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Original Article

Predictors of HIV Testing Among Pregnant Women aged 15-49 Years in Nigeria

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Abstract

Background: The utilization of HIV testing services in Nigeria has not been optimal due to socioeconomic and demographic factors such as educational level, place of residence, and religion. For Nigeria to achieve epidemic control, pregnant women need to know their HIV status through HIV testing, which is the gateway to HIV prevention, care, support, and treatment services. Therefore, the purpose of this study was to determine the predictors of HIV testing among Nigerian pregnant women aged 15-49 years HIV testing during antenatal visits or childbirth.

Methodology: Secondary data analyses of 659 pregnant women randomly selected from the multiple imputation datasets of the 2013 Nigeria Demographic and Health Survey (NDHS)were done using SPSS version 25. Data on socio-demographic characteristics, HIV stigmatizing attitudes, and HIV testing were retrieved from the dataset for the study. Bivariate and multivariate regression analyses were done to determine the predictors of HIV testing.

Results: The prevalence of self-reported HIV testing and receiving results among women of reproductive age was 36.72%. Bivariate model findings showed that educational level, place of residence, and religion were statistically significant predictors of HIV testing among pregnant women. Only educational level and place of residence significantly predicted pregnant women's HIV testing in the parsimonious multivariable regression model. Pregnant women with higher levels of education (Primary Education, AOR, 1.85; 95% CI, 1.07,3.19; Secondary Education, AOR, 3.75; 95% CI:1.93, 7.28; Higher Education, AOR, 11.23; 95% CI: 4.40, 28.68) and those living in urban areas (AOR, 1.60: 95% CI:1.03, 2.47) were more likely to test for HIV than those with no education and those living in the rural areas.

Conclusion: This study identified having a higher level of education and living in urban areas as predictors of HIV testing, therefore, more efforts are needed to have women with lower levels of education and those living in rural areas test for HIV as a strategy for the elimination of mother-to-child transmission of HIV.

Keywords: Antenatal Visits, HIV Testing, Predictors, Pregnant Women, Nigeria

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Introduction

According to The Joint United Nations Programme on HIV/AIDS (UNAIDS), globally,37.7 million people were HIV-positive at the end of 2020.[1]Global new HIV infections and HIV-related deaths in 2020 were 1.5 million and 0.68 million, respectively.[1]UNAIDS in 2014 set a global 90-90-90 target for ending the HIV epidemics.[2]These targets require that by the year 2020, 90% of people globally living with HIV should know their HIV status (1st 90),90% of all people with diagnosed HIV infection should be on antiretroviral treatment(2nd 90), while90% of all people receiving antiretroviral treatment should have viral suppression (3rd 90).[2]The global performances on these 90-90-90 targets set by UNAIDS to end the HIV epidemic showed that at the end of2020,84 %of all the people globally living with HIV knew their status (1st 90); 73% were on treatment (2nd 90), while 66% were virally suppressed (3rd 90).[1] Sub-Saharan Africa accounted for the highest burden of HIV infection, with an estimated two-thirds of all global HIV cases and 58% of global new HIV infections in 2020.[1] Women aged 15 years and above accounted for approximately 60% of the estimated 4.7 million HIV-positive people in West and Central Africain 2020.[1]

Nigeria is ranked fourth globally regarding the burden of HIV, with an estimated 1.7 million people living with HIV/AIDS in 2020.[1] The prevalence rate of HIV infection was 1.3% for ages 15-49 years, with women accounting for most of the infections (1.6%) compared to men (1.0%) within the same period.[1][3]Also, in 2020, the new infection rate for women aged 15-49 years was 0.98 per 1000 population.[1] The trend of the HIV epidemic in Nigeria showed a decline in HIV prevalence from 5.8% in 1991 to 1.3% in 2020 for all adults aged 15-49 years.[1][3]For Nigeria to achieve epidemic control of HIV by 2020, it must meet the UNAIDS 90-90-90 target, requiring that 90% of people living with HIV know their HIV status by 2020.[2] Achievement of these targets showed that by the end of 2020, of the estimated 1.7 million Nigerians living with HIV, 1.6 million (90%) of them knew their HIV status, with 1.5 million (86%) of them were on antiretroviral treatment, while1.2 million (72%) were virally suppressed.[1] These achievements by Nigeria on the UNAIDS 90-90-90 targets showed some gaps to be met for Nigeria to achieve HIV epidemic control.

HIV testing is a leading strategy and the route to prevention, treatment, care, and support services for HIV/AIDS.[4]It is the process through which individuals know their HIV status after being counseled in a confidential setting to make an informed decision about whether to test for HIV.[4]Knowing one's HIV status helps individuals who are positive to seek care and treatment, while those who are negative will continue to engage in preventive behaviors to avoid contracting the virus.[4] Women of reproductive age15-49 years constituted the majority of people infected with HIV (56%) in Nigeria.[1] They are also responsible for population growth through reproduction. Therefore, it is important that they know their HIV status to take appropriate steps to prevent transmitting the infection to their children. These strategies for HIV prevention start with pregnant women knowing their HIV status through HIV testing. Although Nigeria's HIV prevalence rate among women of reproductive age does not differ from that of other neighboring West African countries such as Sierra Leone, Liberia, and Niger, the burden of HIV is higher in Nigeria because of its large population.[1][5]Also, the reported new infection rate among women of reproductive age was higher in Nigeria than in these other countries.[1]Many studies have reported the predictors of HIV testing among pregnant women and women of reproductive age 15-49 years. They include educational level, age categories, religion, place of residence, marital status, stigmatizing attitudes of the pregnant women, knowledge of discriminatory practices against a person living with HIV/AIDS, HIV/AIDS-related knowledge, proximity to the HIV testing center, and confidentiality.[6][7][8][9][10][11]This study addressed the literature gap of women who had ever experienced pregnancy, tested for HIV, and received their test results to know their status. Many of the studies only addressed the issue of HIV testing without stating if the women received their test results to know their status.

HIV testing services serve as the gateway to prevention, care, support, and treatment services.[2]Therefore, they act as the avenue for early identification of HIV-infected pregnant women and their linkage to treatment to reduce their infectivity and the chances of transmitting the virus to their children.[4][12]Nigeria practices the Opt-out model of HIV testing during antenatal care services. The Opt-Out Approach is a model that requires all pregnant women visiting the antenatal clinics for the first time to be counseled about the importance of knowing one's HIV status, including the danger of mother-to-child transmission of HIV.[13] The mandatory provision of information on HIV/AIDS to pregnant women about the risks of not testing and the benefits of testing for HIV may impact their readiness to test and testing decisions.[5]Therefore, the objective of this study was to identify predictors of HIV testing among pregnant women of reproductive age 15-49 years in Nigeria.

Methodology

Ethics

We requested permission to use the dataset, which was granted for me to download the data for the study from https://www.dhsprogram.com/data/dataset_admin /index.cfm. The procedure approved by the Institution Review Board for DHS public-use datasets does not permit respondents, households, or sample communities to be identified. The data files do not contain personal identifiers of individuals or households.

Study design

This study was a secondary analysis of the 2013 Nigerian Demographic and Health Survey (NDHS) data of pregnant women aged 15-49 years. The 2013 NDHS was a cross-sectional nationally representative study that used a three-stage stratified cluster design to select the study participants in Nigeria and collect data on the variables of interest using pretested questionnaires.[14]The detailed 2013 survey methodology has been described elsewhere.[14]

Variables Measure

Stigmatizing attitudes of the pregnant women were coded by combining the following seven questions: (1) "Would you buy fresh vegetables from a vendor who has the AIDS virus?" (2) "If a member of your family got infected with the virus that causes AIDS, would you want it to remain a secret or not?" (3) "If a relative of yours became sick with the virus that causes AIDS, would you be willing to care for her or him in your own household?" (4) "If a female teacher has the AIDS virus, should she be allowed to continue teaching in school?" And (5) "Should children aged 12-14 be taught about using a condom to avoid AIDS?" (6) "People with the AIDS virus should be ashamed of themselves" (7) People with the AIDS virus should be blamed for bringing the disease into the community. Stigmatizing attitudes were graded as positive or negative. For the stigmatizing attitudes questions, a score of one (1) was assigned to a positive answer (non-stigmatizing response) and zero (0) for a negative answer (stigmatizing response). A positive answer can be Yes or No to the questions depending on whether the answer is stigmatizing or not and was scored as 1 while a negative answer can also be Yes or No and was scored 0. The scores were summed up to obtain an overall score for each respondent. Respondents scoring less than the mean score for attitudes were classified as having negative attitudes = 0, while those scoring equal or above the mean score were classified as having positive attitudes = 1. The participant's mean score of .56 (56%) ± was taken as the cut-point. Age categories were categorized into age bands of five-year intervals from 15 to 49 years and numbered in ascending order. Education; No education = 0, primary = 1, secondary = 2, higher = 3. Education was recorded as No education = 0, primary = 1, secondary = 2, higher. Place of Residence was coded as Urban = 1and Rural = 2. Religion was coded as Catholic = 1, Other Christians = 2, Islam = 3, Traditionalist = 4, Others 97. Marital status categories were recoded as Currently Married

(combining married and living with a partner as if married options) = 1, Not currently Married (combining other options) = 0. A combination of four questions was used to create the dependent variable from the responses of the pregnant women who participated in the 2013 NDHS as follows: 1. Did you test for HIV as part of antenatal visits? 2. Did you test for HIV between the time you went for delivery and before the baby was born? 3. Did you get the results of the HIV test as part of antenatal visits? 4. Did you get the results of your HIV test before the baby was born? The binary dependent variable "Self-reported HIV testing by pregnant women aged 15-49 years was coded as; No=0 if the respondent did not test, tested but did not receive the result, and Yes= if the respondent tested and received a result during antenatal visits or childbirth. The pregnant women sample was created from the sample of women of reproductive age by combining three questions: Total child ever born + currently pregnant +ever had a terminated pregnancy. Ever giving birth and a yes answer to currently pregnant and ever had a terminated pregnancy was coded as pregnant woman = 1, while ever not giving birth and not currently pregnant or never had a terminated pregnancy was coded as Not pregnant = 0.

Data Management and Analysis

Statistical Package for Social Sciences Version 25 was used for the study analysis. The coding's of the study's variables are shown in Table 1. The level of significance was set at Alpha = .05. Descriptive statistics showed cases with missing data on some of the study variables. Little's Missing Completely at Random Test was conducted to determine the missingness of the data.[15] The result shows that missingness was not random (χ^2 (df = 652) = 5,374.55); P-value < .001< Alpha = .05.The missing data was handled by performing multiple imputations using the regression method to account for selection bias due to the non-randomness of the missing data.[16][17]The analysis included 659 pregnant women randomly selected using the SPSS command. Sample weights provided by the DHS were used for the analysis to ensure the representativeness of the survey findings due to the non-proportional allocation of samples to states and places of residence, including the different response rates in the primary study.[14]Bivariate and Multivariable Logistic regression analyses were employed to identify the predictor variables of self-reported HIV testing among pregnant women. Predictor variables that were not statistically significant at Alpha = .05 in the bivariate analysis were omitted from the multivariable regression analysis. Crude and adjusted odds ratios with a 95% confidence interval were reported for the predictor variables relative to their reference categories. Predictor variables with a P-value ≤ 0.05 in the multivariable regression analysis were taken as statistically significantly associated with pregnant women's self-reported HIV testing in Nigeria.

Results

Out of the 659 pregnant women who self-reported either did not test, tested, and did not receive results or tested and received HIV results during antenatal or childbirth, 417 (63.28%) of them did not test or tested and did not receive results, while 242 (36.72%) of them tested and received HIV test. The participants' demographic characteristics are presented below in Table 1. The ages of the pregnant women ranged from 15-49 years and were categorized into seven 5-year groups. Women within 25-29 years had the highest number in the sample,139 (21.09%), while those within 15-19 years had the lowest number in the sample, 38 (5.77%). Pregnant women with no education ranked highest in the sample, 296 (44.92%), while those with higher education were the lowest number, 50 (7.59%). More women lived in rural areas, 412 (62.52%) than in urban areas, 247 (37.48 %). Most pregnant women belong to the Islamic religion, 367 (55.69%), followed by other Christians, 219 (33.29%). Pregnant women who are currently married (i.e., married or living with a man as if they are married) were 394(90.14%) of the sample, while those who are not currently married (Never in a union, widowed, divorced, and no longer living together/separated) were65(9.86%). Women with positive attitudes towards persons living with HIV/AIDS were 402(61.00%), while those with negative attitudes were 257 (39.00%).

Table 1: Sociodemographic Characteristics of the Respondents

Predictors	**Weighted Frequency (n)**	**Weighted Percent (%)**
Educational Level		
No Education	296	44.92
Primary Education	129	19.58
Secondary	184	27.92
Higher Education	50	7.59
Age Categories (Years)		
15-19	38	5.77
20 – 24	112	17.00
25 – 29	139	21.09
30 – 34	115	17.45
35 – 39	101	15.33
40 – 44	82	12.44
45 - 49	72	10.93
Place of Residence		
Urban	247	62.52
Rural	412	37.48
Religion		
Catholic	65	9.86
Other Christian	219	33.23
Islam	367	55.69
Traditional	8	1.21
Marital Status		
Not Currently Married	65	9.86
Currently Married	594	90.14

Predictors	**Weighted Frequency (n)**	**Weighted Percent (%)**
Stigmatizing Attitudes		
Negative Attitudes	257	39.00
Positive Attitudes	402	61.00
HIV Testing		
Did not Test, Tested, and did not Receive Result	417	63.28
Tested and Received HIV Result	242	36.72

Table 2 below shows the result of the bivariate and multivariable regression analysis of the predictor variables' association with self-reported HIV testing of pregnant women. HIV testing by pregnant women was statistically 32significantly associated with educational level, place of residence, and religion at Alpha = 0.05, while age categories, marital status, and HIV/AIDS stigmatizing attitudes were not statistically significant at alpha = 0.05 in the bivariate logistic regression model. The results of parsimonious multivariable logistic regression analysis showed that only educational level and place of residence were significantly associated with self-reported HIV testing of pregnant women.

Table 2: Result of the Bivariate and Multivariable Regression Analysis of the Predictors' Association with Self-reported HIV Testing of Pregnant Women

Predictors	**COR (95% C.I.)**	**AOR (95% C.I.)**
Educational Level		
No Education	*Ref*	*Ref*
Primary Education	2.04** (1.16, 3.46)	1.85** (1.07, 3.19)
Secondary Education	4.45** (2,50, 7.96)	3.75** (1.93,7.28)
Higher Education	14.21** (5.95, 33.93)	11.23** (4.40, 28.68)
Age Categories (Years)		
15-19	*Ref*	*Ref*
20 – 24	2.00* (.28, 14.54)	-
25 – 29	2.56* (.27, 24.73)	-
30 – 34	3.15* (.42, 23.67)	-
35 – 39	2.75* (.33, 23.20)	-

Predictors	COR (95% C.I.)	AOR (95% C.I.)
40 – 44	2.26* (.18, 28.37)	-
45 – 49	2.12* (.20, 23.07)	-
Place of Residence		
Rural	*Ref.*	*Ref.*
Urban	2.67** (1.79, 3.98)	1.60** (1.03, 2.57)
Religion		
Islam	*Ref.*	*Ref*
Catholic	4.67** (2.47, 8.85)	2.61* (.97, 7.06)
Other Christian	2.84** (1.78, 4.52)	1.43* (.86, 2.36)
Marital Status		-
Currently Married	*Ref.*	-
Not Currently Married	1.61* (.87, 2.98)	-
Stigmatizing Attitudes		
Negative Attitude	*Ref*	*Ref*
Positive Attitude	1.47* (.57, 3.76)	-

Note. *p > .05 and **p < .05

Discussion

This study determined the predictors of HIV testing among pregnant women aged15-49 years in Nigeria. Knowledge of HIV status among pregnant women through HIV testing is an essential strategy for preventing mother-to-child transmission of HIV. It is also important for the reduction of HIV transmission among the general population.

This study showed no significant association of age with HIV testing during antenatal visits or childbirth among pregnant women aged 15 - 49. Being older has been reported in other studies to be a predictor of uptake of HIV testing,[18][19]although other sub-Saharan African studies by Muhinda and Pazvakawambwa and Takarinda et al. found the opposite.[20][21]The lack of significant difference seen in the different age categories of pregnant women's HIV testing may be associated with the Opt-Out Model of HIV testing practiced in Nigeria. This model requires all pregnant women who attended or were brought in at childbirth to a health facility to be tested unless they refused. The model also requires that

information on HIV/AIDS about the benefits of testing for HIV and the risks of not testing be mandatorily given to pregnant women and this may have accounted for the no significant difference in HIV testing of the older and younger women.

Women with a higher level of education are more likely to test for HIV than those with no education in this study (AOR, 8.09; 95% CI: 2.97, 22.06). Ajayi et al., Ejigu and Tadesse, and Muyunda et al. corroborated this finding in their reports.[18][22][23]The explanation for this finding may be due to the educational level being associated with better knowledge of HIV/AIDS. The 2013NDHS reported that women with higher levels of education have better knowledge of HIV/AIDS, which may have impacted their HIV testing.[5]

Pregnant women dwelling in urban areas were 1.66 times more likely to test for HIV than those dwelling in rural areas in this study (AOR, 1.66; 95% CI: 1.09, 2.53). This finding is consistent with what was reported in similar studies[6][24][25]and may be associated with more availability of testing centers in urban areas and urban dwellers knowing more about where to test for HIV than rural dwellers. According to the 2013 Nigerian Demographic and Health Survey report, women living in urban areas know where to test for HIV than those living in rural areas.[5]

Pregnant women of the Catholic and other Christian religions were statistically significantly more likely to test for HIV than those of the Islamic religion in the bivariate model, although the multivariable model did not corroborate it. Other studies have reported that religion significantly predicted HIV testing of pregnant women.[23][25]However, Udoh and Ushie, and Muhinda and Pazvakawambwa reported that religion was not significantly associated with HIV testing among women of reproductive age.[13][21]The association between religion and HIV testing of pregnant women may be related to faith factors. Some of these factors have been reported in a Nigerian study as barriers to maternal health services utilization in Northern Nigeria, where Islam is predominant. The factors include obtaining permission from husbands, guardians, parents, and religious and cultural leaders, and refusing health services provided by male health workers.[9]

This study found no significant association between self-reported HIV testing of pregnant women who are currently and not currently married. Although Muhinda and Pazvakawambwa and Muyunda et al. corroborated this finding that marital status was not significantly associated with the likelihood of testing for HIV, other studies reported that being currently married was significantly associated with testing for HIV.[18][20][21][22][26]a possible explanation of this study's finding on marital status may be that this study sample consists of only pregnant women who were currently or not currently married. In the Opt-Out Model of HIV testing practiced in Nigeria, all pregnant women who attended antenatal care or were brought in at childbirth to a health facility are supposed to be tested for HIV after relevant HIV/AIDS information has been given to them unless they refuse.[13]This information may have accounted for the no significant difference found in the HIV testing of pregnant women who are currently and not currently married.

In this study, pregnant women with positive attitudes were not significantly more likely to test for HIV than those with negative attitudes during antenatal visits or childbirth (OR, 1.47; 95% CI: .57, 3.76). Meremo et al. and Ha et al. reported similar findings in their studies.[26][27]However, many other studies reported a significant association between stigmatizing attitudes and self-reported HIV testing among pregnant women.[10][11][21][28][29][30]The study finding may also be associated with the Opt-Out Model of HIV testing practiced in Nigeria. According to the Health Belief Model, when people believe that they

are at risk of a health problem and understand the gains of taking action, it impacts their readiness to act.[31][32]The mandatory provision of information on HIV/AIDS and offering of HIV testing to pregnant women may have made them understand the risks of not testing and the gains of testing for HIV, therefore overcoming the barrier posed by stigmatizing attitudes leading to no significant difference in HIV testing by those with positive and negative attitudes.

Limitations

A limitation of this study is the cross-sectional design of the NDHS study, which made it unattainable to establish causality between the predictors and the dependent variable of HIV testing. Also, data were collected in the 2013 Nigeria Demographic and Health Survey through self-reports of the respondents, and therefore, recall bias of the respondents may have impacted this study's findings. Another limitation is the use of a mean cut-off score to categorize those with and without stigmatizing attitudes because those whose attitudes are close to the cut-off mean may be incorrectly grouped leading to skewed conclusions about the prevalence of stigmatization. Unmeasured confounding is another potential limitation because the study variables were restricted to the ones collected in the 2013 NDHS.

Conclusion

This study found that educational level and place of residence predicted HIV testing of pregnant women aged 15-49 in both the bivariable and multivariable regression models. These identified predictors could be targeted in designing informed policies, strategies, and interventions to control the HIV epidemic among pregnant women aged 15-49 years in Nigeria. Also, more HIV testing centers should be made available and accessible to rural dwellers in Nigeria by the Government.

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Conflicts of interest

There are no conflicts of interest.

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