

Marital status and HIV prevalence among women in Nigeria: Ingredients for evidence-based programming



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SUMMARY

Objective: To assess the influence of marital status and other correlates on HIV infection among women in Nigeria.

Methods: Data were extracted from the 2012 Nigerian population-based HIV/AIDS and reproductive health survey. The survey determined the HIV status of consenting women using standard procedures. Data were weighted and analyzed using descriptive statistics and logistic regression at the 5% significance level.

Results: HIV prevalence among currently married and never married women was 3.4%, but was 5.9% among formerly married women. The odds of HIV infection were found to be 1.8 times higher among formerly married women compared with currently married women (odds ratio (OR) 1.8, 95% confidence interval (CI) 1.3–2.5) and never married women (OR 1.8, 95% CI 1.2–2.6). Also, the odds of HIV infection were 1.5 times higher among women who had made their sexual debut before the age of 15 years (adjusted OR 1.5, 95% CI 1.1–2.1) compared with women who delayed it. The odds of HIV infection were 1.4 times higher among women who had recently had transactional sex (adjusted OR 1.4, 95% CI 1.1–2.0) compared with others.

Conclusion: Being formerly married, under 15 years of age at first sex, and having engaged in transactional sex were found to be the strongest HIV risk factors among women. Besides empowering formerly married women and providing better social security, these women should be targeted in HIV programming and policies.

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1. Introduction

In the earlier years of the HIV/AIDS epidemic, certain sub-populations were classified as being a ‘most-at-risk population’ (MARP) or ‘high-risk group’ (HRG). However, the more recent literature on the epidemiology of the disease has shown that HIV/AIDS is no longer restricted to the commonly classified MARP or HRG, but is also found in the general population.^{1–4} The spread of HIV increased remarkably after the first HIV case was officially reported in Nigeria in 1986, 5 years after the first global report in 1981,⁵ although a declining trend has been reported more

recently.⁶ This is similar to the general experience in Sub-Saharan Africa, for which a reported decline of 33% occurred between 2005 and 2013.⁷ About 91% of the global 3.2 million people living with HIV live in Sub-Saharan Africa.^{8–11}

The periodic national surveys performed among antenatal clinic attendees in Nigeria showed a steady increase in the HIV seroprevalence rate from 1.8% to 4.5% to 5.8% in 1991, 1996, and 2001, respectively, before falling to 5.0% in 2003 and 4.4% in 2005.¹² Also, the 2008 and 2010 sentinel surveys showed HIV prevalence of 4.6%¹² and 4.1%,⁶ respectively. Infection rates were put at 3.3% among young women aged 15–19 years, and at 4.6% in those aged 20–24 years and 5.6% in those aged 25–29 years, described as ‘very high’.⁶ However, a general population survey conducted in 2007 put national HIV prevalence at 3.6%, and the prevalence was higher among females (4.0%) than males (3.2%).⁸ The latest of the national surveys in 2012 showed a slightly lower

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general population HIV prevalence of 3.4% in Nigeria, ranging from 3.2% to 3.6%.⁹ A 2010 national survey of MARPs reported HIV prevalence of 27.4% among brothel-based female sex workers, 21.1% among non-brothel-based female sex workers, 17.2% among men who have sex with men, and 4.2% among injecting drug users.¹³ Although the general population prevalence rate was lower than that of pregnant women and the MARPs, the 3.4% prevalence, which translates to 5.78 million of the 170 million people in Nigeria being infected,¹⁴ calls for serious attention, especially with regard to women, who had a higher prevalence than men (3.6% vs. 3.2%).⁹ This is further corroborated by the fact that while about half of the 33 million people living with HIV around the world as of 2008 were women, 60% of HIV infections in Sub-Saharan Africa, which has about two-thirds of the world's HIV burden, are among women.¹⁵

Biological factors have been reported to have made women more susceptible to contracting HIV.^{16,17} The anatomy of females compared to males and the task of child-bearing has made women more vulnerable to HIV/AIDS.^{15,18} While some have become infected during sexual activity and female genital cutting, others have become infected during delivery of their children. The infection may be passed to the baby through mother-to-child transmission.^{8,9,11,18–22} Previous studies have identified limited educational and employment opportunities, economic dependency, poor sexual negotiation, sexual violence, coercion and feminization of poverty, social norms, and other socio-cultural practices such as early marriage and forced marriage, as factors responsible for the higher likelihood of HIV/AIDS among women than men.^{17,23,24}

Researchers worldwide have identified marital status as one of the factors affecting HIV positivity,^{4,25,26} but detailed reports on the relationship between HIV prevalence and the marital status of women in Nigeria are scarce. Specifically, a 2009 joint report by the Joint United Nations Programme on HIV/AIDS (UNAIDS) and the World Health Organization (WHO) indicated that divorced, separated, or widowed women were more likely to be HIV-infected than single, married, or cohabitating women.¹⁷ The findings of recent studies in Guinea, Tanzania, and elsewhere have suggested a similar pattern, with divorced or widowed women more often being HIV-infected.^{3,27–30}

The Nigerian government has made some proactive efforts to confront the scourge of HIV with an overarching strategy in the form of a bottom-up policy for stakeholders and a multi-sector National Strategic Plan (NSP). The NSP originally aimed to halt and begin to reverse the spread of HIV infection, as well as mitigate the impact of HIV/AIDS, by 2015. However, there was no plan in place for sub-groups within the sub-population of women. This is probably due to the fact that differences in HIV risks among female sub-groups have not been fully explored and brought to prominence. The plans should have been population-based and specific to population sub-groups, but the planners had insufficient evidence-based information.

The aim of this study was therefore to provide evidence-based information on the relationship between HIV prevalence and marital status in the sub-population of women. The study also sought to identify other HIV risk factors among women in relation to their marital status. The outcomes of this study will provide useful information for HIV programmers and policymakers, as well as all stakeholders in HIV, health, and quality of life for women in Nigeria.

2. Methods

Data from the 2012 National HIV/AIDS and Reproductive Health and Serological Survey (NARHS Plus) were used. This was a cross-sectional survey of men and women of reproductive age living in households in rural and urban areas in all 36 states and the Federal

Capital Territory (FCT) of Nigeria. The survey contained both behavioural and serological components.

Multi-stage cluster sampling was used to select eligible persons. Stage 1 comprised the selection of rural and urban wards from each state and the FCT. Stage 2 involved the selection of 30 Enumeration Areas (EA) within each of the selected rural and urban wards. Stage 3 involved the selection of households. Thirty-two individual women representing each household in each EA were selected at stage 4 for interview.

Pre-tested structured questionnaires consisting of questions adapted from the UNAIDS general population HIV/AIDS indicators and the Demographic and Health Survey questionnaires were administered to the women. Enumerators, including HIV counselors/testers recruited in their localities, were versed in both English and the local languages of the communities from which they collected the data. They were trained with the aim of acquainting them with the survey instruments and methodologies prior to the survey.

2.1. HIV status testing and validation

A linked anonymous testing approach with the provision of test results was adopted in the survey. Informed consent was obtained from all participants after detailed counselling. The testing algorithm consisted of the collection of five blood spots from a finger prick on the same filter paper card; these were stored as dried blood spots (DBS). STAT-PAK and Determine rapid test kits were used for on-the-spot testing with the immediate provision of test results. All survey instruments including the DBS and the questionnaire were linked anonymously using a unique random identification number. For quality control, all positive samples, all discordant samples from rapid testing in the field, and a randomly selected sample of 10% of all negatives were re-tested at the central laboratory using ELISA and Western blot as the decider.

2.2. Data

In all, 24 115 of 31 235 participants in the behavioural component of the survey consented to HIV testing and had valid HIV test results. All analyses involving HIV status in the present study were based on the 11 946 women with both behavioural survey results and valid HIV test results.

2.2.1. Dependent variable

The outcome variable of interest in this study was the HIV serostatus test result obtained from women who were interviewed and consented to HIV testing. A reactive HIV test was coded '1' and non-reactive outcomes as '0'.

2.2.2. Independent variables

The independent variables used in this study were based on those in the basic existing literature,^{1,4,9,25,26} and included the following socio-demographic characteristics: marital status, location of residence, educational attainment, religion, geopolitical zone, age, tribe, self-reported sexual behaviour within the 12 months preceding the survey, age at first sex, experience of sexually transmitted infections (STIs), current use of contraceptives, multiple partnering, transactional sex, i.e., sex in exchange for gifts/favours, knowledge of HIV prevention, and knowledge of HIV transmission. Marital status was grouped into 'never married', 'currently married/cohabiting', and 'formerly married' (i.e., separated, divorced, or widowed).

2.3. Statistical analyses

Descriptive statistics were used to show the distribution of the women's socio-demographic and sexual and reproductive health

characteristics. Bivariate analyses were performed to assess the significance of the relationship between HIV status and the explanatory variables using Pearson's Chi-square test. While controlling for the effects of other characteristics, multiple logistic regression was used to assess a possible relationship between HIV status and marital status. Three logistic regression models were fitted. The first included HIV prevalence and socio-demographic variables. In the second model, knowledge of HIV transmission and prevention was added to the first model, while the third model consisted of the first two models in addition to the women's sexual and reproductive health behaviour. The Hosmer and Lemeshow statistic was used to select the best model.³¹ The data were weighted and statistical tests were carried out at the 5% significance level.

3. Results

The mean age of the total study population of women was 29.2 ± 9.5 years; it was 20.5 ± 5.5 years for those who had never married, 31.6 ± 8.6 years for those currently married/cohabiting, and 38.6 ± 8.7 years for those who were formerly married. About two thirds (69.8%) of the women were currently married/cohabiting, while 24.6% were formerly married.

HIV prevalence was highest among those who were formerly married at 5.9%, compared with 3.4% among currently married/cohabiting women and 3.4% among never married women (Figure 1). About 16.0% of the never married women had engaged in transactional sex within the 12 months preceding the survey, compared with 3.7% among currently married/cohabiting women and 6.3% among formerly married women. Nearly one fifth (19.1%) of the never married women had had multiple sex partners against 7.1% among the currently married/cohabiting and 10.7% among the formerly married. The same proportions of currently married/cohabiting (7.3%) and formerly married women (7.3%) had experienced at least one sexually transmitted disease within the 12 months preceding the survey, compared with 21.3% among the never married women (Table 1).

The results of the bivariate analysis are shown in Table 2. HIV status was significantly associated with marital status. Also, HIV status was significantly associated with geographical region, educational attainment, tribe, religion, age at first sex, having multiple sex partners, having had an STI, and knowledge of HIV transmission and prevention. By geopolitical zone, the highest prevalence was in the South South (5.5%) and the lowest in the South East (2.5%). HIV was more prevalent among women with a primary (4.5%) or secondary (4.2%) education than among those of other educational levels, and was also more prevalent among women who had experienced an STI within the 12 months before

the survey than in those who had not (5.3% vs. 3.5%). Furthermore, HIV was more prevalent among women who knew all five modes of HIV transmission than in those who did not (4.1% vs. 3.3%) and among those who were currently using contraceptives than in those who were not (4.2% vs. 3.3%).

The relationship between the characteristics of the women and HIV prevalence according to their marital status is presented in Table 3. HIV prevalence was highest among formerly married women in the North East zone (13.7%) and also among formerly married women whose highest educational attainment was Qur'anic education (18.8%). Unlike among formerly married and currently married women for whom HIV prevalence increased with age before declining, the prevalence increased consistently with increasing age in the never married women. Formerly married women aged 20–24 years had the highest prevalence (10.0%).

The outcome of the ordinary logistic model of HIV status fitted on marital status showed that the odds of HIV infection were 1.8 times higher among formerly married women compared with currently married women (odds ratio (OR) 1.8, 95% confidence interval (CI) 1.3–2.5) and never married women (OR 1.8, 95% CI 1.2–2.6) (not shown in the tables).

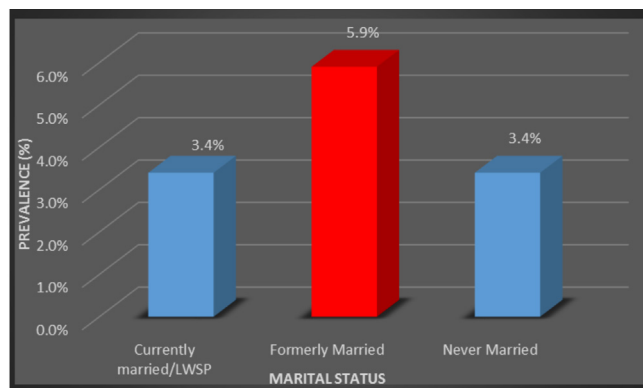
Table 4 presents the findings from the three models fitted in this study. A significant association was found between HIV prevalence and marital status while controlling for other variables. The odds of HIV infection were 1.9 times higher among formerly married women compared with never married women (adjusted OR (aOR) 1.9, 95% CI 1.3–3.1), but the odds of HIV infection were not significantly different among those currently married or cohabiting with sexual partners and the never married women. HIV infection was significantly related to geographical location: women from the North East zone (aOR 2.4, 95% CI 1.4–4.0) and North West zone (aOR 2.6, 95% CI 1.5–4.7) had higher odds of HIV infection of about 2.5 times compared with women from the South West.

In model 2, marital status remained significant, but neither knowledge of HIV prevention nor knowledge of HIV transmission modes was significantly associated with HIV status. After controlling for sexual behaviour indicators in addition to variables in model 2, marital status, geopolitical zone, education, and ethnicity were significantly associated with HIV status in model 3. However, current use of contraceptives, having multiple sexual partners, and having experienced an STI were not significant for HIV infection. The Hosmer and Lemeshow statistic showed that model 3 was the model with the best fit.

4. Discussion

In this study, the role of marital status in a woman's vulnerability to HIV in Nigeria was explored. Wide differences in prevalence and determinants of HIV were found by marital status of the women. Marital status was significantly associated with the seroprevalence of HIV. Furthermore, the influence of marital status on HIV prevalence only reduced slightly when adjustments were made for some confounding characteristics. These characteristics included age at first sex, having transactional sex, geopolitical zone of residence, education, ethnicity, and current use of contraceptives. Interestingly, knowledge of HIV transmission and prevention were not associated with HIV status.

HIV is more prevalent among formerly married women compared with the never married and currently married women in Nigeria. This finding is consistent with the findings of previous studies.^{1,3,25} For instance, Adebayo et al. reported a "disproportionate HIV prevalence across differential marital levels with formerly married women worst affected".¹ The big question is: why would formerly married women be more at risk of HIV than



LWSP, living with sexual partner.

Figure 1. HIV prevalence by marital status among women.

Table 1
Distribution of study participants by marital status, background, and sexual characteristics

Variable	Categories	Currently married/LWSP	Formerly married	Never married	Number
HIV test result	Negative	96.6	94.1	96.6	11 521
	Positive	3.4	5.9	3.4	425
Zone	North Central	14.1	13.9	13.5	2910
	North East	13.6	7.5	7.7	2322
	North West	27.2	13.5	11.1	2998
	South East	9.6	19.1	21.9	2225
	South South	14.0	21.7	22.3	2520
	South West	21.6	24.4	23.4	2465
Location	Urban	33.8	31.5	41.4	4845
	Rural	66.2	68.5	58.6	10 595
Education	No formal education	36.0	35.8	7.2	319
	Qur'anic only	7.8	2.7	2.0	81
	Primary	18.3	26.6	8.9	362
	Secondary	29.5	26.7	66.8	2517
	Higher	8.3	8.2	15.0	570
Wealth quintiles	Lowest	24.5	21.4	11.3	526
	Lower	20.9	26.1	14.6	634
	Middle	17.8	21.1	22.1	887
	Higher	18.0	17.1	24.4	906
	Highest	18.7	14.2	27.5	894
Age group, years	15–19	5.9	1.7	53.1	2729
	20–24	15.0	6.4	27.0	2772
	25–34	41.4	20.1	16.8	5196
	35–49	37.8	71.7	3.1	4743
Religion	Muslim	50.5	26.4	24.6	6434
	Christian	48.3	70.9	74.7	8815
	Other	1.1	2.7	0.7	191
	Hausa/Fulani	32.9	13.8	11.2	3885
Tribe	Igbo	13.3	23.0	27.6	2671
	Yoruba	18.7	23.3	21.0	2513
	Other	35.1	40.0	40.3	6371
	<15 years	11.6	8.4	3.1	1482
Age at first sex	≥15 years	75.2	71.0	32.9	9688
	Never	0.8	0.9	60.2	2364
	Can't remember	12.4	19.6	3.7	1645
	Yes	12.8	9.4	14.0	1990
Currently use contraceptives	No	83.2	90.6	86.0	13 450
	Yes	3.7	6.3	16.0	736
Transactional sex	No	96.3	93.7	84.0	12 109
	Yes	7.1	10.7	19.1	1199
Multiple sex partners	No	92.9	89.3	80.9	11 793
	Yes	92.4	92.7	78.7	11 943
Experienced STI	Yes	7.6	7.3	21.3	1213
	No	92.4	92.7	78.7	11 943
Knowledge of the 5 HIV transmission routes	Don't know all 5	78.8	79.0	70.1	11 945
	Know all 5	21.2	21.0	29.9	3495
Knowledge of the 2 HIV prevention methods	Don't know the 2	50.6	48.8	37.3	7526
	Know the 2	49.4	51.2	62.7	7914
Total		68.9	5.6	24.8	15 440

LWSP, living with sexual partner; STI, sexually transmitted infection.

other women? Could it be linked to the affordability and accessibility of contraceptives? Adebayo et al. attributed their finding to a lack of economic independence, lack of formal education, and low knowledge about HIV transmission and prevention, which could result in a poor ability or inability to negotiate safe sex among the formerly married women. In the same vein, a US study established a significant association between marital status and HIV/AIDS-related death. The authors attributed the association to the health care system that historically disadvantaged the poor.⁴ This can also be said of formerly married women, generally known to have lower purchasing power than married women. In consonance with the existing literature,^{4,25} the findings of the current study suggest that matrimony plays a huge role in hindering the spread of HIV, as married women were found to have a lower prevalence of HIV infection than formerly married women.

The use of contraceptives was generally lower among formerly married women than among other women, although HIV was higher among current users. The two major problems associated with the use of contraceptives are affordability and accessibility. These constitute major barriers to HIV prevention among formerly married

women.^{11,32} On the one hand, these women may lack the financial power to obtain contraceptives such as condoms; on the other, it might be very difficult for them to buy condoms because society may not look favourably on a 'single' woman buying condoms. This is corroborated in a review article on the barriers to health services.³³ Being a formerly married woman would make it more difficult and nearly impossible to obtain condoms in a public place in Nigeria.

The disparity in HIV status by women's marital status found in the current study has further shown that women of different social and marital status are accorded differential social treatment in the African setting. It has been reported in a previous study that while widows are not properly catered for in Africa,^{34,35} separated and divorced women are often treated with disdain.³⁶ The case of formerly married women is complex. These groups of women constitute high HIV risk groups as they are often exploited sexually by men through deception, offering financial support. As well as the likely inability to negotiate safer sex, these women may be unable to vouch for the trust of their partners. It is not unlikely that a formerly married woman and her sexual partner will both have multiple sexual partners, and this increases her vulnerability to HIV.

Table 2
HIV prevalence in the women by selected characteristics

Variable	Categories	HIV prevalence	p-Value ^a
Marital status	Currently married/LWSP	3.4	0.002
	Formerly married	5.9	
	Never married	3.4	
Wealth quintile	Lowest	2.8	0.151
	Lower	3.3	
	Middle	3.8	
	Higher	4.1	
	Highest	3.5	
	North Central	3.9	
North East	3.7		
North West	2.8		
South East	2.5		
South South	5.5		
South West	2.9		
Location	Urban	3.4	0.678
	Rural	3.6	
Education	No formal education	2.2	<0.001
	Qur'anic only	2.0	
	Primary	4.5	
	Secondary	4.2	
	Higher	3.5	
Age group, years	15–19	2.9	0.229
	20–24	3.7	
	25–34	3.9	
	35–49	3.4	
Religion	Muslim	2.6	<0.001
	Christian	4.2	
	Other	2.4	
Tribe	Hausa/Fulani	2.1	<0.001
	Igbo	3.2	
	Yoruba	2.9	
	Other	4.8	
Age at first sex	<15 years	3.4	0.05
	≥15 years	3.8	
	Never	2.5	
	Can't remember	3.5	
Currently use contraceptives	Yes	4.2	0.112
	No	3.3	
Had transactional sex	Yes	4.9	0.129
	No	3.6	
Had multiple sex partners	Yes	5.4	0.008
	No	3.5	
Experienced STI	No	3.5	0.004
	Yes	5.3	
Knowledge of the 5 HIV transmission routes	Don't know all 5	3.3	0.002
	Know all 5	4.1	
Knowledge of the 2 HIV prevention methods	Don't know the 2	3.1	0.012
	Know the 2	3.9	
	Total	3.4	

LWSP, living with sexual partner; STI, sexually transmitted infection.

^a p-Values are based on Pearson's Chi-square test.

Neither knowledge of HIV prevention nor knowledge of HIV transmission modes was significantly associated with HIV status. This was not unexpected, since HIV was found to be more prevalent among women using contraceptives. This finding gives credence to a previous article by Fagbamigbe et al., which reported that marital status was not significant to perceptions of women in Nigeria concerning the modes by which they could become infected with HIV.¹⁰ This implies that the socio-demographic characteristics that were significant at the bivariate level could totally explain the association between HIV status and the women's marital status. Among these are educational attainment, geopolitical zone, ethnicity, age at sexual debut, and having engaged in transactional sex. Women with no formal education were less likely to be HIV-positive, and the more educated a woman was, the higher her chances of contracting HIV. This could further explain why knowledge of HIV transmission and prevention were not significant

Table 3
Distribution of HIV by marital status and selected characteristics of the women

Variable	Currently married/LWSP	Formerly married	Never married
Zone			
North Central	4.0 ^a	7.3 ^a	2.7 ^a
North East	3.1	13.7	4.2
North West	2.9	1.4	2.3
South East	2.6	1.7	2.3
South South	5.6	5.6	5.2
South West	2.3	7.5	3.0
Location			
Urban	3.3	7.0	3.0
Rural	3.4	5.4	3.7
Education			
No formal education	2.0 ^a	5.2	2.0
Qur'anic only	1.5	18.8	2.5
Primary	4.2	6.0	4.4
Secondary	4.6	6.4	3.3
Higher	3.4	3.6	3.8
Wealth index (quintiles)			
Lowest	2.4 ^a	5.6	3.9
Lower	3.0	7.1	3.3
Middle	4.0	5.4	3.4
Higher	3.8	7.8	3.9
Highest	3.9	3.1	2.8
Age group (years)			
15–19	1.9	0.0	3.1
20–24	3.7	10.0	3.5
25–34	3.8	6.5	4.0
35–49	3.0	5.6	4.7
Religion			
Muslim	2.5 ^a	7.0	2.3
Christian	4.2	5.8	3.7
Other	2.3	0.0	5.6
Tribe			
Hausa/Fulani	2.1 ^a	4.1 ^a	1.6 ^a
Igbo	3.8	2.0	2.6
Yoruba	2.3	7.9	3.2
Other	4.7	7.3	4.4
Age at first sex			
<15 years	3.5	5.7	1.1 ^a
≥15 years	3.4	6.0	5.5
Never	3.2	0.0	2.5
Can't remember	3.3	6.3	1.7
Currently use contraceptives			
Yes	4.3	11.1 ^a	2.9
No	3.3	5.3	3.5
Had transactional sex			
Yes	3.8	5.6	6.7
No	3.3	5.8	4.2
Had multiple sex partners			
Yes	5.2 ^a	7.0	5.1
No	3.2	5.9	4.6
Experienced STI			
No	3.2 ^a	5.2 ^a	4.8
Yes	5.4	13.8	3.2
Knowledge of the 5 HIV transmission routes			
Don't know all 5	3.0 ^a	5.2	3.9 ^a
Know all 5	4.6	8.6	2.3
Knowledge of the 2 HIV prevention methods			
Don't know the 2	2.8 ^a	5.8	3.5
Know the 2	3.9	6.1	3.4
Total	3.4	5.9	3.4

LWSP, living with sexual partner; STI, sexually transmitted infection.

^a Significant at 5%.

with regard to the women's HIV status. Although this finding is in agreement with the outcomes of an earlier study in Nigeria,¹ it is at variance with a study performed in Pakistan.³ Women who had initiated sexual activity before the age of 15 years were more vulnerable to HIV than their peers who were older than 15 years of age at first sex. There is need to encourage girls to delay their sexual debut.

In conclusion, the odds of been HIV-infected were two times higher among formerly married women compared with other

Table 4
Multiple logistic regression of determinants of HIV prevalence

Variable	Model 1			Model 2			Model 3		
	aOR	95% CI		aOR	95% CI		aOR	95% CI	
		Lower	Upper		Lower	Upper		Lower	Upper
Marital status									
Never married	1.000	Ref.							
Currently married/LWSP	1.063	0.967	1.171	1.065	0.970	1.171	0.872 ^a	0.774	0.982
Formerly married	1.976 ^a	1.259	3.106	1.980 ^a	1.263	3.115	1.565 ^a	1.136	2.618
Wealth quintile									
Lowest	0.876	0.570	1.346	0.879	0.571	1.353	0.860	0.520	1.420
Lower	0.953	0.648	1.402	0.958	0.650	1.410	1.058	0.682	1.640
Middle	1.044	0.744	1.465	1.049	0.747	1.473	1.063	0.723	1.563
Higher	1.129	0.826	1.544	1.134	0.829	1.551	1.019	0.713	1.457
Highest	1.000	Ref.							
Zone									
North Central	1.630 ^a	1.024	2.596	1.633 ^a	1.026	2.601	1.696	0.989	2.909
North East	2.348 ^a	1.368	4.028	2.334 ^a	1.360	4.007	2.361 ^a	1.248	4.467
North West	2.628 ^a	1.481	4.664	2.613 ^a	1.471	4.642	3.034 ^a	1.582	5.819
South East	0.583	0.317	1.074	0.579	0.315	1.067	0.558	0.281	1.105
South South	1.779 ^a	1.110	2.851	1.780 ^a	1.109	2.854	1.916 ^a	1.108	3.312
South West	1.000	Ref.							
Location									
Urban	0.909	0.691	1.196	0.909	0.690	1.196	0.955	0.700	1.303
Rural	1.000	Ref.							
Education									
No formal education	0.659 ^a	0.405	0.990	0.658	0.406	1.068	0.624	0.357	1.091
Qur'anic only	0.654	0.320	1.337	0.657	0.321	1.347	0.605	0.276	1.329
Primary	1.234	0.816	1.867	1.245	0.820	1.890	1.358	0.852	2.163
Secondary	1.230	0.856	1.765	1.238	0.862	1.780	1.323	0.885	1.977
Higher	1.000	Ref.							
Age, years									
15–19	0.839	0.552	1.274	0.840	0.553	1.277	0.996	0.602	1.645
20–24	1.143	0.825	1.584	1.146	0.827	1.588	0.996	0.691	1.434
25–34	1.195	0.927	1.541	1.198	0.929	1.544	1.118	0.849	1.473
35–49	1.000	Ref.							
Religion									
Muslim	1.484	0.419	5.249	1.486	0.420	5.258	1.546	0.335	7.136
Christian	1.659	0.477	5.769	1.659	0.477	5.772	1.608	0.355	7.278
Other	1.000	Ref.							
Tribe									
Hausa/Fulani	0.487 ^a	0.307	0.774	0.488 ^a	0.307	0.777	0.576 ^a	0.338	0.979
Igbo	1.330	0.857	2.065	1.334	0.859	2.072	1.943 ^a	1.204	3.138
Yoruba	0.988	0.622	1.570	0.995	0.626	1.583	1.137	0.663	1.949
Other	1.000	Ref.							
Know both methods of HIV prevention									
Yes				0.958	0.746	1.231	0.995	0.681	1.454
No				1.000	Ref.				
Know five methods of HIV transmission									
Yes				1.081	0.833	1.402	0.882	0.551	1.412
No				1.000	Ref.				
Age at first sex									
<15 years							1.481 ^a	1.033	2.124
≥15 years							1.000	Ref.	
Currently use contraceptives									
Yes							1.289	1.105	1.556
No							1.000	Ref.	
Had transactional sex									
Yes							1.419 ^a	1.022	1.972
No							1.000	Ref.	
Had multiple sex partners									
Yes							0.957	0.713	1.284
No							1.000	Ref.	
Had STI									
Yes							1.170	0.878	1.558
No							1.000	Ref.	

aOR, adjusted odds ratio; CI, confidence interval; LWSP, living with sexual partner; STI, sexually transmitted infection.

^a Significant at 5%.

women. These women deserve more focused attention considering the higher HIV prevalence recorded among them, as well as their vulnerability in society. The formerly married women sub-group might soon become one of the 'most-at-risk groups' if they are left unattended to. The continual neglect of formerly married women in HIV intervention programmes in Nigeria could worsen their HIV/AIDS morbidity and mortality. A US study has already reported that

marital status is associated with death from HIV/AIDS.⁴ Efforts must therefore be made to reach all women and particularly this key group in areas of HIV transmission and prevention. Furthermore, as well as empowering the formerly married women and providing them with better social security, the government and other stakeholders should also direct HIV programming and policies to focus on these women. It is recommended that HIV programming

should consist of a special focus on formerly married women with a view to sensitizing them to the risk of HIV infection within their socio-cultural milieu in order to increase the effectiveness of prevention strategies.

A large nationally representative dataset that includes women of diverse characteristics in Nigeria was used to arrive at these conclusions. The data used for this study were cross-sectional, thus a causal relationship could not be established and the data might be subject to recall bias. It was impossible to determine the women's marital status at the onset of HIV infection, so current marital status was used as a proxy. It is therefore not unlikely that some formerly married women became infected before or during marriage. Also, it could not be ascertained whether the formerly married women's partners had died of HIV/AIDS, or whether the women were divorced as a result of their former spouse's HIV status. This leaves a gap for further research.

The data used for this study are readily available at Federal Ministry of Health, Abuja, Nigeria.

Author contributions

AFF and SBA jointly designed the study; AFF analyzed the data, wrote the results and contributed to the introduction and discussion; SBA and EA contributed to the introduction and discussion; all authors read and approved the final version of the manuscript.

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