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# Sociodemographic Influences on HIV/AIDS Knowledge among Women of Reproductive Age in Nigeria: A Comparative Analysis

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## *Abstract*

*In Africa, HIV (Human immunodeficiency virus) is the leading cause of death among women of reproductive age and unprotected sex is the main driver of HIV transmission which contributes to high rate of mother to child transmission. Lack of knowledge is one of the foremost causes of this public health menace among this population. The study aims to explore how sociodemographic variables such as age, education, income, and marital status influence the comprehensive knowledge of HIV/AIDS among Nigerian women aged 15-49. This is a cross-sectional study which used from 2018 Nigeria Demographic and Health Survey. Stata software Version 14.2 (StataCorp LP, College Station, Texas 77845 USA) was employed to conduct analysis. Data was analyzed at three stages: univariate, bivariate and multivariate. Descriptive statistics were used to define sample characteristics. This study found that the major sociodemographic factors affecting HIV/AIDS knowledge among women of reproductive age are age, education, place of residence, religion, marital status, and wealth. Women between 20 to 24 years (OR=1.64,95% CI=1.274,2.111) were found to have higher HIV knowledge than adolescents. Women with tertiary education have higher odds (AOR=3.21,95%CI=2.397-4.321) than women without formal education. Women with highest wealth index had higher knowledge (AOR=1.50, 95%CI=1.113,2.027) than the poorest. Being exposed to TV (AOR=1.11, 95%CI=0.927,1.321) and radio (AOR=1.58,95%CI=1.266,1.979) at least once a week had higher knowledge. Living in rural areas have less knowledge (AOR=0.67,95%CI=0.574,0.795) compared with living in urban areas. These findings provide evidence for policymakers to understand the determinants of health for women and design policies targeting rural and female gender.*

***Keywords:*** *Comprehensive, Determinants, HIV, Knowledge, Nigeria.*

## Introduction

In Africa, Human Immunodeficiency virus (HIV) is the leading cause of death among women of reproductive age (15-49) and unprotected sex is the main driver of HIV transmission [1]. Lack of accurate and complete knowledge is one of the foremost causes of increase in the number of new HIV infections among women in Sub-Saharan Africa [1]. According to 2018 Nigerian AIDS Indicator and Impact Survey results, HIV prevalence among women in Nigeria aged 15-64 is 1.9% and 1.1% among men [2, 23]. This prevalence figure of 1.9% is the same for women aged 15-49 years, however, for men it is 0.9%. This indicates that HIV disproportionally affects women in Nigeria. This could be because of the

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inequalities that are driven by gender norms related to masculinity and feminism, violence against women, barriers of access to health services, poor education, lack of economic security, and other factors affecting knowledge about HIV/AIDS [1, 3, 24, 25, 28]. There is a need to address some of these problems. The purpose of this study is to explore how sociodemographic variables such as age, education, income, pace of residence, religion and marital status influence the comprehensive knowledge of HIV/AIDS among Nigerian women aged 15-49, compare the outcome of the study with similar studies carried out in other countries and recommend possible ways on how to improve the knowledge of HIV/AIDS among women of reproductive age 15-49 years.

Knowledge about HIV includes an understanding of HIV transmission routes and the ability to counter local misconceptions about HIV/AIDS [4]. The definition of knowledge of HIV may vary slightly between studies or countries but it is considered here to be the knowledge of HIV of an individual. It means knowing that constant use of condoms during sexual intercourse and having just one uninfected faithful partner can reduce the chances of getting HIV, knowing that a healthy-looking person can have HIV and rejecting the two most common local misunderstandings about HIV transmission or prevention (mosquito spreads HIV and one can get HIV by being around people who are HIV positive) amongst others.

The theoretical framework of comprehensive knowledge of HIV among women of reproductive age is based on Social Determinants of Health. There are 5 recognized determinants of population health. They are: biology and genetics (e.g., sex); individual behavior (e.g., alcohol or injection drug abuse, unprotected sex, smoking); social environment (e.g., discrimination, income, education level, marital status); physical environment (e.g., place of residence, overcrowding conditions, built environment (i.e., buildings, spaces, transportation systems, and products that are created or modified by people) and health services (e.g., access to and quality of Healthcare, health insurance status) [5].

Social determinants are complex, integrated, and overlapping social structures and economic system [5]. They are linked to lack of opportunities and lack of resources which are important for protection, improvement and maintenance of good health.

Studies have shown that HIV-infected persons with low literacy levels had less general knowledge of their disease and disease management and were more likely to be non-adherent to treatment than those with higher literacy levels [6, 7]. Studies also showed that black Men having sex with Men (MSM) at lower income levels are more likely to engage in sexual behaviors that put them at higher risk for acquiring STDs, compared to back MSM with higher income levels [5]. Therefore, we need to go beyond controlling disease on individual level by addressing other contributors to disease, including the social and environmental factors.

Though, comprehensive HIV/AIDS knowledge plays an important role in preventing the spread of HIV, there is much gap regarding the extent and links of comprehensive HIV/AIDS knowledge among women of reproductive age (15-49 years) in Nigeria. Women have been disproportionally affected by new HIV infections and there is a need to compared this study with similar studies in Sub-Saharan Africa (SSA) countries and other parts of the world.

Previous studies conducted in other developing countries have found that comprehensive HIV/AIDS knowledge among women of reproductive age is low in SSA countries [1, 8, 10, 11], therefore, it is important to carry out this study in Nigeria in order to determine the sociodemographic variables that have major impact on the comprehensive knowledge of HIV/AIDS among women of

reproductive age (15-49 years). A good knowledge of HIV increases a person's level of consciousness regarding potential risks associated with not using preventive measures during sexual practices such as consistent use of condoms [42].

## Methods

### Source of Data

The data for this study is a secondary data obtained from Nigeria Demographic and Health Survey of 2018 [33]. NDHS (Nigerian Demographic and Health Survey) is a nationally representative household survey that collects a very wide range of population, health, and other important indicators covering all the 36 states and Federal Capital Territory (FCT). The sampling frame used for the 2018 NDHS was derived from the 2006 National Population and Housing Census of the Federal Republic of Nigeria [9]. The survey sample was selected using a stratified, two-stage cluster design, with enumeration areas (EAs) as the sampling units for the first stage and the second stage was a complete listing of households carried out in each of the 1,400 selected Enumeration Areas [9]. The extracted secondary dataset from NDHS, 2018 is on comprehensive knowledge of HIV/AIDS among women of reproductive age 15-49 years in Nigeria. The number of women with complete information included in the analysis was 8061.

### Study Variable

The outcome (dependent) variable is comprehensive knowledge of HIV/AIDS which is defined as correct knowledge of two mechanisms to prevent HIV and rejection of three misconceptions about HIV. This was assessed by obtaining responses from respondents to the following questions:

1. Having only one sex partner, who has no other partners reduce HIV infection
2. A healthy-looking person can have HIV
3. Whether it is possible to get HIV by sharing food with person who has AIDS
4. Condom use can prevent HIV
5. Can get HIV from mosquito bites

For each correct score, respondents were assigned 1 mark and for each wrong response, 0 was awarded. Women who were able to correctly respond to the 5 questions were seen as having good comprehensive knowledge of HIV/AIDS otherwise poor knowledge.

Independent variables were demographic characteristics such as age (15-19, 20-24, 25-29, 30-34, 35-39, 40-44, 45-49), place of residence (Rural, Urban) provinces, marital status (married, not married), religion (Catholic, Other Christian, Muslim, Others), highest education level (Primary, Secondary, Tertiary, No education). Media exposure was defined as listening radio, watching TV or reading newspaper at least once a week. The NDHS assessed wealth index from family's assets such as availability of television set, a bicycle, or a car and other household characteristics like sources of drinking water. These were used to calculate the wealth index of each participant.

### Research Design

This is a cross-sectional study. The study accepted the sample size calculated by NDHS. Sampling frame used for the 2018 NDHS is the Population and Housing Census of the Federal Republic of Nigeria (NPHC), which was implemented in 2006 by the National Population Commission. Organizationally, Nigeria was divided into states and each state was subdivided into local government areas (LGAs), and each LGA was divided into wards. In addition to these administrative units, during the 2006 NPHC each neighborhood was divided into convenient areas called census enumeration areas (EAs).

The primary sampling unit (PSU), known as a cluster for the 2018 NDHS, is well-defined on the basis of EAs from the 2006 EA census frame. Though, the 2006 NPHC did not provide the number of households and population for each EA, population estimations were published for 774 LGAs. A mixture of

information from cartographic material demarcating each EA and the LGA population estimations from the census was used to recognize the list of EAs, estimate the number of households, and differentiate EAs as urban or rural for the survey sample frame. Before sample selection, all neighborhoods were classified distinctly into urban and rural areas based on predetermined minimum sizes of urban areas; consistent with the official definition in 2017, any neighborhood in excess of 20,000 population size was classified as urban.

**Sampling Technique**

Sample for the 2018 NDHS was a stratified sample selected in two phases or stages. Stratification was realized by separating each of the 36 states and the Federal Capital Territory into urban and rural areas. In total, 74 sampling strata were acknowledged. Samples were selected independently in every stratum through a two-stage selection process. Implicit stratifications were realized at each of the lower administrative levels by sorting the sampling frame before sample selection in accordance with administrative order and by using a probability proportional to size selection during the first sampling phase.

In the first phase, 1,400 EAs were selected with probability proportional to EA size. EA size was recognized as the number of households in the EA. A household listing operation was conducted in all selected EAs, and the resulting lists of households served as a sampling frame for the selection households in the second phase. In the second phase's selection, a fixed number of 30 households was selected in every cluster through equal probability systematic sampling, resulting in a total sample size of roughly 42,000 households. The household listing was conducted using tablets, and random selection of households was conducted through computer programming. The interviewers carried out the interviews only in the pre-selected households. To prevent bias, no replacements and no changes of the preselected households were allowed in the implementing phase.

**Data Analysis**

Stata software Version 14.2 (StataCorp LP, College Station, Texas 77845 USA) was employed to clean up, rename, recode, and conduct analysis after data had been extracted. Data was analyzed at three stages namely, univariate, bivariate and multivariate. Descriptive statistics to describe the background characteristics of the study sample such as age, residence, religion, wealth index and education status were generated. Variables from the bivariable analysis using Chi-square with p-values $<0.05$ were chosen to be adjusted in the final model. The probability of selection and non-response discrepancies were modified using sampling weights. Due to the hierarchical and clustered structure of NDHS, a generalized mixed modeling approach known as mixed effect binary logistic regression modeling was used for the multivariate analysis. This is a sophisticated model that takes clustering-related variability into account.

**Ethical Considerations**

The study is using secondary data publicly available from DHS (Demographic and Health Surveys) for analyses. Ethical processes are the responsibility of the institutions that commissioned, funded or managed the surveys. DHS surveys are usually approved by ICF international as well as an Institutional Review Board in respective country to ensure that the protocols are in compliance with the U.S. Department of Health and Human Services guidelines for the protection of human subjects.

The 2018 Nigeria Demographic and Health Survey was approved by Nigeria Health Sciences Research Committee and the Institutional Review Board of ICF Macro in Calverton Maryland, USA. Consent for participation in the survey was obtained from all the respondents by enumerators on behalf of

the National Population Commission of Nigeria and the DHS program. However, a written request was submitted to the DHS program and permission was granted to use the data for this study. In addition, approval for the study has been given by Nigeria National Health Research and Ethics Committee (NHREC).

**Limitations of the Study**

This study had both strengths and limitations. It was based on a relatively large dataset. It was also based on an appropriate model (multilevel modeling) to account for the hierarchical nature of the DHS data. Despite that, our study had few important limitations. Due to the nature of the data (secondary data), we had no control over confounders and the measurement of indicators.

## Results

Figure 1 below showed that 95.2% of the women knew that having only one sex partner, who has no other partners could reduce HIV infection and 77.8% of women knew that condoms could help prevent sexual transmission of HIV. More than three quarters (78.1%) of women (15–49) were aware of sharing foods with people who have HIV will not transmit HIV and 74.4% of women indicated that HIV cannot be transmitted through mosquito bites. More than three-quarters of the participants (87.5%) had correctly answered the question of whether a healthy-looking person could have HIV Overall, only less than half (48.3%) of Nigerian women had a comprehensive knowledge of HIV/AIDS.

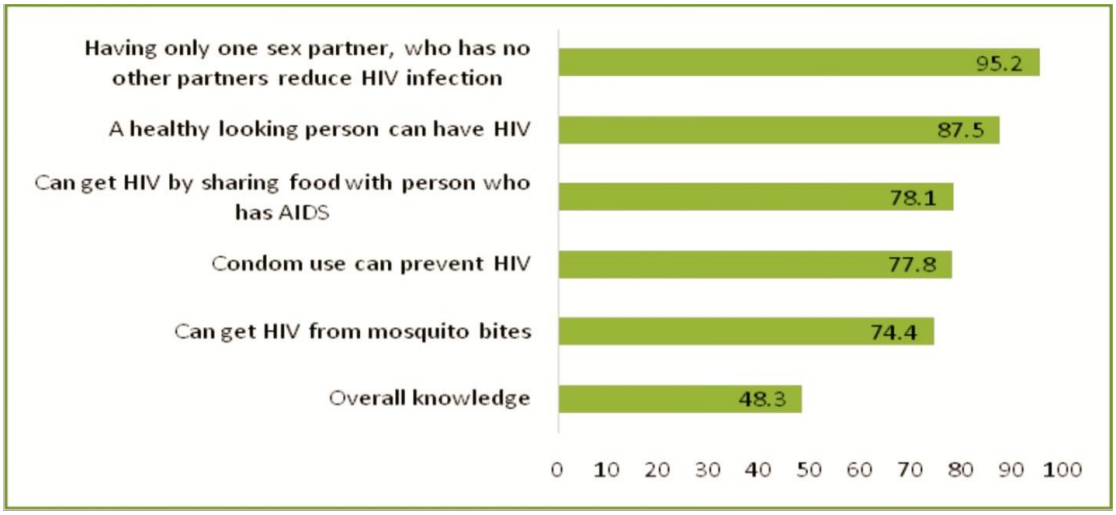


**Figure 1.** Percentage of Correct Answers about Knowledge of HIV/AIDS among Women of Reproductive Age (15-49years) Women, 2018 NDHS (N=7586)

Table 1 shows the socio-demographic characteristics of women of reproductive age. More than three quarters of the participants were young women aged 20-34 years while only 6.2% were teenagers with more than half (57.4%) rural inhabitants. Table 1 also showed that the participants were predominantly Muslims (57.9%) with only 3.5% living with partner but not married. About 41.5% of the women did not attend formal education and more than one third (39.1%) was in the poor wealth quantile. More than 61% of the participants were women from the Northern region while the remaining 38.7% were from the South. About 60% of the participants did not watch television while 43.8% reported not to have listened to radio.

In bivariate mixed-effect logistic regression; table 2 below shows that age of respondents, types of residence, religion, marital status, wealth index combined, highest educational level, frequency of watching television and listening to radio were significantly associated with women's knowledge of HIV/AIDS ($P< 0.05$) and these variables were included in the multivariate analysis.

**Table 1.** Socio-Economic and Demographic Characteristics of Sample, HS 2018 (n = 8,061)

| Variables | Frequency | Percent |
|---|---|---|
| **Age (in Years)** | | |
| 15-19 | 497 | 6.2 |
| 20-24 | 1236 | 15.3 |
| 25-29 | 1880 | 23.3 |
| 30-34 | 1699 | 21.1 |
| 35-39 | 1431 | 17.8 |
| 40-44 | 794 | 9.8 |
| 45-49 | 524 | 6.5 |
| **Type of residence** | | |
| Urban | 3436 | 42.6 |
| Rural | 4625 | 57.4 |
| **Religion** | | |
| Catholic | 751 | 9.3 |
| Other Christian | 2603 | 32.3 |
| Islam | 4667 | 57.9 |
| Traditionalist | 26 | 0.3 |
| Other | 14 | 0.2 |
| **Marital status** | | |
| Married | 7,782 | 96.5 |
| Living with partner | 279 | 3.5 |
| **Wealth index combined** | | |
| Poorest | 1535 | 19.0 |
| Poorer | 1619 | 20.1 |
| Middle | 1595 | 19.8 |
| Richer | 1583 | 19.6 |
| Richest | 1729 | 21.4 |
| **Highest educational level** | | |
| No education | 3345 | 41.5 |
| Primary | 1270 | 15.8 |
| Secondary | 2650 | 32.9 |
| Higher | 796 | 9.9 |
| **Region** | | |
| North Central | 1099 | 13.6 |
| North East | 1338 | 16.6 |
| North West | 2505 | 31.1 |
| South East | 848 | 10.5 |
| South South | 762 | 9.5 |
| South West | 1509 | 18.7 |
| **Frequency of watching television** | | |
| Not at all | 4105 | 50.9 |
| Less than once a week | 1498 | 18.6 |

| | | |
|---|---|---|
| At least once a week | 2459 | 30.5 |
| **Frequency of listening to radio** | | |
| Not at all | 3529 | 43.8 |
| Less than once a week | 2038 | 25.3 |
| At least once a week | 2494 | 30.9 |

**Table 2.** Association between Samples' Socio-Economic/Demographic Characteristics and Knowledge of HIV/AIDS among Reproductive Age (15–49 years) Women in Nigeria, NDHS 2018 (N = 8,061)

| **Variables** | **Poor Knowledge (N=3,708)** | **Good knowledge (3,878)** | **Total** | **□2** | **P-value** |
|---|---|---|---|---|---|
| **Age (in years)** | N (%) | N (%) | N | | |
| 15-19 | 270(61.4) | 170(38.6) | 440 | 27.513 | 0.000 |
| 20-24 | 540(46.8) | 613(53.2) | 1153 | | |
| 25-29 | 869(49.6) | 882(50.4) | 1751 | | |
| 30-34 | 760(46.8) | 865(53.2) | 1625 | | |
| 35-39 | 629(46.2) | 731(53.8) | 1360 | | |
| 40-44 | 379(49.8) | 382(50.2) | 761 | | |
| 45-49 | 261(52.6) | 235(47.4) | 496 | | |
| **Type of place of residence** | | | | | |
| Urban | 1293(38.9) | 2033(61.1) | 3326 | 197.605 | 0.000 |
| Rural | 2415(56.7) | 1845(43.3) | 4260 | | |
| **Religion** | | | | | |
| Catholic | 295(40.0) | 443(60.0) | 738 | 61.158 | 0.000 |
| Other Christian | 1157(45.9) | 1362(54.1) | 2519 | | |
| Islam | 2245(52.3) | 2050(47.7) | 4295 | | |
| Traditionalist | 6(28.6) | 15(71.4) | 21 | | |
| Other | 5(38.5) | 8(61.5) | 13 | | |
| **Marital status** | | | | | |
| Married | 3664(48.5) | 3889(51.5) | 7552 | 8.519 | 0.004 |
| Living with partner | 161(59.0) | 112(41.0) | 273 | | |
| **Wealth index combined** | | | | | |
| Poorest | 850(61.8) | 526(38.2) | 1375 | 279.251 | 0.000 |
| Poorer | 819(55.7) | 652(44.3) | 1471 | | |
| Middle | 785(52.2) | 719(47.8) | 1505 | | |
| Richer | 664(43.3) | 871(56.8) | 1535 | | |
| Richest | 589(34.7) | 1110(65.3) | 1700 | | |
| **Highest educational level** | | | | | |
| No education | 1752(58.3) | 1253(41.7) | 3005 | 329.418 | 0.000 |
| Primary | 664(54.5) | 555(45.5) | 1219 | | |
| Secondary | 1091(42.3) | 1490(57.7) | 2581 | | |

| | | | | | |
|---|---|---|---|---|---|
| Higher | 201(25.7) | 580(74.3) | 781 | | |
| **Region** | | | | | |
| North Central | 539(58.7) | 380(41.3) | 919 | 217.925 | 0.000 |
| Northeast | 802(64.3) | 446(35.7) | 1248 | | |
| Northwest | 1018(42.2) | 1397(57.8) | 2415 | | |
| Southeast | 312(37.1) | 528(62.9) | 840 | | |
| South south | 411(55.9) | 324(44.1) | 735 | | |
| Southwest | 626(43.8) | 803(56.2) | 1429 | | |
| **Frequency of watching television** | | | | | |
| Not at all | 2132(56.7) | 1625(43.3) | 3757 | 231.651 | 0.000 |
| Less than once a week | 707(49.2) | 731(50.8) | 1438 | | |
| At least once a week | 869(36.3) | 1522(63.7) | 2391 | | |
| **Frequency of listening to radio** | | | | | |
| Not at all | 1788(55.6) | 1428(44.4) | 3216 | 138.184 | 0.000 |
| Less than once a week | 931(47.4) | 1034(52.6) | 1965 | | |
| At least once a week | 989(41.1) | 1416(58.9) | 2405 | | |

**Table 3.** Determinants of Knowledge of HIV/AIDS among Reproductive Age (15–49) Women in Nigeria, 2018 NDHS 2018 (n=8061)

| **Variables** | **COR (95%CI)** | **AOR (95%CI)** | **P-value** |
|---|---|---|---|
| **Age (in years)** | | | |
| 15-19 | 1.00 | 1.00 | |
| 20-24 | 1.80(1.395,2.325) | 1.64(1.274,2.111) | 0.000 |
| 25-29 | 1.61(1.250,2.066) | 1.31(1.025,1.685) | 0.031 |
| 30-34 | 1.80(1.409,2.309) | 1.43(1.112,1.837) | 0.005 |
| 35-39 | 1.84(1.433,2.365) | 1.55(1.208,2.003) | 0.001 |
| 40-44 | 1.59(1.202,2.128) | 1.46(1.085,1.965) | 0.012 |
| 45-49 | 1.43(1.042,1.959) | 1.32(0.964,1.804) | 0.084 |
| **Type of residence** | | | |
| Urban | 1.00 | 1.00 | |
| Rural | 0.48(0.414,0.569) | 0.67(0.574,0.795) | 0.000 |
| **Religion** | | | |
| Catholic | 1.00 | 1.00 | |
| Other Christian | 0.78(0.643,0.956) | 0.84(0.674,1.043) | 0.115 |
| Islam | 0.61(0.488,0.757) | 0.59(0.449,0.777) | 0.000 |
| Traditionalist | 1.64(0.590,4.564) | 2.62(0.885,7.767) | 0.082 |
| Other | 1.17(0.561,2.455) | 1.71(0.721,4.061) | 0.223 |
| **Marital status** | | | |
| Married | 1.00 | 1.00 | |
| Living with partner | 0.66(0.471,0.913) | 0.79(0.557,1.124) | 0.192 |
| **Wealth index combined** | | | |

| | | | |
|---|---|---|---|
| Poorest | 1.00 | 1.00 | |
| Poorer | 1.28(1.046,1.579) | 1.13(0.917, 1.384) | 0.256 |
| Middle | 1.48(1.198,1.828) | 1.16(0.938,1.444) | 0.166 |
| Richer | 2.12(1.676,2.681) | 1.47(1.121,1.927) | 0.005 |
| Richest | 3.04(2.412,3.842) | 1.50(1.113,2.027) | 0.008 |
| **Highest educational level** | | | |
| No education | 1.00 | 1.00 | |
| Primary | 1.17(0.978,1.397) | 1.26(1.042,1.527) | 0.017 |
| Secondary | 1.91(1.628,2.235) | 1.86(1.516,2.278) | 0.000 |
| Higher | 4.01(3.162,5.096) | 3.21(2.397,4.321) | 0.000 |
| **Region** | | | |
| North Central | 1.00 | 1.00 | |
| North East | 0.79(0.592,1.052) | 1.54(1.175,2.025) | 0.002 |
| North West | 1.95(1.517,2.498) | 4.37(3.353,5.704) | 0.000 |
| South East | 2.40(1.797,3.211) | 1.27(0.951,1.703) | 0.105 |
| South South | 1.12(0.845,1.485) | 0.64(0.479,0.850) | 0.002 |
| South West | 1.82(1.383,2.396) | 0.98(0.731,1.321) | 0.909 |
| **Frequency of watching television** | | | |
| Not at all | 1.00 | 1.00 | |
| Less than once a week | 1.36(1.137,1.625) | 1.05(0.869,1.277) | 0.591 |
| At least once a week | 2.29(1.955,2.697) | 1.11(0.927,1.321) | 0.263 |
| **Frequency of listening to radio** | | | |
| Not at all | 1.00 | 1.00 | |
| Less than once a week | 1.39(1.189,1.627) | 1.16(0.929,1.454) | 0.188 |
| At least once a week | 1.8(1.547,2.079) | 1.58(1.266,1.979) | 0.000 |

Table 3 shows the results of COR (Crude odds ratio) and AOR (Adjusted odds ratio) for variables included in the multivariate analysis. The results indicated that being in older age group, living in the urban settings, being a traditionalist, high-wealth indices, higher mother's educational level, listening to radio and television at least once a week were statistically significant with the comprehensive knowledge of HIV/AIDS among women of reproductive age in Nigeria. Women with tertiary education were 3 (AOR=3.21,95%CI=2.397-4.321) times likely to have better knowledge of HIV/AIDS than mothers with no formal education. Similarly, the chance of having better knowledge of HIV/AIDS among women increases with high-wealth indices. Women with richest wealth index were 1.5 (AOR= 1.50, 95%CI=1.113,2.027) times chances of having comprehensive knowledge of HIV/AIDS than those in the poorest wealth index.

Women that were exposed to TV (AOR=1.11, 95%CI=0.927,1.321) and radio (AOR=1.58, 95%CI=1.266,1.979) at least once a week had higher chances of having better knowledge of HIV/AIDS than those who are not exposed. Living in rural areas is associated with less knowledge of HIV/AIDS (AOR=0.67, 95% CI=0.574,0.795). Furthermore, women

between 20 to 24 years of age (OR=1.64, 95% CI=1.274,2.111) were found to be stronger factor associated with higher level of HIV-related knowledge and adolescents (15-19 years) have the lowest comprehensive knowledge of HIV/AIDS. Living with partner but not married is associated with less comprehensive knowledge of HIV/AIDS (A0R=0.79, 95% CI=0.557,1.124). In the area of religion, traditionalists have higher Comprehensive Knowledge of HIV/AIDS than other religious groups.

## Discussion

Among women of reproductive age, the study found that women with tertiary education were 3(AOR=3.21,95%CI=2.397-4.321) times likely to have better knowledge of HIV/AIDS than women without formal education. There is a strong association between knowledge of HIV/AIDS and level of education. In a study in Ethiopia, they found out that in comparison with women without education, the odds of having a comprehensive knowledge of HIV/AIDS are higher in women who had primary (OR 2.86, 95% CI: 1.63-5.02; P< 0.001) and secondary or higher educational level (OR=5.49, 95% CI: 2.92-10.32; P< 0.001) respectively [10]. This is in line with other similar studies [8, 11, 12, 29]. A study in Vietnam found that the level of educational attainment was closely related to comprehensive knowledge about HIV/AIDS through all the survey rounds and that the result was consistent with a number of previous studies (4). A similar study on the assessment of comprehensive knowledge about HIV/AIDS in 51 Low and Middle-Income Countries (LMICs) between 2003 to 2018, found out that on the aggregate level, knowledge of HIV/AIDS was 37.8% (95% CI, 31.9%-43.6%) and 18.4% (95% CI, 15.1%-21.8%) between young women with education higher than primary and those with primary education or less, respectively, and that the gap between the 2 groups was 19.4 (95% CI, 16.6-22.2) percentage points. On the country level, the gap between the 2 groups was significant in 50 of 51 LMICs (98.0%), ranging from 1.8 (95% CI, 0.7-2.9) percentage points in Afghanistan in 2015 to 38.9 (95% CI, 35.2-42.7) percentage points in Burkina Faso in 2010. There were 24 countries (47.1%) with a gap between the 2 groups of more than 20 percentage points (13). Ugandan study on determinants of comprehensive knowledge of HIV/AIDS among women of reproductive age (15-49 years), the result shows that respondents with primary and secondary (OR=1.63) 95% CI=1.34-1.99), (OR=3.6) 95% 2.86-4.58) respectively had significant (p=0.000) higher odds of having comprehensive knowledge compared to those with no education (1). This result is also supported by studies done in Ethiopia, Vietnam and Bangladesh [4, 10, 14]. These findings showed that the higher level of education gives women higher chances of having comprehensive knowledge of HIV. Another possible explanation is that education enhances women to be more aware about their health and to seek for information on how to protect themselves against HIV/AIDS. Furthermore, provision of public education during health care services as a key component of primary prevention of AIDS has to be encouraged and appreciated.

This study showed that listening to radio (AOR=1.16, 95% CI=0.929,1.454), and watching TV (AOR=1.11, 95% CI=0.927, 1.321) were statistically significant in relation with the comprehensive knowledge of HIV/AIDS among women of reproductive age in Nigeria. A similar study in Ethiopia demonstrated that watching television (AOR=1.22, 95% CI, 1.06–1.41) and own mobile phone (AOR=1.18, 95% CI 1.05–1.33) were positively associated with comprehensive knowledge of HIV/AIDS among women of reproductive age (8, 34). Other studies show this consistency in association between electronic media and comprehensive knowledge about HIV/AIDS and women of reproductive age group [30, 36, 37, 43].

In our study we found that women in the highest wealth index had a good comprehensive knowledge about HIV/AIDS with higher odds (AOR=1.13 95% CI=0.917, 1.384); (AOR=1.16, 95% CI=0.938, 1.444); (AOR=1.47, 95%CI=1.121,1.927), (AOR=1.50, 95%CI=1.113, 2.027) poorer, middle, richer and richest respectively compared to the poorest women. This result is in agreement with the study done in Ghana, Republic of Ethiopia and in three east African countries (8, 15, 16). This is because having good socioeconomic status improves access to media and better educational achievement which increases the likelihood of better knowledge about HIV/AIDS Those with the rich wealth index had a high score on HIV/AIDS prevention and transmission knowledge, while those with a poor wealth index had a medium score for HIV/AIDS prevention and transmission knowledge [10, 25, 28, 37, 38,39].

This study found that women living in rural area are less (AOR=0.67, 95%CI=0.574,0.795) likely to have comprehensive knowledge about HIV/AIDS than those in the urban settings. Similar studies in Indonesia and Ghana showed that place of residence plays important role in comprehensive knowledge on HIV/AIDS [17, 26]. Their study indicated that urban residents have almost 2 times the knowledge of rural dwellers (OR=1.84, 95% CI=1.73-1.95). The Vietnam study reported that few previous studies had significant differences in the levels of comprehensive knowledge about HIV among women in Vietnam when comparing women from urban and rural areas and that people living in urban areas were more likely to have comprehensive knowledge about HIV than those people living in rural areas. However, their study showed such differences in 2000, 2006, and 2011 but not in 2014. They concluded that there was a possibility that past efforts towards HIV prevention interventions had a positive effect on women living in rural areas. They also found that the percentage increase of knowledge about HIV among women living in rural areas was significantly higher (17.2% between 2000 and 2014) than that of women living in the urban areas (9.7% between 2000 and 2014). However, in the most recent survey round (2014), the percentage of comprehensive knowledge about HIV among women living in rural areas was still much lower than that among women living in urban areas [4]. Therefore, awareness efforts regarding HIV prevention should potentially prioritize women living in rural areas.

Marital status plays important role in knowledge of HIV/AIDS among women of reproductive age. In a study in Malawi, women who were married (AOR = 0.85, 95%CI: 0.76–0.95) were less likely to have comprehensive knowledge of HIV/AIDS compared to their never married counterparts [18]. This is consistent with a related study in New Delhi, India, where ever married women were less likely than never married women in slum and non-slum areas to have comprehensive knowledge of HIV/AIDS prevention methods [4, 19]. This is because the never married would like to have all information about HIV/AIDS in order to avoid HIV infection because they may be asked to do HIV test before marriage. According to a study in Uganda, titled "Predictors of HIV/AIDS comprehensive knowledge and acceptance attitude towards people living with HIV/AIDS among unmarried young females in Uganda", they found out that young unmarried women were more likely to have a better comprehensive knowledge on HIV/AIDS as compared to their married counterparts (OR 1.82, 95% CI 1.52–2.18 and AOR 1.37, 95% CI 1.12–1.67) [20].

In this study, age of the respondent also is associated with knowledge about HIV/AIDS. The odds of having more knowledge about HIV/AIDS was higher among older women as compared to younger-aged women. This is in line with studies conducted in Latin America and the Caribbean countries, Uganda and

Bangladesh [20, 21, 25, 40]. This may be because the traditional social system and health care service often bother older age group women. Besides, younger age women had a barrier to communicate with adults regarding sex-related information and sexually transmitted diseases. It has been documented, those women with older ages had higher odds of having knowledge compared to teenagers [11, 29]. This shows that HIV knowledge increases with age of a woman. This result is in consonance with other studies elsewhere [24, 30, 31, 32, 35, 40]. From this study, we found that respondents below 20 years of age were also less likely to have greater knowledge of HIV compared to those with older age group. This is because opportunities to obtain knowledge about HIV are extremely limited for young people who are not in school.

In the area of religion, the study shows that traditional religion has higher Knowledge of HIV/AIDS than other religious groups (AOR=2.62, 95%CI=0.885,7.767) and followed by other forms of religion (not specified) (AOR=1.71, 95% CI=0.721,4.061). The sample size was very small which could be responsible for the high AOR score. Similar studies have documented that there is a significant association between the women's knowledge about HIV/AIDS and their religion [16, 21, 22]. Another study reported that Muslim women are found to be more knowledgeable about HIV/AIDS compared to non-Muslim women in Bangladesh (14). Another study in Ethiopia on Determinants of comprehensive knowledge of HIV/AIDS among women of reproductive age (15–49 years), reported that Orthodox Christians accounted for around 44.8% of the women with comprehensive knowledge of HIV/AIDS [8] and a study in Ghana reported that religion increases the chances of having better Knowledge of HIV and AIDS and found to be higher among individuals who were affiliated to a religious group than those who were not [26]. Similarly, another study shows that people from the three states in the Equatoria region of Southern Sudan had higher odds of HIV knowledge and positive attitudes towards people living with HIV than in the other states because of their religious practice [27]. These findings are consistent with other studies [35, 36, 40, 41, 42].

## Conclusion

This study aimed at determining which sociodemographic variables have impact on the comprehensive knowledge of HIV among women of reproductive age 15-49 years in Nigeria. In general, women of reproductive age (15-49 years) have low knowledge of HIV/AIDS (48.3%), while women with the highest educational status, wealth index, watching television, age of respondents, types of residence, religion, marital status, and listening to radio were significantly associated with their comprehensive knowledge of HIV/AIDS. The study has therefore contributed by filling the knowledge gap in the literature concerning the comprehensive knowledge of HIV and AIDS in Nigeria. Furthermore, the has study demonstrated the level of comprehensive knowledge of HIV and AIDS among women of reproductive age in Nigeria and its related determinants thereby providing further guidance to health planners and decision-makers in strategic interventions on HIV prevention and control in Nigeria. For instance, health promotion programs should be designed in such a way that young women below 19 years of age, rural women, poor women and uneducated women are targeted.

Government, partners and other stakeholders should put more efforts in promoting girl child education and prevent their withdrawal from schools prematurely since our results showed that higher the level of education is associated with higher comprehensive knowledge of HIV. There is also need to promote accessibility to information and quality education to all eligible children.

Finally, the findings will be very useful to policy-makers and program planners, especially those involved in HIV and AIDS behavioral change interventions, to put into consideration the socioeconomic dimensions in their programming by redirecting their efforts to the poorer sections of the population. This implies adopting modes of communication that are more pro-poor instead of relying exclusively on television and other electronic media.

## Conflict of Interest

There is no conflict of interest in this study.


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## References


[1]. Ankunda, D., Asiimwe, J. B., 2017, Determinants of comprehensive knowledge of HIV/AID among women of the reproductive age (15-49) in Uganda *Int J Community Med Public Health*; 4:3530-5.

[2]. National Agency for the Control of AIDS. NAIIS NATIONAL FACTSHEET. Retrieved from https://www.naiis.ng/resource/factsheet/NAIIS%20PA%20NATIONAL%20FACTSHEET%20FINAL.pdf

[3]. Fauk, N. K., Ward, P. R., Hawke, K., Mwanri, L., 2021, Cultural and religious determinants of HIV transmission: A qualitative study with people living with HIV in Belu and Yogyakarta, Indonesia. *PLoS ONE* 16(11): e0257906.https://doi.org/10.1371/journal.pone.0257906

[4]. Son, N. V., Luan, H. D., Tuan, H. X., Cuong, L. M., Duong, N., & Kien, V. D., 2020, Trends and factors associated with comprehensive knowledge about HIV among women in vietnam. *Tropical medicine and infectious disease*, *5*(2), 91.https://doi.org/10.3390/tropicalmed5020091

[5]. Shokouh, SMH., 2017, Conceptual Models of Social Determinants of Health: A Narrative Review. *Iran J Public Health*. 46(4):435-446. PMID: 28540259; PMCID: PMC5439032.

[6]. Fikri, E., 2023, Comprehensive knowledge, attitudes, behaviors, and associated factors of hiv/aids in gondar city public health facilities among HIV testing and counselling service users, Northwest Ethiopia, 2022; an Ordinal Logistic Regression Analysis. *HIV AIDS (Auckl)*.2023;15:713-726https://doi.org/10.2147/HIV.S441447

[7]. Jeannine Coreil., 2009, Social and Behavioral Foundations of Public Health (2nd edition).

[8]. Agegnehu, C. D., Geremew, B. M., Sisay, M. M., Muchie, K. F., Engida, Z. .T., Gudayu, T. W., Weldetsadik, D. S., Liyew, A. M., 2020, Determinants of comprehensive knowledge of HIV/AIDS among reproductive age (15-49 years) women in Ethiopia: further analysis of 2016 Ethiopian demographic and health survey. *AIDS Res Ther*. 2020 Aug 12;17(1):51. doi: 10.1186/s12981-020-00305-z. PMID: 32787881; PMCID: PMC7425582.

[9]. National Population Commission (NPC) [Nigeria] and ICF., 2019, Nigeria Demographic

[10]. and Health Survey 2018. Abuja, Nigeria, and Rockviile, Maryland, USA: NPC and ICF. Abate, B. B., Kassie, A. M., Reta, M. A., *et al.*,2020, Residence and young women's comprehensive HIV knowledge in Ethiopia. *BMC Public Health* **20,** 1603.https://doi.org/10.1186/s12889-020-09687-1

[11]. Teshale, A. B., Yeshaw, Y., Alem, A. Z., *et al.*, 2022, Comprehensive knowledge about HIV/AIDS and associated factors among women of reproductive age in sub-Saharan Africa: a multilevel

analysis using the most recent demographic and health survey of each country. *BMC Infect Dis*, 130.https://doi.org/10.1186/s12879-022-07124-9

[12]. Ama, P. Fenny., Aba, O. Crentsil., & Derek Asuman., 2017, Determinants and Distribution of comprehensive HIV/AIDS knowledge in Ghana. URL:https://doi.org/10.5539/gjhs.v9n12p32

[13]. Yang, F., Li, Z., Subramanian, SV., Lu, C., 2021, Assessment of Knowledge of HIV/AIDS and Association with Socioeconomic Disparities Among Young Women in Low- and Middle-Income Countries, 2003 to 2018. JAMA Netw Open. 2021 Jan 4;4(1): e2035000. doi:10.1001/jamanetworkopen.2020.35000. Erratum in: JAMA Netw Open;4(2): e213317. PMID:33481034; PMCID: PMC7823222.

[14]. Khan, M. A., Mondal, N. I., Islam, R., et al., 2019, Knowledge about HIV/AIDS among women in Bangladesh: an urban-rural comparison of trend, attitude and determinants. *Biom Biostat Int J.* 2019;8(5):162–170. DOI: 10.15406/bbij.2019.08.00285.

[15]. Kefale, B., Damtie, Y., Yalew, M., Adane, B., Arefaynie, M., 2020, Predictors of Comprehensive Knowledge of HIV/AIDS Among People Aged 15-49 Years in Ethiopia: A Multilevel Analysis. HIV AIDS (Auckl).12:449-456. doi:10.2147/HIV.S266539. PMID: 32982472; PMCID: PMC7509684.

[16]. Teshome, R., Youjie, W., Habte, E., Kasm, N., 2016, Comparison and association of comprehensive HIV/AIDS knowledge and attitude towards people living with HIV/AIDS among women aged 15–49 in three east African countries: Burundi, Ethiopia and Kenya. *J AIDS Clin Res*. 7(4):1–8.

[17]. Efendi, F., Pratama, E. R., Hadisuyatmana, S., Indarwati, R., Lindayani L., Bushy A., 2020, HIV-related knowledge level among Indonesian women between 15 years and 49 years of age. *Afr Health Sci*. 20(1):83-90. doi:10.4314/ahs.v20i1.13. PMID: 33402896 PMCID: PMC7750044.

[18]. Mandiwa, C., Namondwe, B., & Munthali, M., 2021, Prevalence and correlates of comprehensive HIV/AIDS knowledge among adolescent girls and young women aged 15–24 years in Malawi: evidence from the 2015–16 Malawi demographic and health survey. *BMC Public Health*; https://doi.org/10.1186/s12889-021-11564-4

[19]. Jha, P. K., Narayan, P., Nair, S., Ganju, D., Sahu, D., Pandey, A., 2015, An Assessment of comprehensive Knowledge of HIV/AIDS among Slum and Non-Slum Populations in Delhi, India. Open Journal of Preventive Medicine, 5, 259-268.http://dx.doi.org/10.4236/ojpm.2015.56029

[20]. Estifanos, T. M., Hui, C., Tesfai, A. W. *et al.*, 2021, Predictors of HIV/AIDS comprehensive knowledge and acceptance attitude towards people living with HIV/AIDS among unmarried young females in Uganda: a cross-sectional study. *BMC Women's Health* **21;**https://doi.org/10.1186/s12905-021-01176-w

[21]. Sheikh et al., 2017, A comprehensive analysis of trends and determinants of HIV/AIDS knowledge among the Bangladeshi women based on Bangladesh Demographic and Health Surveys, 2007– 2014. *Archives of Public Health* 75:59. DOI 10.1186/s13690-017-0228-2.

[22]. Fauk, N. K., Ward, P. R., Hawke, K., Mwanri L., 2021, Cultural and religious determinants of HIV transmission: A qualitative study with people living with HIV in Belu and Yogyakarta, Indonesia. PLoS ONE 16(11): e0257906.https://doi.org/10.1371/journal.pone.0257906

[23]. Federal Ministry of Health, 2018 National AIDS Indicator and Impact Survey- Fact Sheet. Retrieved from https://afenetnigeria.net› Documents › NAIIS-N

[24]. Luiz, N. J., et al., 2021, Comprehensive knowledge and HIV prevalence in two migrant mineworkers' communities of origin in Gaza Province in Southern Mozambique: evidence from a cross-sectional survey. *Pan African Medical Journal.* 2021;40(19). 10.11604/pamj.2021.40.19.22165.

[25]. Gutiérrez, J. P., Trossero, A., 2021, Socioeconomic inequalities in HIV knowledge, HIV testing, and condom use among adolescent and young women in Latin America and the Caribbean. *Rev Panam Salud Publica*. 2021;45: e47.https://doi.org/10.26633/RPSP.2021.47

[26]. Guure, C., et al., 2020, Comprehensive Knowledge of HIV and AIDS among Ghanaian Adults from 1998 to 2014: A multilevel logistic regression model approach. Retrieved from https://pubmed.ncbi.nlm.nih.gov/33029448/

[27]. Mude, W., Oguoma, V. M., Gesesew, H. A., Ameyaw, E. K., Njue, C., Nyanhanda, T., et al., 2020, HIV/AIDS knowledge and attitudes assessment among women of child-bearing age in South Sudan: findings from a Household Survey. PLoS ONE. 15(12): e0243969.

[28]. Yaya, S., Ghose, B., Udenigwe, O., Shah, V., Hudani, A., Ekholuenetale, M., 2019, Knowledge and attitude of HIV/AIDS among women in Nigeria: a cross-sectional study. *Eur J Public Health* 29(1):111-117. doi: 10.1093/eurpub/cky131. PMID: 30053009.

[29]. Seifu, B. L., Eshun, G., Tesema, G. A. *et al.*, 2024, Comprehensive knowledge about HIV/AIDS and associated factors among reproductive age women in Liberia. *BMC Public Health* **24**, 619 (2024). https://doi.org/10.1186/s12889-024-18105-9

[30]. Anthony, M., Paphani, D., Keletso, M., Morongwa, D., Tshephang, K., Fredah, R., GodfreyM R., 2019, Determinants of comprehensive knowledge of mother to child transmission (MTCT) of HIV and its prevention among Zimbabwean women: Analysis of 2015 Zimbabwe Demographic and Health Survey, *Alexandria Journal of Medicine*, 55:1, 68-75, DOI: 10.1080/20905068.2019.1667114.

[31]. Kawuki, J., Gatasi, G., Sserwanja, Q., Mukunya, D., Musaba, MW., 2023, Comprehensive knowledge about HIV/AIDS and associated factors among adolescent girls in Rwanda: a nationwide cross-sectional study. *BMC Infect Dis.* 2023 Jun 7;23(1):382. doi: 10.1186/s12879-023-08187-y. PMID: 37286932; PMCID: PMC10246540.

[32]. Chris, G., Stephen, O., Samuel, D., Frances, B. C. V., Seth, A., 2020, "Comprehensive Knowledge of HIV and AIDS among Ghanaian Adults from 1998 to 2014: A Multilevel Logistic Regression Model Approach", *Scientifica*, vol. 2020, Article ID 7313497: https://doi.org/10.1155/2020/7313497

[33]. Nigeria Demographic and Health Survey (NDHS,2018). Retrieved from https://www.dhsprogram.com/pubs/pdf/FR359/FR359.pdf

[34]. Yaya, S., Ghose, B., Udenigwe., Shah, V., and Hudani, A., 2018, Knowledge and attitude of HIV/AIDS among women in Nigeria: a cross-sectional study. doi:10.1093/eurpub/cky131. PMID:30053009.

[35]. Oginni, A. B., Adebajo, S. B., Ahonsi, B. A., 2017, Trends and Determinants of Comprehensive Knowledge of HIV among Adolescents and Young Adults in Nigeria: 2003 - 2013. Afr J Reprod Health; 21(2):26-34. doi: 10.29063/ajrh2017/v21i2.4. PMID: 29624937.

[36]. Gebremedhin, S. A., Youjie, W., Tesfamariam, E. H., 2017, Predictors of HIV/AIDS Knowledge and attitude among young women of nigeria and democratic republic of congo: Cross-Sectional Study. *J AIDS Clin Res* 8: 677. doi: 10.4172/2155- 6113.1000677.

[37]. Ripon, R. K., 2023, Determinants of HIV/AIDS prevention and transmission knowledge factors among women aged15-49: a trend analysis based on the Bangladesh Demographic and Health Survey. Retrieved from https://www.socialmedicine.info/index.php/socialmedicine/article/view/1619

[38]. Tetteh, J. K., Frimpong, J. B., Budu, E., et al., 2022, Comprehensive HIV/AIDS knowledge and HIV testing among Men in sub-Saharan Africa: a multilevel Modelling. *Journal of Biosocial Science*. 975-990. Doi: 10.1017/S002193202100560.

[39]. Kareem, Y. O., Dorgbetor, C. I., Ameyaw, E. K., et al., 2023, Assessment and associated factors of comprehensive HIV knowledge in an at-risk population: a cross-sectional study from 19,286 young persons in Nigeria. *Therapeutic Advances in Infectious Disease*. 2023;10. doi:10.1177/20499361231163664.

[40]. Bhattacharyya, A., Chakraborty, R., Raj, T., Padhi, B. K., Khubchandani, J., Satapathy, P., Rustagi, S., Chattu, V. K., 2023, Comprehensive Knowledge about HIV/AIDS among Women of Reproductive Age in India. *Epidemiologia* **2023**, *4*,

492-504.
https://doi.org/10.3390/epidemiologia4040041
[41]. Ramos, N. N. V., Fronteira, I., Martins, M. R. O., 2023, Comprehensive Knowledge of HIV and AIDS and Related Factors in Angolans Aged between 15 and 49 Years. *Int. J. Environ. Res. Public Health* **2023**, *20*, 6816.
[42]. Izudi, J., Kadengye, D. T., 2022, Effect of comprehensive knowledge of HIV on risky sexual behaviours associated with HIV transmission among adult Ugandans: a propensity score-matched analysis *BMJ Open* 2022;**12:** e064011. doi: 10.1136/bmjopen-2022-064011.