for HIV/AIDS (cases) and 90 who tested negative for HIV/AIDS (controls). Data were collected using questionnaires from June 2019 to August 2019 at three community health centres in West Kalimantan. Data were analyzed using IBM Statistical Package Social Science (SPSS) 19. Descriptive analyses and Multivariate logistic regression analysis were used to examine the factors associated with HIV/AIDS. Results: This study has found a significant association between crucial aspects such as marital status, occupation, knowledge about HIV/AIDS, HIV treatment, and VCT (Voluntary Counseling and Testing) service program with cases of HIV/AIDS. A significant association between marital statuses with HIV/AIDS suggests that divorced/widowed have a higher risk of having HIV/AIDS, followed by the married group. Women with good educational backgrounds will likely know how to prevent HIV infection and take preventive measures to protect themselves.

#### Results

This study found a significant relationship between several important aspects such as marital status, occupation, knowledge of HIV/AIDS, HIV treatment, and the VCT (Voluntary Counseling and Testing) service program with HIV/AIDS cases. The significant relationship between marital status and HIV/AIDS shows that divorced/widows have a higher risk of contracting HIV/AIDS, followed by the

married group. Women with a good educational background tend to know about HIV infection prevention measures and take precautions to protect themselves.

### Conclusions

Some factors are significantly related to HIV/AIDS. Thus, educating women about sex could potentially decrease the number of HIV/AIDS cases.

**Keywords:** HIV; AIDS; VCT; Women

## ABSTRAK

### Latar Belakang

Menurut data nasional, Kalimantan Barat merupakan salah satu dari sepuluh provinsi teratas yang melaporkan kasus AIDS, peringkat kedelapan. Hingga Desember 2019, berdasarkan data yang tercatat di Dinas Kesehatan Provinsi yang dilaporkan ke Kemenkes RI, angka kasus AIDS di Kalimantan Barat adalah 49.35, menunjukkan angka kasus AIDS nasional (38.93). Dalam penelitian ini, unmatched case control menentukan faktor-faktor yang berhubungan dengan HIV/AIDS pada perempuan di Kalimantan Barat, Indonesia.

### Metode

Penelitian dilakukan pada 90 perempuan yang dinyatakan positif HIV/AIDS (kasus) dan 90 perempuan yang dinyatakan negatif HIV/AIDS (kontrol). Pengumpulan data dilakukan dengan menggunakan kuesioner pada bulan Juni 2019 hingga Agustus 2019 di tiga Puskesmas di Kalimantan Barat. Data dianalisis dengan menggunakan IBM Statistical Package Social Science (SPSS) 19. Analisis deskriptif dan analisis regresi logistik multivariat digunakan untuk menguji faktor-faktor yang berhubungan dengan HIV/AIDS.

### Hasil

Penelitian ini menemukan hubungan yang signifikan antara beberapa aspek penting seperti status perkawinan, pekerjaan, pengetahuan tentang HIV/AIDS, pengobatan HIV, dan program layanan VCT (Voluntary Counseling and Testing) dengan kasus HIV/AIDS. Hubungan yang signifikan antara status perkawinan dengan HIV/AIDS menunjukkan bahwa janda cerai/janda memiliki risiko lebih tinggi untuk tertular HIV/AIDS, diikuti oleh kelompok yang menikah. Wanita dengan latar belakang pendidikan yang baik cenderung mengetahui tentang langkah-langkah pencegahan infeksi HIV dan melakukan tindakan pencegahan untuk melindungi diri mereka sendiri.

### Kesimpulan

Beberapa faktor berhubungan signifikan dengan HIV/AIDS. Dengan demikian, mendidik perempuan tentang seks berpotensi menurunkan jumlah kasus HIV/AIDS.

**Kata Kunci:** HIV; AIDS; VCT; Perempuan

## INTRODUCTION

The cumulative number of reported HIV infection cases in Indonesia by 2019 was 50,282, with 7,036 cases for AIDS. In addition, there were 40,321 cases of HIV infection reported through 226 Voluntary Counselling and Testing (VCT) clinics nationwide. The male and female ratio of those diagnosed with AIDS was 3:1 (68.60%: 31.40%), differing from the 4:1 ratio of previous years, offering a glimpse of the progress of the pandemic in Indonesia. The global number of HIV cases through case fatality rate (CFR) in 2019 was 0.59%.<sup>1</sup> According to national data, West Kalimantan is one of

the ten top provinces that reported AIDS cases, ranked eighth.<sup>2</sup> Until December 2019, based on data recorded in the Provincial Health Office that reported to the Indonesia Ministry of Health, the AIDS case rate in West Kalimantan was 49.35, showing over the national AIDS case rate (38.93).<sup>1</sup>

The geographical condition of West Kalimantan was one of the causes of the easy wide-spreading of HIV and AIDS. The influx of migrants by sea, air, and land is open anytime and by anyone. Besides, a positive impact on potential changes in development is also a contributing factor in bringing negative implications. Furthermore, the high level of community mobilization in West Kalimantan also influences socio-economic life, including the risks of exposure to HIV and AIDS. In addition, many people who work inter-island as laborers, transit foreign fishermen, prostitutes, nightclub workers, and Indonesian female workers, as well as high cases of /narcotics abuse, were the other reasons that influence the spreading of HIV/AIDS.<sup>3</sup>

Women and girls are the two most vulnerable groups to contract HIV. UNAIDS reported that the incidence of new cases of HIV and AIDS in developing countries among the younger age group (15-24 years) was 67% (of which 64% consist of women and girls).<sup>4</sup> According to the Indonesia Ministry of Health report, 70.4% of AIDS cases are found between the ages of 25-49, which is the productive age population.<sup>1</sup> Due to the imbalance of power in the relationship created by their high economic and emotional dependency, women are often unable to protect themselves, even though they know the potential risks associated with extra-marital sexual interaction with their partners. CDC 2018 reported that there were 37.968 new HIV diagnoses in the U.S.; of those, 19% were among women and attributed to heterosexual contact.<sup>5</sup>

Some opinions state that marriage is a good solution to protect a woman from becoming infected with HIV; however, this is contradictory that many new infections in women occur in marriage or long-term relationships and significantly contribute to increasing female sexual exposure.<sup>6</sup>

A cohort study mentioned there is a relationship between the increased prevalence of HIV/AIDS among women with certain patterns of sexual behaviour. Women with frequently changing sexual partners reported an increased prevalence of HIV/AIDS<sup>7</sup>. Blanc said that sexual behaviour among educated people was at high risk, and educated women have sex more frequently and delay marriage<sup>8</sup>. This causes them to become more independent and sexually active for a longer period and thus have many sexual partners.<sup>9</sup> Contraceptive choice can also be influenced by education. Although educated people may be more likely to use contraception entirely, they are also more likely to choose methods like the contraceptive pill, which does not protect against sexually transmitted diseases like HIV. Considering these factors, and with the absence of a response to the epidemic, these factors increase the vulnerability of individuals who are more educated about HIV infection at an early stage.<sup>5</sup> Some theories and evidence presented that educated people should be easier to adopt safe sexual practices in response to health promotion or other information sources about HIV / AIDS.<sup>10</sup>

The relationship between HIV/AIDS and migration is close and complex. Generally, the highest incidence of HIV/AIDS exists in countries with good transport infrastructure and relatively high economic development levels. The relationship between HIV/AIDS and migration has good empirical evidence. The incidence of HIV/AIDS was higher among the people who either have migration experience or migrants who have sexual partners. Migrant workers, especially male

migrants, a bridge for transmitting infections from core risk groups to the general population, and unprotected non-spousal sex increase their HIV/AIDS infections<sup>11</sup>. Some studies suggest a significant relationship between income and HIV / AIDS. A woman with no income or low income tends to do jobs with high risk and exposure to HIV, such as having sex with non-regular partners to earn an additional income due to their need/responsibility to help support their families.<sup>12</sup>

The relationship between occupation types with HIV/AIDS is inextricably linked, whether directly or indirectly; for instance, sex workers are directly related to HIV / AIDS. A study showed a strong relationship between a partner's occupation status and HIV among women. The first consideration was that the men in this working group were more likely to travel (such as truck drivers compared to the farmers), putting them at greater risk of infection, which would then infect their wives.<sup>13</sup> The key vulnerability factor of women and girls contracting HIV generally was a lack of knowledge and information about HIV-AIDS or access to HIV prevention services.<sup>14</sup> Several countries have noted a reduction in new infection rates among sex workers in recent years. This decrease is associated with better knowledge and awareness about HIV/AIDS.<sup>15</sup>

Voluntary Counselling and Testing is an important components for the prevention of HIV. It is also the gateway to treatment, care, and support for people living with HIV. Unfortunately, limited access to VCT centres is available in several large cities only, although VCT is available in most countries now.<sup>16</sup> The most common reasons to refuse testing were the need to discuss with a partner, fear of HIV-positive status, fear of losing marital security, domestic violence, and confidentiality. The study also reported that better-educated women were more reluctant to test than others.<sup>17</sup>

Transmission of HIV from mother to child tends to increase with the increasing number of women with HIV from an infected partner or due to risky behaviour. Although prevalence data of HIV transmission from mother to child is still limited, the number of positive pregnant women tends to increase.<sup>18</sup>

Research programs for preventing mother-to-child transmission (PMTCT) in six African countries have found several reasons why pregnant women were reluctant to perform an HIV test or refused to return to take their test results. The important reason was a fear of exclusion and domestic violence.<sup>16</sup> Prevention tools can empower women to take control of their sexual behaviour, for example, the female condom. The limited number and high price of female condoms and low awareness of HIV increased their exposure to HIV.<sup>5</sup> The influence of cultural and religious morality often links the use of a condom with promiscuity and restriction of the availability of free condoms, resulting in psycho-social barriers to using them. Many opinions in some countries state that condom is strongly associated with marginalized groups such as sex workers.<sup>19</sup>

## **MATERIALS AND METHODS**

An unmatched case-control study (ratio 1:1) was conducted among 90 women who tested positive for HIV/AIDS (cases) and 90 women who tested negative for HIV (controls). Data collection was done using questionnaires at three community health centres in West Kalimantan. Inclusion criteria for cases; all women who tested positive for HIV/AIDS (following WHO recommendation), those who were 15 years old and above, resident or non-resident of West Kalimantan registered at VCT "CAHAYA" Clinic in Puskesmas Pemangkat, agreed to participate and cooperated in this study.

The exclusion criteria for cases were non-West Kalimantan residents and those sick during the data collection procedure. The sample selected for control were women without HIV/AIDS who came to the three selected Community Health Centres in West Kalimantan within a week. The inclusion criteria for cases; were all women who tested negative HIV with a rapid test, all women that came to three selected Community Health Centres in West Kalimantan within a week, residents of West Kalimantan, those who were 15 years old or above, those who agreed to participate and cooperated in this study. The exclusion criteria; those who were tested positive for HIV during the data collection.

This study applied the purposive sampling method for both cases and controls. The sample size calculation for this study design was determined using Pocock's formula. Due to the exclusion criteria, an additional 20% was added to the calculated minimum sample size of 73 as an estimated percentage for dropouts and rejected subjects. Therefore, the required sample size for this study was 90 pairs of cases and controls or 180 respondents. The data which trained counsellors collected were socio-cultural (sexual behaviour), economic data (migration, income/salary, occupation and level of education), socio-demographic data (age and marital status), knowledge/awareness about HIV/AIDS, and program and services access data (VCT, PMTCT, HIV prevention, and HIV treatment). The study tools were a set of questionnaires, Rapid test tools, and datasheet/medical records. The datasheet/medical record of cases was the first protocol used during data collection. The questionnaires were divided into two sections; Section A for socio-demographic information. Section B for knowledge about HIV/AIDS. Some questions were changed based on the needs and done through a trial (pre-test) validated before use. All controls were tested by the Rapid test method as a screening tool to ensure they were HIV-negative. PITC (Provider Initiated Testing and Counselling) was used for these screening tests. All controls signed the informed consent as an agreement that they agreed to be a part of this screening test. The controls who tested HIV positive by the rapid test were excluded from the rest of this study. Those who tested HIV negative proceeded to be interviewed by the researcher. This procedure was continued throughout data collection until the required sample size was obtained.

Data were analyzed using IBM Statistical Package Social Science (SPSS) 19. Descriptive analyses and multivariate logistic regression were used to examine the factors associated with HIV/AIDS. The respondents were informed that their participation in the study was voluntary and no action would be taken if they chose not to participate. They were told of the research objective and the involved tests (how the HIV rapid test was administrated and the need for vein puncture to take 2 ml of blood for the rapid test in-tube test). Those who agreed to participate were ensured that they were only identified by a peculiar serial number known only to the researcher. The information they disclose and the test result for HIV are confidential. Before screening for HIV, all the respondents were counselled about HIV/AIDS and were asked to sign the informed consent form. After the screening for HIV, all respondents were informed about their results and given counselling after the test. Before starting the research, the researcher requested permission to conduct the study from the Head of the West Kalimantan Provincial Health Office (Project Code: FF-184-2019).

## RESULTS

A total of 180 women respondents (90 were cases and 90 were controls) were included in this study. The mean age of cases was 32.22 years, and the standard deviation was 8.118. The mean age of controls was 33.72 years, and the standard deviation was 9.376. The majority of respondents were married (56.7% cases and 70.0% controls), had no college education (87.8% cases and 84.5% controls), had one or less partner (73.3% cases and 74.4% controls), income/salary of less than regional minimum wage (57.8% cases and 65.6% controls), housewives (44.5% cases and 57.8% controls) and migrant (43.3 cases and 60% controls), (Table 1)

**Table 1.** Respondents' socio-demographic, economic, and socio-cultural characteristics among women in Sambas, West Kalimantan, Indonesia, 2019

Variable	Cases		Controls	
	N	%	n	%
Number of respondents	90	100.0	90	100.0
Age				
15 – 24 years old	17	18.9	12	13.3
25 – 34 years old	44	48.9	39	43.3
35 – 44 years old	21	23.3	25	27.8
>44 years old	8	8.9	14	15.6
Mean (years)	32.22		33.72	
SD	8.118		9.376	
Marital status				
Single	7	7.8	15	16.7
Married	51	56.7	63	70.0
Divorced/widowed	32	35.5	12	13.3
Level of education				
Primary school	49	54.5	43	47.8
Secondary school	27	30.0	24	26.7
High school	12	13.3	18	20.0
University and higher	2	2.2	5	5.5
Sexual behavior				
≤ one partner	66	73.3	67	74.4
≥ two partner	24	26.7	23	25.6
Migration				
Migrant	39	43.3	54	60.0
Non-migrant	51	56.7	36	40.0
Income/salary				
< Rp 2,200,000.00 per month	52	57.8	59	65.6
≥ Rp 2,200,000.00 per month	38	42.2	31	34.4
Occupation				
Not working	1	1.1	4	4.4
Housewife	40	44.4	52	57.8
Businesswomen	29	32.2	13	14.5
Government employee	0	0.0	3	3.3
Farmer	9	10.0	8	8.9
Others	11	12.3	10	11.1

Table 2 shows that most cases (85.6%) did not use condoms for HIV prevention, while only 14.4% used condoms. Almost all respondents among controls did not use condoms for HIV prevention (90.0%), and the remaining 10% used condoms. In most cases, about 80.0% had good knowledge about HIV/AIDS, 18.9% had moderate knowledge, and 1.1% had poor knowledge about

HIV/AIDS. Among controls, 46.7% had moderate knowledge about HIV/AIDS, 36.6% had good knowledge, and 16.7% had poor knowledge about HIV/AIDS. The majority of cases did not know about antiretroviral therapy as HIV/AIDS treatment (68.9%), and 31.1% of cases knew about antiretroviral therapy as HIV/AIDS treatment. Almost all respondents among controls did not know about antiretroviral therapy (96.7%) used for HIV/AIDS treatment, and 3.3% of them knew about it.

**Table 2.** Knowledge about HIV/AIDS, program and services access characteristics among women in Sambas, West Kalimantan, Indonesia, 2019

Variable	Cases		Controls	
	N	%	n	%
Number of respondents	90	100.0	90	100.0
HIV prevention and tools (condom use)				
Use condom	13	14.4	9	10.0
Not use condom	77	85.6	81	90.0
Knowledge about HIV/AIDS				
Poor	1	1.1	15	16.7
Moderate	17	18.9	42	46.7
Good	72	80.0	33	36.6
HIV treatment				
Know about ART	28	31.1	3	3.3
Don't know about ART	62	68.9	87	96.7
VCT Service				
Know about VCT service and want to test	39	43.3	28	31.1
Know about VCT service but don't want to test	5	5.6	7	7.8
Don't know VCT service but want a test	30	33.3	16	17.8
Don't know VCT service and don't want test	16	17.8	39	43.3
VCT Access				
Far to VCT service	35	38.9	17	18.9
Not far to VCT service	37	41.1	37	41.1
No idea about the VCT service	18	20.0	36	40.0
PMTCT Service				
Know about PMTCT	16	17.8	7	7.8
Don't know about PMTCT	74	82.2	83	92.2
PMTCT Access				
Far to PMTCT service	13	14.4	14	15.5
Not far to PMTCT service	8	8.9	5	5.6
No idea about the PMTCT service	69	76.7	71	78.9

There was 43.3% of cases knew about VCT service, and they wanted to do the test in the VCT clinic. About 5.6% of cases knew about VCT service but did not want to do the blood test for HIV in the VCT clinic. 33.3% of cases who did not know about the VCT service actually wanted to do the blood test for HIV, while 17.8% of cases did not know about the VCT service and did not want to do the blood test for HIV in the VCT clinic. Table 2 shows about 43.3% of controls did not know about VCT service and did not want to do the blood test for HIV. 31.1% of controls knew about the VCT service and wanted to do the blood test for HIV in the VCT clinic. About 17.8% of controls did not know about the VCT service but wanted to do the blood test, and the remaining 7.8% of controls knew about the VCT service but did not want to do the blood test. On the question pertaining to VCT access, 41.1% of cases answered that VCT service was not located far from their houses, 38.9% answered that VCT service was far from their home, and the remaining percentage, which 20.0% responded that they did not know about the location of the VCT service in their area. Among

controls, 41.1% answered that VCT services are near their house. About 40.0% of controls did not know about the VCT service location in their area, and 18.9% answered that the VCT service was located far from their houses. In terms of PMTCT service, Table 2 also shows that in the majority of cases, about 82.2% did not know about Prevention Mother to Child Transmission (PMTCT) service, and 17.8% knew about PMTCT service. The majority of controls, about 92.2%, did not know about the PMTCT service, while only 7.8% knew about it. On the PMTCT service access question, 76.7% of cases answered that they did not know the distance between the PMTCT service clinic and their houses. Only 8.9% of cases answered that the PMTCT service clinic is near their homes, and 14.4% stated that the clinic is far from their houses. Among controls, 78.9% of controls did not know whether the PMTCT service clinic was located far or near their homes. About 15.5% of controls answered that the PMTCT service clinic is located far from their houses, and the remaining 5.6% of controls answered that the PMTCT service clinic is not far from their homes

### **Association between socio-demographic, economic, and socio-cultural factors with HIV/AIDS**

The result shows that for the age variable, the Pearson Chi-Square value was 3.15, and the p-value was 0.369. Since the p-value for the age variable was  $> 0.05$ , it was considered insignificant. The crude odds ratio for the age group 15 -24 years compared to the age group  $> 44$  years was 2.48 (95% CI 0.79 – 7.75) times more likely to get/have HIV/AIDS. The crude odds ratio for the age group 25 – 34 years compared to the age group  $> 44$  years was 1.97 (95% CI 0.75 – 5.21) times more likely to get/have HIV/AIDS. Meanwhile, the crude odds ratio for the age group 35 - 44 was 1.47 (95% CI 0.52 – 4.18) times more likely to be HIV/AIDS than the age group  $> 44$  years. The Marital status variable's Pearson Chi-Square value was 13.26, and the p-value was 0.001. Since the p-value was  $< 0.05$ , marital status thus had a significant association with HIV/AIDS. The crude odds ratio for the married group compared to the single group was 1.74 (95% CI 0.66 - 4.58) times more likely to get/have HIV/AIDS. The crude odds ratio for the divorced/widowed group compared to the single group was 5.71 (95% CI 1.87 – 17.44) times more likely to get/have HIV/AIDS. The result also showed that for the level of education variable, the Pearson Chi-Square value was 1.34, and the p-value was 0.247. Since the p-value was  $> 0.05$  so it was considered to be insignificant. The crude odds ratio for the low education group compared to the high education group was 0.39 (95% CI 0.07 – 2.05) times more likely to get/have HIV/AIDS. termstern of sexual behaviour, the Pearson Chi-Square value was 0.03, and the p-value was 0.865. Therefore, it showed no significant association with HIV/AIDS. The crude odds ratio for one or less partner group compared to more than one partner's group was 0.94 (95% CI 0.49 – 1.84) times more likely to get/have HIV/AIDS.



**Table 3.** Association between socio-demographic, economic, and socio-cultural factors with HIV/AIDS

Variables	Cases n (%)	Controls n (%)	Crude OR	(95% CI)	$\chi^2$	p value
Age					3.15	0.369
15 – 24	17 (18.9)	12 (13.4)	2.48	0.79, 7.75		
25 – 34	44 (48.9)	39 (43.3)	1.97	0.75, 5.21		
35 – 44	21 (23.3)	25 (27.8)	1.47	0.52, 4.18		
>44	8 (8.9)	14 (15.6)	1.00	-		
Marital status					13.26	0.001
Single	7 (7.8)	15 (16.7)	1.00	-		
Married	51 (56.7)	63 (70.0)	1.74	0.66, 4.58		
Divorced/widowed	32 (35.5)	12 (13.3)	5.71	1.87, 17.44		
Level of education					1.34	0.247
Low Education	88 (87.8)	85 (84.5)	0.39	0.07, 2.05		
High Education	2 (2.2)	5 (5.5)	1.00	-		
Sexual behavior					0.03	0.865
≤ one partner	66 (73.3)	67 (74.4)	0.94	0.49, 1.84		
≥ two partner	24 (26.7)	23 (25.6)	1.00	-		
Migration					5.01	0.025
Migrant	39 (43.3)	54 (60.0)	1.00	-		
Non-migrant	51 (56.7)	36 (40.0)	1.96	1.08, 3.55		
Income/salary					1.15	0.283
< Rp 2,200,000.00/ month	52 (57.8)	59 (65.6)	0.72	0.39, 1.31		
≥ Rp 2,200,000.00/ month	38 (42.2)	31 (34.4)	1.00	-		
Occupation					8.01	0.018
Businesswomen	29 (32.2)	13 (14.4)	2.66	1.11, 6.37		
Housewife	40 (44.5)	52 (57.8)	0.92	0.45, 1.87		
Others (Not working, Gov. Employee, Farmer, etc.)	21 (23.3)	25 (27.8)	1.00	-		

The migration variable significantly associated with HIV/AIDS since the p-value was 0.025 and the Pearson Chi-Square value was 5.01. Meanwhile, the crude odds ratio for the non-migrant group compared to the migrant group was 1.96 (95% CI 1.08 – 3.55) times more likely to get/have HIV/AIDS. Table 3 shows no significant association between income/salary with HIV/AIDS (p-value = 0.283), and The Pearson Chi-Square value was 1.15. The crude odds ratio for income/salary of less than the

regency minimum wage (< Rp 2,200,000.00) per month compared to income/salary of Rp 2,200,000.00 and above per month was 0.72 (95% CI 0.39 – 1.31) times more likely to get/have HIV/AIDS. In the occupation variable, the Pearson Chi-Square value was 8.01, and the p-value was 0.018. Since the p-value was < 0.05, occupation thus had a significant association with HIV/AIDS. The crude odds ratio for the business women group compared to other groups was 2.66 (95% CI 1.11 – 6.37) times more likely to get/have HIV/AIDS. Meanwhile, the crude odds ratio for the housewife group compared to other groups was 0.92 (95% CI 0.45 – 1.87) times more likely to get/have HIV/AIDS.

### **Association between knowledge about HIV/AIDS, program, and services access factors with HIV/AIDS**

The Chi-square test tested knowledge, program, and services access factors among women. The result showed a significant association between knowledge and HIV/AIDS with the Pearson Chi-square value of 34.77 and p-value of less than 0.001. The crude odds ratio for the good knowledge group compared to the poor knowledge group was 6.91 (95% CI 3.53 – 13.52) times more likely to get/have HIV/AIDS. Similarly, there was a significant association between HIV treatment and HIV/AIDS with the Pear Chi-square value of 24.36 and p-value of less than 0.001. The crude odds ratio for those with no knowledge about antiretroviral therapy compared to those who know about antiretroviral therapy was 0.08 (95% CI 0.02 – 0.26) times more likely to get/have HIV/AIDS. Table 4 below shows a significant association between the VCT service program and HIV/AIDS with a Pearson Chi-square value of 16.02, and the p-value was 0.001. The crude odds ratio for respondents that knew about the VCT service program and were interested in doing a blood test compared to those who knew about the VCT service program but didn't want to do a blood test was 1.95 (95% CI 0.56 – 6.78) times more likely to get/have HIV/AIDS. The crude odds ratio for respondents that didn't know about the VCT service program but wanted to do a blood test compared to those who knew about the VCT service program but didn't want to do a blood test was 2.63 (95% CI 0.72 – 9.61) times more likely to get/have HIV/AIDS. Meanwhile, the crude odds ratio for respondents that didn't know about the VCT service program and didn't want to do a blood test compared to those who knew about the VCT service program but didn't want to do a blood test was 0.57 (95% CI 0.16 – 2.08) times more likely to get/have HIV/AIDS.

**Table 4.** Association between knowledge about HIV/AIDS, program and services access with HIV/AIDS

Variables	Cases n (%)	Controls n (%)	Crude OR	95% CI	$\chi^2$	p value
HIV prevention and tools (condom use)					0.83	0.363
Use condom	13 (14.4)	9 (10.0)	1.00	-		
Not use condom	77 (85.6)	81 (90.0)	0.66	0.27, 1.63		
Knowledge about HIV/AIDS					34.77	<0.001
Poor	18 (20.0)	57 (63.4)	1.00	-		
Good	72 (80.0)	33 (36.6)	6.91	3.53, 13.52		
HIV treatment					24.36	<0.001
Know about ART	28 (31.1)	3 (3.3)	1.00	-		
Don't know about ART	62 (68.9)	87 (96.7)	0.08	0.02, 0.26		
VCT Service					16.02	0.001
Know about VCT service and want test	39 (43.4)	28 (31.1)	1.95	0.56, 6.78		
Don't know VCT service but want test	30 (33.3)	16 (17.8)	2.63	0.72, 9.61		
Know VCT service and don't want test	5 (5.6)	7 (7.8)	1.00	-		
Don't know VCT service and don't want test	16 (17.8)	39 (43.3)	0.57	0.16, 2.08		
VCT Access					12.23	0.002
Far to VCT service	35 (38.9)	17 (18.9)	4.12	1.83, 9.26		
Not far to VCT service	37 (41.1)	37 (41.1)	2.00	0.97, 4.14		
No idea about the VCT service	18 (20.0)	36 (40.0)	1.00	-		
PMTCT Service					4.04	0.044
Know about PMTCT	16 (17.8)	7 (7.8)	1.00	-		
Don't know about PMTCT	74 (82.2)	83 (92.2)	0.39	0.15, 1.00		
PMTCT Access					0.76	0.685
Far to PMTCT service	13 (14.4)	14 (15.5)	0.58	0.15, 2.24		
Not far to PMTCT service	8 (8.9)	5 (5.6)	1.00	-		
No idea about the PMTCT service	69 (76.7)	71 (78.9)	0.61	0.19, 1.95		

In terms of VCT access, there was a significant association between VCT access and HIV/AIDS with a Pearson Chi-square value of 12.23 and p-value of 0.002. The crude odds ratio for respondents who stated that their houses were located far from the VCT clinic compared to respondents who do not know about the VCT clinic was 4.12 (95% CI 1.83 – 9.26) times more likely to get/have HIV/AIDS. The crude odds ratio for respondents who live near the VCT clinic compared to respondents who do not know about the location of the VCT clinic near their housing area was 2.00 (95% CI 0.97 – 4.14) times more likely to get/have HIV/AIDS. There was also a significant association

between the PMTCT service program and HIV/AIDS with a Pearson Chi-square value of 4.04 and a p-value of 0.044. The crude odds ratio for respondents that didn't know about the PMTCT service program compared to respondents that knew about the PMTCT service program was 0.39 (95% CI 0.15 – 1.00) times more likely to get/have HIV/AIDS. Meanwhile, there was no significant association between HIV prevention and tools (p-value = 0.363) and PMTCT service access (p-value = 0.685) with HIV/AIDS

### **Multivariate analysis (logistic regression)**

Logistic regression with backward L.R. method was done in multivariate analysis to identify the factors associated with HIV/AIDS among women. Further analysis showed that the marital status, occupation, knowledge, HIV treatment, and VCT service program remain significant factors associated with HIV/AIDS. Still, the migration variable and housewife were non-significant factors. The marital status, occupation, knowledge, and VCT service program are the risk factors contributing to HIV/AIDS cases. The adjusted odds ratio for divorced/widowed was 21.56 (95% CI 4.52 – 102.67) times more likely to have HIV/AIDS than those who are single. The adjusted odds ratio for married people was 5.09 (95% CI 1.18 – 21.95) times more likely to have HIV/AIDS than those who are single. Meanwhile, the adjusted odds ratio for the businesswomen group was 4.18 (95% CI 1.25 – 13.93) times more likely to have HIV/AIDS than other occupation groups.

The adjusted odds ratio for those aware and have good knowledge of HIV/AIDS was 7.38 (95% CI 2.94 – 18.55) times more likely to have HIV/AIDS than those within the poor knowledge group. Regarding the HIV treatment variable, the adjusted odds ratio for those who didn't know about the antiretroviral therapy group was 0.05 (95% CI 0.01 – 0.22) times unlikely to get HIV/AIDS compared to those who knew about antiretroviral therapy. The VCT service variable showed the adjusted odds ratio for those who knew about the VCT service program and wanted to do a blood test was 2.28 (95% CI 0.38 – 13.56) times more likely to get/have HIV/AIDS compared to those who knew about VCT service program but did not want to do a blood test. The adjusted odds ratio for those who did not know about the VCT service program but wanted to do a blood test was 14.14 (95% CI 2.19 – 91.38) times more likely to get/have HIV/AIDS compared to those who knew about VCT service program but did not want to do a blood test. Meanwhile, the adjusted odds ratio for those who did not know about the VCT service program and did not want to do a blood test was 14.14 (95% CI 2.19 – 91.38) times more likely to get/have HIV/AIDS compared to those who knew about VCT service program but did not want to do a blood test (Table 5).

**Table 5.** Factors associated with HIV/AIDS among women

Variables	B	S.E.	Wald	Adjusted OR	95% CI	p-value
Marital status			15.70			<0.001
Single				1.00	-	
Married	1.64	0.73	4.99	5.15	1.22, 21.65	0.025
Divorced/widowed	2.91	0.76	14.48	18.27	4.09, 81.57	<0.001
Migration						
Migrant	-0.87	0.47	3.43	0.42	0.17, 1.05	0.064
Non-migrant				1.00	-	
Occupation			10.26			0.006
Businesswomen				1.00	-	
Housewife	-1.99	0.63	10.02	0.14	0.04, 0.47	0.002
Others	-1.43	0.61	5.58	0.24	0.07, 0.78	0.018
Knowledge about HIV/AIDS						
Poor				1.00	-	
Good	1.78	0.44	16.54	5.96	2.52, 14.07	<0.001
HIV treatment						
Know about ART				1.00	-	
Don't know about ART	-2.97	0.76	15.18	0.05	0.01, 0.23	<0.001
VCT Service			11.29			0.004
Know about VCT service and want test	-1.74	0.57	9.54	0.18	0.06, 0.53	0.002
Don't know VCT service but want test				1.00	-	
Know, Don't know VCT service and don't want test	-1.44	0.53	7.29	0.24	0.08, 0.67	0.007

## DISCUSSION

The previous study showed that the significant risk factors for women to get HIV infection were 26-35 years.<sup>20</sup> This study found that there was no significant association between age and HIV/AIDS. Although we did not find any significant association between Age and HIV/AIDS, the higher numbers of cases among women in West Kalimantan were aged between 25 – 34 years. Some opinions stated that marriage is always a good solution to protect a woman from becoming infected with HIV. It turned out that this opinion is contradictory to the fact that many new infections in women occur in marriage or long-term relationships<sup>6</sup>. Other studies have shown that the only HIV risk factor for the majority of women was having sex exclusively with their spouse (one's husband).<sup>21</sup>

Similarly, the higher number of cases among women in West Kalimantan was married, followed by divorced/widowed. The study found a significant association between marital statuses with HIV/AIDS. Divorced/widowed have a higher risk of having HIV/AIDS, followed by the married group. Gender inequality in the marriage relationship, especially in the decision-making process related to sex, leads to high vulnerability to HIV transmission. We look at current data worldwide, which shows that the incidence of new HIV infection is increasing among married women and

girls.<sup>22</sup> The opinion that married women should obey their husbands and do not have the right to decide are some of the causes of women's vulnerability in contracting HIV. Therefore married women could not decide on safe sex with their partner even when they knew that they would be potentially exposed to HIV due to unsafe sex practices by their spouse.

There was a relationship between the increased prevalence of HIV/AIDS among women with certain patterns of sexual behaviour. For example, women who frequently change sexual partners reported an increased prevalence of HIV/AIDS<sup>7</sup>. However, our findings did not seem to corroborate this observation because we found that there was no significant association between sexual behaviour and HIV/AIDS. This was due to the majority of cases among women in West Kalimantan were involving married women where most of them got HIV from their husbands, so the majority of cases in this study had less than two sexual partners.

The education sector is the best avenue to explore an effective response to HIV/AIDS. Studies have shown that women with good educational backgrounds were more likely to know how to prevent HIV infection, delay sexual activity, and take preventive measures to protect themselves. A study has found that women in 32-country post-primary education were five times more likely to know facts about HIV/AIDS compared to illiterate women. On the other hand, illiterate women were four times more likely to believe that there is no way to prevent HIV infection<sup>4</sup>. This study found that most respondents attended school at the primary level, but there was no significant association between levels of education with HIV/AIDS in bivariate analysis. Another study found a significant association between levels of education with HIV in bivariate analysis but no significant association in multivariate analysis also found no significant association between levels of education with HIV/AIDS. This further suggests that level of education is not a simple determinant of HIV risk.<sup>20,22</sup>

The relationship between HIV / AIDS and migration was close and complex. Generally, the highest incidence of HIV / AIDS exists in countries with good transport infrastructure and relatively high economic development levels.<sup>11</sup> Our findings seemed to corroborate this observation. We found a significant association between migration and HIV/AIDS. The high level of community mobilization in West Kalimantan and strategic geographic location also influence the socio-economic life, including the dangers of HIV and AIDS. In addition, many people work inter-island as laborers, transit of foreign fishermen, prostitutes, nightclub workers, and Indonesian female workers, who have led to high migration rates in the West Kalimantan<sup>3</sup>. Although the number of cases among migrants in this study was not as high as among non-migrant, the interviews found that most of their husbands were migrants. It is a highly complex relationship between the income factor and the risk of HIV infection. Many arguments explained why higher infection rates were found among the poor.<sup>23</sup> One study conducted in America by the sizeable national population of HIV research has found that HIV infection rates among low-income communities in 24 U.S. cities with high AIDS prevalence are between 10 to 20 times greater than in the general U.S. population.<sup>24</sup> In contrast, this study had shown that there was no significant association between income/salary with HIV/AIDS. Meanwhile, we found that majority of the respondents had low household income/salary less than the regional minimum wage of Indonesia.

The finding showed that there was a significant association between occupation and HIV/AIDS. The result supported the study of<sup>14</sup>, which found a strong direct and indirect relationship

between types of occupation with HIV / AIDS. In this study, the results have also shown that businesswomen were exposed to a higher risk to get/have HIV/AIDS compared to housewives.<sup>13</sup> This finding contradicted the previous study results by<sup>13</sup> that showed housewives tend to have a higher risk to get/have HIV/AIDS. The first consideration was that the men in this work nature were more likely to travel (such as truck drivers than the farmers, for example), putting them at greater risk of infection, thus infecting their wives.

Some previous studies found that higher HIV prevalence was associated with poor knowledge of HIV.<sup>23</sup> Vulnerability factors of women and girls to contract HIV were generally due to their lack of knowledge and information about HIV-AIDS or the lack of access to HIV prevention services.<sup>15</sup> This is in oppose to the situation in the early stage of the epidemic, where there was an increase in the vulnerability of individuals who were more educated and had a good knowledge of HIV/AIDS for HIV infection.<sup>5</sup> This study found that there was a strong significant association between knowledge of HIV/AIDS and good knowledge of HIV/AIDS was a high risk to be infected. We suggest that good knowledge and also high level of awareness do not necessarily indicate a low risk of being infected. Some individuals may have actively sought knowledge because of their high-risk status (exp., sex workers), while others may not act on the knowledge they have.

Voluntary Counselling and Testing is an important component for the prevention of HIV, acting as the gateway to treatment, care, and support for people living with HIV. Limited access to VCT centres is available in several large cities only, although VCT is available in most countries now. Due to the far distance to VCT services and transportation barriers as an obstacle, it makes it hard for women to access these services.<sup>16</sup> In terms of VCT access, this study found a significant association between VCT access with HIV/AIDS. Far distance to VCT service has a higher risk of getting/have HIV/AIDS than those who live near the VCT service. However, a few notable reasons made them refuse to do the blood test; the need to discuss with their partner, fear of HIV positive status, and fear of loss of marital security, domestic violence, and confidentiality. These findings were similar to the previous study conducted by Getachew Worku, which reported that better-educated women refused to test more often than others.<sup>17</sup>

The PMTCT program aims to provide medicines, counselling, and psychological support to help mothers safeguard their infants against the virus. We strive at ensuring PMTCT is given to all women who need it, making it our most effective effort to end mother-to-child HIV transmission by 2019 in the hope of achieving the U.N.'s Millennium Development Goal 6. Ensuring that no baby is born with HIV is important to achieve an AIDS-free generation<sup>25</sup>. In the PMTCT service variable, this study found a significant association between PMTCT service programs with HIV/AIDS. Meanwhile, in PMTCT access, there was no significant association between PMTCT accesses with HIV/AIDS. This study found that respondents did not know about PMTCT service programs, live far from PMTCT service, and did not know about PMTCT service as a protective measure against HIV/AIDS. Most of them did not know the location where they could get the PMTCT service and the types of services that PMTCT offers. Lack of promotion of the PMTCT program was one of the critical causes that dampened the public awareness of the program.

Even though many studies have shown there is a significant association between HIV prevention and Tools (condoms use) with HIV/AIDS<sup>26</sup>, this study has found a relatively different result since the majority of the respondents did not use condoms as HIV prevention. This study also

found that there was no significant association between HIV prevention and Tools (condoms use) with HIV/AIDS. There were reasons why the bargaining power of condom use is very low. The most common reason was physical discomfort, thus making them refuse to use a condom. The increased frequency of unprotected sex after the marriage has been dramatically boosted by the implications of infidelity or distrust associated with certain opinions of contraception such as condoms, a pressure to have children, and the imbalance of gender power relations. This led to the increasing inability of women to negotiate safe sex<sup>7</sup>. Due to the imbalance of power in the relationship created by the economic and emotional dependency, women were often unable to protect themselves. However, they were aware of the potential risks exposed by their extra-marital sexual interaction partners.<sup>5</sup> The influence of cultural and religious beliefs, which equated condom use with promiscuity and restriction of the availability of free condoms, resulted in psycho-social barriers to using them. Many opinions in certain countries stated that the use of condoms was strongly associated with marginalized groups such as sex workers. For example, in Morocco, people who asked for condoms were seen as evidence of involvement in immoral sexual activities.<sup>19</sup> Married women were often unable to negotiate condom use for fear of being accused of adultery or resistance to bear children due to the influence of culture and religious beliefs.<sup>27</sup>

This study found a significant association between HIV treatments with HIV. In contrast, the majority of respondents did not know about antiretroviral therapy as HIV treatment and did not know that HIV treatment was unlikely to get HIV/AIDS. A study report in Bangladesh and India found a significant association between HIV treatments (antiretroviral therapy) with HIV/AIDS.<sup>28</sup> Another study in Malang, Indonesia, found a significant relationship between the level of knowledge of HIV/AIDS with the level of adherence to the use of ARV drugs.<sup>29</sup> Lack of information on HIV treatment made the women still think that HIV is a disease that is very frightening and even deadly because they believe that it can never be cured.

Using logistic regression test, marital status, migration, occupation, knowledge about HIV/AIDS, HIV treatment, VCT service program, VCT access, and PMTCT service program were tested. The result showed that the variables of marital status, occupation, knowledge about HIV/AIDS, HIV treatment, and VCT service program were still significantly associated with HIV/AIDS, but the migration variable was non-significant. Regression analysis revealed that marital status (divorced/widowed and married), occupation (businesswomen), good knowledge, and VCT service program were the factors associated with HIV/AIDS. For those who were divorced/widowed, married, businesswomen, possess good knowledge, knew about VCT service and want to do a blood test, did not know about VCT service program but want to do a blood test and did not know about VCT service program and did not want to do blood test were more likely to get/have HIV/AIDS. These findings are similar to those of the previous study in South Africa.<sup>23</sup> They identified the most significant determinant factors of HIV risk in South Africa: knowledge, occupation, and marital status. This study also showed that respondents who did not know about antiretroviral therapy were unlikely to get HIV/AIDS.

## CONCLUSION

It could be concluded from the study that the prevalence of HIV/AIDS was higher among women in West Kalimantan, followed by those divorced/widowed. The study also found that there was a significant association between marital statuses with HIV/AIDS suggesting that



divorced/widowed have a higher risk of having HIV/AIDS followed by the married group. Furthermore, current data around the globe indicates that the incidence of new HIV infection is increasing among married women and girls. This implicates that married women could not decide on safe sex with their partner even when they knew that they would be potentially exposed to HIV due to unsafe sex practices by their spouse.

The number of HIV/AIDS infected women engaged in extra-marital sex was lower than the number of married women infected with HIV/AIDS. It could also be concluded that women with good educational backgrounds were more likely to know about preventing HIV infection and take preventive measures to protect themselves. Thus, the fulfillment of the need to educate women about sex could potentially decrease the number of HIV/AIDS cases.

Adequate programs which provide important information that would enhance young people's awareness and ability to assess their risk of HIV infection correctly, cross-sectorial cooperation to promote the prevention of HIV/AIDS, and the promotion of VCT and PMTCT services are highly needed. The number of HIV/AIDS intervention programs should be expanded beyond the education and information sectors to be able to include skill-building programs for young women and housewives. Such programs should focus on individual empowerment and interpersonal skills that are necessary for safer sexual behaviours. Both husband and wife should be involved in such programs.

## ACKNOWLEDGEMENT

Thanks to all those who have helped carry out this research.

## AUTHORS CONTRIBUTION

NH: Study concept and design, data collection, analysis and interpretation of results, preparation of manuscripts and corresponding author; IS and HA: data collection and preparation of manuscripts.

## FUNDING

This research was carried out with the researcher's personal funds

## CONFLICT OF INTEREST

There is no conflict of interest between the authors.

## REFERENCES

1. Kementerian Kesehatan Indonesia. Pusat Data dan Informasi Kementerian Kesehatan RI. 2019
2. Provincial Health Office. Laporan Tahunan. Dinkes Kalbar 2019; 109-240.
3. KPAD. Rencana Aksi dan Strategi Penanggulangan HIV/AIDS Kabupaten Sambas. Sambas. KPAD 2018;11-9
4. UNAIDS. UNAIDS report on the global AIDS epidemic. Geneva, Switzerland: WHO Library; 2010.
5. Centers for Disease Control and Prevention. HIV and Women. National Center for HIV/AIDS, Viral Hepatitis, STD, and T.B. prevention. 2021

6. UNICEF. Women: at the Heart of the HIV Response for Children. New York, NY, USA: UNICEF; 2018.
7. Raffetti E, Postorino MC, Castelli F, et al. The risk of late or advance presentation of HIV infected patients is still high, associated factors evolve, but impact on overall mortality is vanishing over calendar years: result from the Italian MASTER cohort. *BMC Public Health*. 2016; 16: 1-10.
8. Muyunda B, Musonda P, Mee P, et al. Educational attainment as a predictor of HIV testing uptake among woman of child-bearing age: analysis of 2014 demographic and health survey in Zambia. *Front Public Health*. 2018; 6: 192.
9. Sweya MN, Msuya SE, Mahande MJ, et al. Contraceptive knowledge, sexual behavior, and factors associated with contraceptive use among female undergraduate university students in Kilimanjaro region in Tanzania. *Adolesc Health Med Ther*. 2016; 7: 109-15
10. Deuba K, Ekstrom AM, Tomson G. HIV decline associated with changes in risk behaviours among young key populations in Nepal: analysis of population-based HIV prevalence surveys between 2001 and 2012. *Int J STD AIDS*. 2017; 28 (9):864-75.
11. Abdulkader RS, Goswami K, Rai SK, et al. HIV-risk behaviour among the male migrant factory workers in North Indian City. *Indian J Community Med*. 2015; 40(2): 108-15.
12. Ojikutu BS, Mayer K. HIV prevention among black woman in the US-time for multimodal integrated strategies. *JAMA Netw Open*. 2021; 4(4):e215356.
13. Maulsby CH, Ratnayake A, Hesson D, et al. A Scoping Review of Employment and HIV. *AIDS Behav*. 2020 Oct;24(10):2942-55. doi: 10.1007/s10461-020-02845-x. PMID: 32246357; PMCID: PMC7716244.
14. Kementerian Negara Pemberdayaan Perempuan RI. Pemberdayaan Perempuan dalam Pencegahan Penyebaran HIV-AIDS. Jakarta, Indonesia: Kementerian Negara Pemberdayaan Perempuan Republik Indonesia; 2016.
15. Duarte Marli TC, Parada Cristina MG, Souza LR. Vulnerability of woman living with HIV/aids. *Rev Lat Am Enfermagem*. 2014; 22(1): 68-75
16. Mahato P, Bi Peng, Burgess T. Voluntary counseling and testing (VCT) services and its role in HIV/AIDS preventions and management in Nepal. *South Est Asia Journal of Public Health*. 2014; 3(1):10-6.
17. Gizaw R, Gebremdhin S. Acceptance of HIV counseling and testing among antenatal clinic attendees in Southern Ethiopia. *Ethiop J Health Sci*. 2018; 28 (4):413-22.
18. Kementerian Koordinator Bidang Kesejahteraan Rakyat RI. Pencegahan Penularan dari Ibu ke anak: Program HIV/AIDS. Jakarta, Indonesia: Kementerian Koordinator Bidang Kesejahteraan Rakyat Republik Indonesia; 2017.
19. Astle S, McAllister P, Emanuels S, et al. College students' suggestions for improving sex education in schools beyond 'blah blah blah condoms and STDs. *Sex Education*. 2021; 21(1): 91-105. <https://doi.org/10.1080/14681811.2020.1749044>
20. Naicker N, Kharsany AB, Werner L, et al. Risk Factors for HIV Acquisition in High Risk Women in a Generalized Epidemic Setting. *AIDS Behav*. 2015 Jul;19(7):1305-16. doi: 10.1007/s10461-015-1002-5. PMID: 25662962; PMCID: PMC4506252.
21. Leslie KAA. Factors affecting married, monogamous woman's risk of HIV infection in India: traditional gender roles and husband's high-risk sexual behaviours. *Int Jour of Medicine and Public Health*. 2019; 9 (4): 112-7.
22. Anglewicz P, Reniers G. HIV status, gender, and marriage dynamics among adults in Rural Malawi. *Stud Fam Plann*. 2014 Dec;45(4):415-28. doi: 10.1111/j.1728-4465.2014.00005.x. PMID: 25469927; PMCID: PMC4267682.
23. Anokye R, Acheampong E, Budu-Ainooson A, et al. Knowledge of HIV/AIDS among older adults (50 years and above) in a peri-urban setting: a descriptive cross-sectional study. *BMC Geriatr*. 2019 Nov 11;19(1):304. doi: 10.1186/s12877-019-1335-4. PMID: 31711421; PMCID: PMC6849319.

24. Choudhary HA, Ali Rana A, Altaf S. Knowlade, behaviour and attitudes regarding HIV/AIDS among undergraduate students in an Irish University. *International Journal of Surgery and Medicine*. 2015; 1(2):58-66.
25. CDC. HIV Among Women fact sheet. Atlanta, GA, USA: Centres for Disease Control and Prevention; 2015.
26. Ghoma Linguissi LS, Sagna T, Soubeiga ST, et al. Prevention of mother-to-child transmission (PMTCT) of HIV: a review of the achievements and challenges in Burkina-Faso. *HIV AIDS (Auckl)*. 2019 Jul 24;11:165-77. doi: 10.2147/HIV.S204661. PMID: 31440104; PMCID: PMC6664853.
27. Osuafor GN, Maputle S, Ayiga N, et al. Condom use among married and cohabiting women and its implications for HIV infection in Mahikeng, South Africa. *J Pop Research*. 2018; 35: 41–65. <https://doi.org/10.1007/s12546-017-9195-2>
28. Tao J, Vermund SH, Qian HZ. Association Between Depression and Antiretroviral Therapy Use Among People Living with HIV: A Meta-analysis. *AIDS Behav*. 2018 May;22(5):1542-50. doi: 10.1007/s10461-017-1776-8. PMID: 28439754; PMCID: PMC7942230.
29. Putra DS, Atmadani RN, Hidayati IR. Relationship between knowladge level of HIV/AIDS patient with antiretroviral adherence in primary healthcare service in Malang City. *Jour of HIV/AIDS & Social Services* 2019; 20 (3): 228-45.



This work is licensed under a Creative Commons Attribution Non-Commercial 4.0 International License

---