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Predictive Factors of HIV Testing Uptake among Pregnant Women in Nigeria- 2013 Demographic Health Survey

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ABSTRACT

INTRODUCTION: In sub-Saharan Africa countries such as Nigeria, the rate of Mother-to-child- transmission (MTCT) of HIV is notably high. Despite the availability of prenatal care services to prevent MTCT of HIV, Nigeria still records a higher rate of new pediatric HIV infections compared to other countries in the region. HIV counseling and testing during antenatal care is necessary as it serves as an entry point for Prevention of Mother-to-child-transmission (PMTCT).

AIM: This study aims to determine factors that are associated with HIV testing uptake during antenatal care (ANC) among women in Nigeria.

METHODS: Cross-sectional data from the 2013 Demographic Health Study on women aged 15-49 years (n=3410), who attended at least one ANC visit was used recruited for this study. The outcome variable was HIV testing during ANC. Predictor variables included various mothers' level characteristics (awareness of the mode of transmission, prevention methods of HIV, age, and educational level), demographic characteristics (place of residence, the region of residence, facility for ANC, and workers at ANC), and religious affiliation. Odds ratio from univariate and multivariate logistic regression methods were used to determine the association between the predictor variables and odds of HIV testing during ANC.

RESULTS: Over 50% of the sample were tested for HIV during ANC visits. All the demographic variables, mothers level factors, and sociocultural factors were significantly associated with increased odds of HIV testing uptake. Urban residence participants were 2 times more likely to take the test than the rural residence participants. Christians were 1.3times more likely to be tested than Muslims. Women who received care at government-owned facilities were 1.2 times more likely to be tested for HIV than women who received care at private-owned medical facilities. HIV testing tended to increase with increased levels of education. Women who were 24 - 49 years of age were more likely to be tested for HIV compared to women who were younger than 24 years of age. Compared to women who had no comprehensive knowledge of HIV transmission, women who knew about transmission during delivery (AOR =1.31; 95%CI:1.08 - 1.59), and drugs for PMTCT (AOR=2.28; 95%CI:1.89 - 2.68) were more likely to be tested for HIV during ANC. Women who were attended to by skilled workers were more likely to be tested than women attended to by unskilled workers(AOR=2.11; 95%CL:1.63 – 2.71).

CONCLUSION: In this study, factors driving HIV uptake during ANC was found to be rooted in demographic characteristics, mothers' level characteristics, and socio-cultural factors. Thus, addressing modifiable factors such as availability of government health facilities, and skilled workers may lead to a higher uptake of HIV testing during ANC among women. This will contribute to a notable reduction in the incidence of MTCT HIV infections in Nigeria

**PREDICTIVE FACTORS OF HIV TESTING UPTAKE AMONG PREGNANT WOMEN
IN NIGERIA - 2013 DEMOGRAPHIC HEALTH SURVEY**

By

OGOCHUKWU JULIET EZEIGWE

A Thesis Submitted to the Graduate Faculty of Georgia State University in Partial Fulfillment of
the Requirements for the Degree

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AUTHORS STATEMENT

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CHAPTER I

INTRODUCTION

1.1Background

Infection from the Human Immune-deficiency Virus (HIV) is a global pandemic that has been reported in almost every country in the world. HIV infection remained a significant public health challenge, especially in low- and middle-income countries. Mother-to-child transmission (MTCT) of HIV accounts for nearly 90% of cases among children (Joint United Nations Programmed on HIV/AIDS (UNAIDS, 2017). MTCT of HIV transmission occurs through various means, including utero and intra-partum (15-30%), breastfeeding (20-45%) and vaginal delivery (60-70%) (World Health Organization ((WHO),2009). Various studies have suggested that antiretroviral (ARV) drugs given to pregnant women and their newborn babies is associated with reduced risk of mother-to child transmission of HIV (Guay *et al.,* 1999). The WHO also issued an advisory recommending the use of antiretroviral (ARV) drugs for treatment of HIV-Positive pregnant women and for the prevention of HIV infection in infants (WHO,2009).

Despite the global efforts to reduce or eliminate MTCT of HIV, Sub-Saharan African countries like Nigeria have continued to record high transmission rates (WHO,2017). In Western and Central Africa, approximately 58,000 children aged between 0-14 months were diagnosed with MTCT-HIV in 2018. Nearly 41% of these children lived in Nigeria, the country with the biggest HIV burden in the region (UNAIDS, 2019). According to the National Agency for Control of AIDS (NACA), the most common routes of pediatric HIV infection in Nigeria occur during pregnancy (10%), labor (15%) and delivery (60-70%) and during breastfeeding (NACA,2014).

The predisposing factors of vertical transmission of HIV from mother to child in Nigeria include; poor use of antenatal services, delivery outside health facilities without the help of a skilled birth attendant, low prevalence of exclusive breastfeeding, and poor access and use of reproductive health care (NACA, 2017).

The prevention of mother to child transmission of HIV program started in Nigeria in 2001 in 6 tertiary health facilities but has steadily increased to involve 7,256 sites across the 36 states of the country and its capital, Abuja by 2016. Elimination of Mother to Child Transmission (EMTCT) of HIV is among the five thematic areas of the National HIV and AIDS Strategic Plan (NSP) that aims to directly reduce the risk and transmission of HIV, incidence of new HIV infection, and HIV- and AIDS-related morbidity and mortality. The NSP aims to achieve this by increasing and integrating PMTCT service delivery points at primary health facilities, private health facilities, and community-based facilities by 2021 (FMoH, 2010; NACA, 2017).

However, despite the introduction of Prevention of Mother to Child Transmission (PMTCT) and its spread across the country, Nigeria is among the countries with limited coverage of PMTCT services. This explains why little improvement in reduction of new infections among children has been observed in the country (UNAIDS, 2019). In 2018, about 23,780 children aged between 0-14years were living with HIV/AIDS in Nigeria. The number of pregnant women receiving antiretroviral medicine for PMTCT in Nigeria decreased from 60,000 in 2014 to 44,00 between 2010 and 2018, with treatment coverage diminishing   from 63% to 44% over the same period (UNAIDS, 2019; Liellie *et al.,* 2019). Challenges to the implementation   of PMTCT in Nigeria ranges from operational to persistent enrolment to retention including health system-

related challenges such as difficulty in identifying HIV-infected pregnant women because of low uptake of prenatal care, lack of knowledge about the national guideline for PMTCT among healthcare workers, lack of a national unique identifying system to enhance data quality, and interrupted supply of medical commodities to health care facilities (Oladele *et al.,* 2017; Olakunde *et al.,* 2019).

The increase in MTCT seen in Nigeria could be due, in part, to the decline in the number of women receiving antiretroviral drugs, low retention in care and adherence to antiretroviral therapy or nonacceptance of HIV testing during antenatal care(ANC), that leads to delay in the commencement of antiretroviral therapy(Ekanem E.E and Gbadegesin A,2004). The key approach to reduction of MTCT of HIV involves early HIV counselling and testing during ANC, which aims to enroll and retain pregnant women who tested positive in the ARV prophylaxis treatment regimen. Thus, understanding the factors that predict the acceptance of HIV testing during ANC visits is important in achieving reduction of perinatal transmission. It is based on this premise that the study seeks to understand factors that affect the acceptance of HIV counselling and testing during prenatal care among pregnant women in Nigeria**.**

1.2 Study Objective

The objective of this study is to assess the determinants of HIV testing uptake among pregnant women in Nigeria. The results of the investigation may help program managers in understanding the limiting factors that influence HIV testing uptake, to reduce that rate of MTCT and to guide intervention purposes.

1.3 Research Question

The main question for this study is: What factors predict HIV testing uptake among pregnant

women in Nigeria?

CHAPTER II

LITERATURE REVIEW

Bello *et al.,* (2011) examined the acceptability of voluntary counselling and testing (VCT) for HIV among 104 unregistered women in labor at university college Hospital Ibadan, Nigeria. Of the 104 women, 86.5% accepted to be counselled and tested. The prevalence of HIV infection was 6.7%. The study reported 99% of acceptance rate on VCT for HIV. Of 69 participants who had adequate knowledge of the mode of transmission of HIV, 59 accepted to be tested while 10 declined the test. The study indicates that women of lower educational status were more likely to accept testing in labor while age, parity, occupation, and knowledge of HIV had no influence on testing uptake during pregnancy and labor.

A cross sectional study that assessed the level of awareness of MTCT of HIV infection in Nigeria using the 2008 Nigeria Demographic Health Survey showed that the majority of the respondents were from the north east (24%) while 12.3% were from the south east geopolitical zone. Seventy percent of participants from the southeast region were aware of transmission by breastfeeding while the northwest demonstrated least awareness of transmission by breastfeeding (33.6%) and special drugs to prevent mother-to-child-transmission (22%). Among pregnant women, more than half were aware of mother-to-child- transmission by breastfeeding (51.5%), 28.6% were aware that the risk of MTCT could be reduced through the use of antiretroviral drugs and 26.1% were   aware that HIV could be transmitted by breastfeeding and the risk of MTCT could be reduced by taking antiretroviral drugs. The study also reported a direct correlation between level of education and knowledge of HIV transmission by breastfeeding and

the use of drugs for PMTCT. The higher educated the women were, the more aware they were about HIV transmission and prevention (Deji, S. A *et al.*,2016).

 Another survey carried out at primary health care centers in Sagamu, Ogun state; south-west region in Nigeria found that 97.8% of 333 pregnant women who were receiving antenatal care were aware of VCT. A total of 257 women in the study accepted to undergo voluntary counseling and HIV testing. The study indicated that religion, knowledge of benefits of prenatal HIV testing, self-perception of no risk of HIV infection and marital status are predictors of the acceptance of Prenatal HIV testing among the participants (Daniel O.J & Oladapo O.T, 2006).

In Ogun state Nigeria, a study assessed the factors driving the willingness to seek and undergo counselling and testing among 804 women attending antenatal clinics in Ijebu. A small proportion of the women have not heard of AIDS while majority have heard of AIDS (10.3% and 89.8% respectively). Almost all the participants who have heard of AIDS (90%) were willing to test and only 79.3% of those who have no knowledge of AIDS were willing to test. Willingness for CT was positively associated with education. The study identified four key factors that were associated with willingness for CT: educational attainment, perception about result confidentiality, perception of higher levels of social support from relatives, and not fearing a blood test. It concluded that those who expressed their unwillingness for counselling and testing are afraid of social stigma and rejection if tested positive (Adeneye *et al.,*2007)

The barriers to antenatal care use among non-users of Antenatal care services was examined by Fagbamigbe and Idemudia (2105) using the 2012 National HIV/AIDS and Reproductive Health

Survey (NARHS Plus II). Among the 6299 women of reproductive age, 2199 (34.9%) respondents did not attend ANC clinics. The barriers to ANC were assessed using the reported social characteristics such as geo-political zone, place of residence, wealth index status, educational level, age and marital status. Majority of the non-user were women living in the rural areas(82.5%), had no formal education (57.3%),from the Northwest region of Nigeria (42.1%), aged between 25- 34(42.5%),poorest quintiles (42%),Islam(65.4%), and employed (96.5%).More than half of the non-users reported having problems with getting money to use ANC services (56.2%), while 44.1% claimed they do not because of availability of transport fare. The study concluded that non-use of ANC was highly associated with being a poor resident in a rural area, currently married, less educated, resident in certain geopolitical zones (especially people women from the Northern region), and availability and accessibility of ANC providers.

A study that assessed the factors that determine the uptake of HIV testing during antenatal care and during delivery in Nigeria showed that among the 13,352 women aged 15-49 years, 53% of the women were tested for HIV during ANC and only 6% during labor. Women aged between 20-49 years, resident in the southern region and urban areas (66.3%), and with higher wealth index were more likely to test for HIV during ANC and between labor and delivery. For instance, 66% of those living in urban settlements were tested, compared to 38% of those living in the rural settlements. Majority of the women in the study had a good knowledge of mode of MTCT (by delivery-57.8%; by breastfeeding-57.4%; during pregnancy- 56.1%). Further, women who did not receive counselling on MTCT of HIV, testing for HIV had a lower probability of being tested during ANC (Udoh &Ushie, 2019).

CHAPTER III

METHODS AND PROCEDURE

3.1Study design and Area

This study used secondary data analysis using a dataset from the Nigeria National Demographic and Health Survey (NDHS) of 2013. The 2013 NDHS is the fourth survey implemented by the National Population Commission, designed to collect data and provide information on various health issues such as maternal and child health, fertility, family planning, HIV/AIDS, etc. The full report of the 2013 NDHS contains the details of the methodology used in the survey, which is summarized below (DHS,2013).

The sampling frame used for the 2013 NDHS is the Population and Housing Census of the Federal Republic of Nigeria (NPHC), which was conducted in 2006 by the National Population Commission. Nigeria is divided into 36 states. Each state is subdivided into local government areas (LGAs), and each LGA is divided into localities. The 2006 NPHC subdivided each locality into convenient areas called census enumeration areas (EAs). The primary sampling unit (PSU), referred to as a cluster for the 2013 NDHS, was defined on the basis of EAs from the 2006 EA census frame. The 2013 NDHS samples were selected using a three-stage cluster design consisting of 904 clusters, 372 in urban areas and 532 in rural areas. A total of 40,680 households were sampled (16,740 urbans, and 23,940 in rural areas). Through equal probability systematic sampling, a fixed number of 45 households were selected from every cluster. The interviewer conducted an interview only in pre-selected households. The 2013 NDHS included all women aged 15-49 years and all men aged 15-59 in the selected households.

Data from the 2013 NDHS was collected with a questionnaire that was developed by the MEASURES DHS. The questions were adapted to reflect the population and health issues relevant to Nigeria. Four questionnaires were used for the 2013 NDHS: The Household Questionnaire, the Woman's Questionnaire, Man's Questionnaire, and the Biomarker Questionnaire. The questionnaires were translated into Hausa, Yoruba, and Igbo, representing the three major tribes in Nigeria. The survey protocol was reviewed and approved by the National Health Research Ethics Committee of Nigeria (NHREC) and Institutional Review Board of Nigeria. Of the number of the 4,329 households selected, 38,552 were successfully interviewed yielding a response rate of 99%. In the households interviewed, 39,902 women aged 15-49 years and 18,229men aged 15-59 years were eligible for an interview. Interviews were completed with 38,948 women and 17,359 men yielding a response rate of 97.6% and 95.2% respectively.

3.2 Study Sample

This study involved the analysis of data from women aged between 15-49 years in Nigeria, who were interviewed in the 2013 NDHS. The samples were selected because the study is focused on women of childbearing age. Women who had at least 1 antenatal visit during pregnancy were selected(n=13,410)

3.3 Variables Used in the Analysis

Outcome variable

The outcome variable of interest is HIV testing during ANC and was classified as either Yes (had HIV test) and No (had no HIV test). The outcome variable was obtained by combining two variables (offer of HIV during ANC and tested for HIV during ANC) from the questionnaire.

Those who were offered HIV test during ANC and got tested together with those who were not offered HIV test during ANC but got tested were classified as 'YES'. Participants who were offered HIV test, but they did not get tested, and those who were not offered, and they did not test were classified as 'No'.

Predictor Variables

Based on their availability in the dataset, the following demographic and healthcare variables were selected as predictors variables: Age (15-19, 20-24, 25-29, 30-34,35-39,40-44,45-49 years); level of Education (No education, Primary, secondary, Higher); level of literacy(cannot read, read part of a sentence, able to read a whole sentence, No card with language, visually impaired);Religion(Catholic, Islam, Traditionalist, Other Christian, Other forms of religion); Place of residence (Urban, Rural); Region of residence (north-central, northeast, northwest, southwest, south-south, southwest); Place of ANC (Government hospital, Private hospital, Other public sector, Respondent home, Other places); Health Personnel at ANC (Doctor, Nurse/Midwife, Auxiliary midwife, traditional birth attendant, community village worker, community extension worker, Other health Personnel). Knowledge of mode of HIV transmission was assessed using a question with a three-level response: Can the virus that causes AIDS be transmitted from a mother to her baby : During pregnancy (yes, no, don't know); During delivery (yes, no, don't know); By breastfeeding (yes, no, don't know).

3.4 Data Management and Analysis

The data were analyzed using SAS 9.4 software suite developed by the SAS institute used for advanced Statistical analysis. The survey used a cluster sampling technique; thus, all analyses

accounted for the cluster sampling design of the survey. Thus, the sampling weight, strata and primary sampling unit values were used in generating all estimates. Binary and multivariate logistic regression analysis was used to estimate the odds (with 95% confidence interval) of HIV testing during ANC among the selected predictor variables. A significance level of 0.005 was used to evaluate any observed associations.

3.5 Ethical Consideration

The study was done using publicly available secondary data. The data has no risk of undue disclosure and other ethical concerns to study subjects.

CHAPTER IV

RESULTS

4.1 Socio-demographic and clinical characteristics

Table 1A shows the demographic characteristics of the study participants. More than half of the participants were tested for HIV during the antenatal visit (52.5%). More women were sampled from the rural areas (51.8%) and greater proportion who are urban resident tested for HIV (66.4%). About 64.2% of women who are Christians tested for HIV compared to 40.6% of those who were Muslims. More women were sampled form the government hospital (74.1%) followed by Private hospital (22.9%), home and other form of healthcare facility (2.9% and 0.01% respectively).Majority of the women who were attended to by skilled workers(55.1%) tested for HIV compared to women who were attended to by unskilled worker(24.1%). The highest proportion (26.8%) of women were aged between 25-29 years. Majority of the women (24.4%) were sampled from the northwest but the proportion (39.4%) of women who tested was low compared to other regions.

As shown in Table1B, the level of literacy among the women were: Cannot read (42.1%), Read part of a Sentence (8.4%), Able to read a sentence (49.2%). The proportion of study participants who tested for HIV according to level of education were: No education (28%), Primary education (43.2%), Secondary education (66.5%) and Higher Education (89.0%). The majority of study participants who were knowledgeable about MTCT. The majority of study participants who were knowledgeable about MTCT during pregnancy (56.0%), during delivery (68.5%), by breastfeeding (57.3%), and knew about drugs for PMTCT (61.0%) were tested for HIV.

4.2 Factors associated with HIV testing

Table 2 shows the association between the predictors and HIV testing uptake during prenatal care. The odds of HIV testing were higher in urban areas than in rural (AOR= 1.96; 95% CI: 1.62 – 2.38). Compared to Muslims, Christians were more likely to be tested for HIV (AOR= 1.33, 95% CI:1.08 – 1.65). Women from the south-south region had a higher odd of testing than those in the southwest region (AOR= 1.52; 95% CI: 1.15 – 2.01). Women who were attended to by a skilled workers (Doctor, Nurse/Midwife, Auxiliary midwife) had a higher odds(AOR= 2.11; 95% CI: 1.63 – 2.71) of being tested for HIV than those who were attended to by an unskilled workers (Traditional birth attendant, Community village worker, Community extension worker). There were no significant differences in HIV testing uptake by age group among the women. Women with primary and higher levels of education had a higher odds of HIV testing than those with no education. The odds of HIV test were higher among women who had the knowledge that MTCT can occur during delivery (AOR=1.31, 95% CI=1.46 – 1.90), and knew of drug for (AOR=2.28, 95% CI= 1.89 – 2.68).

Table1A: Descriptive and summary statistic of ANC women aged between 15-49years(N=13410)

Characteristics	Sample size (n)	Weighted %	Took HIV Test n (%) No 5838(47.5)	Yes 6631(52.5)
Place of Residency				
Urban	6016	48.1	1944(33.6)	3861(66.4)
Rural	7394	51.8	3894(61.4)	2770(38.6)
Religion				
Christian	6919	49.4	2398(35.8)	4195(64.2)
Islam	6337	49.9	3352(59.4)	2383(40.6)
Traditionalist	93	0.7	56(67.2)	26(32.8)
Other	2	0.0	2(100.0)	0(0.0)
Region				
north central	2427	15.9	919(48.8)	1188(51.2)
northeast	2534	15.1	1244(57.0)	1069(43.0)
northwest	2579	24.4	1572(60.6)	868(39.4)
southeast	1627	12.2	577(34.6)	1026(65.4)
southsouth	1782	11.7	594(34.0)	1063(66.0)
southwest	2461	20.9	932(39.7)	1417(60.3)
Place of ANC				
Government hospital	10022	74.1	4442(49.1)	4825(50.9)
Private Hospital Clinic	2840	22.9	1047(38.3)	1682(61.7)
home (respondent or other)	356	2.9	244(77.4)	60(22.6)
Others	14	0.1	8(68.2)	3(31.8)
Personnel at ANC				
skilled	11925	90.9	4925(44.9)	6274(55.1)
unskilled	1390	8.9	862(75.9)	327(24.1)
Others	20	0.2	11(63.6)	7(36.4)
Mothers age in group				
15 - 19	704	5.3	383(65.4)	228(34.6)
20 - 24	2517	18.9	1213(53.0)	1107(47.0)
25 - 29	3582	26.8	1487(54.0)	1847(56.0)
30 -34	2930	21.9	1187(43.2)	1574(56.8)
35 -39	2185	16.3	885(43.3)	1181(56.7)
40 -44	1075	7.8	473(48.6)	529(51.4)
45-49	416	3.0	210(58.5)	165(41.5)

Table1B: Descriptive and summary statistic of ANC women aged between 15-49years(N=13410)

Characteristics	Sample size (n)	Weighted %	Took HIV Test n (%) No 5838(47.5)	Yes 6631(52.5)
level of education				
No education	3965	30.4	2393(72.0)	994(28.0)
primary	3172	23.0	1646(56.8)	1323(43.2)
secondary	4962	37.2	1641(33.5)	3172(66.5)
higher	1311	9.4	158(11.0)	1142(89.0)
literacy/Sentence Read				
Cannot read	5538	42.1	3236(68.6)	1594(31.4)
Read part of sentence	1171	8.4	594(53.7)	521(46.3)
Able to read whole	6599	49.2	1956(29.9)	4480(70.1)
Knowledge of HIV/AIDS				
● **During pregnancy**				
No	3429	28.4	1648(49.2)	1704(50.8)
Yes	8280	64.4	3486(44.0)	4665(56.0)
Don't know	994	7.1	700(72.3)	260(27.7)
● **During delivery**				
No	2978	23.7	1574(55.0)	1324(45.0)
Yes	8641	68.5	3498(42.3)	5015(57.7)
Don't know	1083	7.8	761(71.3)	290(28.7)
● **By breastfeeding**				
No	1844	15.0	1096(61.6)	702(38.4)
Yes	10000	78.9	4100(42.7)	5731(57.3)
Don't know	859	6.1	637(75.2)	197(24.8)
● **Drugs for PMTCT**				
No	1069	9.5	604(57.4)	448(42.6)
Yes	8285	78.9	3069(39.0)	5075(61.0)
Don't know	1223	11.6	702(59.0)	506(41.0)

Table 2: Association between demographic and clinical care characteristics and HIV testing during ANC visit among women, 2013 NDHS

Characteristics	Crude OR (95%CI)	Adjusted OR (95%CI)**
Place of Residency		
Urban	3.13(2.65 – 3.69)	1.96(1.62 – 2.38)
Rural	**ref**	**ref**
Religion(V130)		
Christian	2.63(2.24 - 3.08)	1.33(1.08 – 1.65)
Islam	**ref**	**ref**
Traditionalist	0.71(0.39 - 1.32)	1.02(0.41 - 2.52)
Region		
north central	0.69(0.55 – 0.88)	1.13(0.87 – 1.49)
northeast	0.49(0.37– 0.66)	0.99(0.70 – 1.42)
northwest	0.43(0.33 – 0.55)	0.79(0.58– 1.08)
southeast	1.25(0.94 – 1.65)	1.13(0.84 – 1.52)
south south	1.28(1.01 – 1.62)	1.52(1.15 – 2.01)
southwest	**ref**	**ref**
Place of ANC		
Government hospital	0.64(0.54 – 0.76)	1.21(1.04 – 1.42)
Privat Hospital Clinic	**ref**	**ref**
home (respondent or other)	0.18(0.12 - 0.26)	0.39(0.23 - 0.68)
Others	0.29(0.07 - 1.15)	0.58(0.16 - 2.17)
Personnel at ANC		
skilled	3.87(3.16 - 4.74)	2.11(1.63 - 2.71)
unskilled	**ref**	**ref**
Others	1.80(0.63- 5.17)	1.42(0.44 - 4.60)
Mothers age in group		
15 - 19	0.75(0.56 - 1.00)	0.72(0.49 - 1.04)
20 - 24	1.25(0.96- 1.62)	0.92(0.67 - 1.27)
25 - 29	1.73(1.34 - 2.22)	1.11(0.82 - 1.52)
30 -34	1.86(1.46 - 2.37)	1.11(0.82 - 1.50)
35 -39	1.85(1.44 - 2.38)	1.27(0.93 - 1.74)
40 -44	1.49(1.14 - 1.96)	1.21(0.85 – 1.67)
45-49	**ref**	**ref**

** Odds ratio mutually adjusted for all demographic and clinical characteristic

Table 2(continue): Association between demographic and clinical care characteristics and HIV testing during ANC visit among women, 2013 NDHS

Characteristics	Crude OR (95%CI)	Adjusted OR (95%CI)**
level of education No education primary secondary higher	**ref** 1.96(1.68 – 2.29) 5.11(4.34 – 6.01) 20.8(16.24– 26.62)	**ref** 1.35(1.10– 1.66) 2.56(1.77– 3.70) 8.14(5.37 – 12.33)
literacy/Sentence Read Cannot read Read part of sentence Able to read whole	**ref** 1.88(1.58 – 2.24) 5.12(4.49 – 5.84)	**ref** 1.22(0.98 – 1.51) 1.24(0.87 – 1.76)

Knowledge of HIV/AIDS
  ● **During pregnancy**
    No
    Yes
    Don't know
 	
  ● **During delivery**
    No
    Yes
    Don't know
 	
  ● **By breastfeeding**
    No
    Yes
    Don't know
 	
  ● **Drugs for PMTCT**
    No
    Yes
    Don't know
	ref
	1.23(1.07 – 1.42)
	0.37(0.30-0.46)
	
	ref
	1.67(1.46 - 1.90)
	0.49 (0.40– 0.60)
	
	ref
	2.15(1.85 - 2.49)
	0.53(0.41 – 0.68)
	
	ref
	2.11(1.77 - 2.52)
	0.94(0.76- 1.16)
		ref
		0.57(0.47- 0.69)
		0.617(0.40 – 0.95)
		
		ref
		1.31(1.08 - 1.59)
		1.00(0.71 – 1.42)
		
		ref
		1.10(0.81 - 1.51)
		1.14(0.64 – 2.02)
		
		ref
		2.28(1.89 - 2.68)
		1.05(0.84– 1.31)

** Odds ratio mutually adjusted for all demographic and clinical characteristics

CHAPTER V

DISCUSSION

HIV testing during ANC plays a crucial role in the prevention of mother-to-child-transmission, as early detection helps to place pregnant women in antiretroviral treatment. Evidence-based research is needed to understand the factors that affect HIV testing uptake during ANC visit. It is based on this premise that this study investigated the predictive factors of HIV testing during ANC among pregnant women in Nigeria using the 2013 NDHS dataset. The findings of this study showed that 52.5% of eligible Nigeria women included in this study were offered and tested for HIV during ANC visits. The National Agency for the Control of AIDS has a strategic objective of at least 95% of pregnant women accessing HIV Testing Services (HTS) by 2021(NACA,2017). This result can serve as a baseline that can be used to examine progress towards achieving this objective.

There was no significant difference by age in the likelihood of being tested for HIV among women. Other studies have had contradictory findings, with one showing that women of younger age in Northern Ethiopia were less likely to be tested for HIV (Alemu *et al.*,2017), while the other Awka, Nigeria reported that most women who did not test for HIV during ANC were mainly adolescent and young women aged 15-24 years (Okonkwo *et al.*,2007). The place of ANC visit was shown to be significantly associated with HIV testing uptake. The number of women who tested for HIV during ANC visits in the government or public owned clinic was 1.2 times the number of women who were tested at the private hospital clinic. The reason for the difference seen among private and public hospitals could be poor provision of testing services in

the private hospitals which is in line with the result of a study that showed that more than 4 out of 10 every facility without PMTCT were private facilities (Oladele *et al.*, 2017).

The personnel at ANC were shown to be independently and positively associated with HIV testing uptake. Women who received their ANC services from skilled professionals (doctor, nurse and midwives) were more likely to receive HIV testing compared to those who received their services from unskilled workers (community extension workers, village extension workers and traditional birth attendants). A study showed similar findings of high rate of HIV test among women who were attended to by skilled workers compared to unskilled workers (Gunn *et al.*,2016). On one hand, studies in Nigeria have noted uneven distribution in the regional differences of childbirth attended by skilled and unskilled birth workers. Birth attended by skilled worker is highest in the south(73.4 - 78.8%), followed by North-central(46.5-67.2%), and least in the North(16.1- 27.8%) while attendant by unskilled workers is highest in the North;77.2 - 86.5%, less in North-Central;7.2 - 13.4% and least in the South;6.3 - 9.5% (DHS,2013). A likely possible reason which could explain the difference in birth attendant usage is that the northern part of Nigeria is highly dominated by Islam and studies have shown that Muslims women are more likely to use unskilled birth attendant due to reason such as maintaining the sanctity of female body in Islam, lack of privacy in public health care facilities which prevent them from saying their prayers, and health care provider insensitivity and lack of knowledge about Muslim women's religion and cultural practices (Ganle,2015). Furthermore, Christians were more likely to test for HIV than Muslims. This coincides with the study by Al-Mujtaba *et al.*(2016) that showed the uptake of maternal health services appears to be minimally

influenced by religion. Religion has been shown to play a key role in HIV testing behavior (Zou *et al.*,2009)

Based on the findings of this study, educational status and literacy played an important role in determining HIV testing during ANC visits. The findings revealed a higher odd of test among women with primary education and higher when compared with women with no level of education. This finding reaffirms results from a similar study conducted in Mozambique in 2019 which observed that the likelihood of testing for HIV during ANC visit is strongly associated with educational attainment (Yaya *et al.*,2019). The study reported about 1.8 times likelihood of an educated pregnant woman testing compared with pregnant women with no education. Education has been noted as a prominent socioeconomic factor that impacts health-relate seeking behavior. Educated women are more likely to be able to acquire information about health risk factors associated with pregnancy which enable them to take preventive measures and reach out for professional help. (Yaya *et al.*,2017). Similarly, the uptake of HIV testing during ANC was higher among the more literate categories.

Another major determinant of HIV testing uptake during ANC is awareness about MTCT and PMTCT. Pregnant women attending ANC who had knowledge about prevention of mother-to-child transmission of HIV are more likely to test for HIV during Antenatal care (Alemu *et al.*,2017; Ejigu & Biniyam, 2018). In this study, participants who had knowledge of MTCT were more likely to test for HIV. Similarly, pregnant women who had knowledge of the drugs for PMTCT were more likely to test for HIV than those who were not aware. The possible

explanation of this observation could be due to higher perceived benefit of HIV testing among pregnant women who were aware of MTCT and PMTCT.

Furthermore, women from urban areas are more likely to be tested for HIV compared with women from the rural areas. This is in line with studies which showed a higher odd of testing among pregnant women living in the urban area than the rural area (Ejigu & Biniyam,2018).

Study Limitation and Strength

This study is a cross sectional study that made use of a nationally representative survey to report the factors that predict HIV testing uptake during ANC in Nigeria. This study has several limitations, First, study participants may not remember past events, which could potentially lead to recall and reporting bias. However, restrictions were made as to select the variable the participants are more likely to remember to reduce recall bias. The strength of the study is that the outcome variables were combined in such a way to limit collinearity and were not sampled using convenience samples. The large sample size of the overall population is a major strength as it minimizes random errors in the study estimates. Even though more than half of the sample size is from the Northern region, this will have little impact on the results as a greater population of Nigerians are from the Northern State.

CONCLUSION

In this study, a large proportion of pregnant women who received ANC visits were not tested for HIV, an indication that there is a need to scale up HIV Testing Services (HTS) in Nigeria in order to eliminate new pediatric infections. Mothers level factors (such as educational level, age, literacy, knowledge of MTCT of HIV/AIDS, and drug for PMTCT) and demographic characteristic (place of residence, religion, region, place of ANC, and medical personnel at ANC) were independent predictors of HIV testing uptake. All the factors were shown to be associated with HIV testing. This suggests a need for the expansion of HIV testing services during ANC to rural areas and other regions. The initiation of community level education about HIV, MTCT and PMTCT for women of reproductive age, who reside in the rural areas could help to improve uptake of HIV testing services during pregnancy and reduce the rate of MTCT. Furthermore, an education and counselling session, that is appropriately tailored for the educational and literacy levels of pregnant women, on the first day of ANC visit will also help improve HIV testing uptake

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