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Stigma and Discrimination's Effect on HIV Testing of Pregnant Women in Nigeria

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Abstract

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Dissertation Submitted in Partial Fulfillment

of the Requirements for the Degree of

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Abstract

The utilization of HIV testing services among pregnant women in Nigeria has not been optimal. Although much is known about the determinants of HIV testing among pregnant women, there is a gap in knowledge on determinants for pregnant women infected with the virus, specifically whether stigma and discrimination are barriers. The purpose of this study was to examine the effect of stigmatizing attitudes and personal knowledge of discriminatory practices towards persons living with HIV/AIDS on the decision by pregnant Nigerian women aged 15-49 years to test for HIV during antenatal visits or childbirth. The health belief model served as the study's theoretical foundation. A quantitative cross-sectional design was used. Secondary data for 659 pregnant women aged 15–49 from the 2013 Nigeria Demographic Health Survey were analyzed. Multivariable regression analysis showed no difference in the likelihood of testing for HIV between pregnant women with positive and negative attitudes towards HIV-infected persons (AOR = 1.55, 95% CI: .59, 4.06), controlling for the effects of educational level and place of residence. Similar results were found between pregnant women with knowledge and those without knowledge of discriminatory practices towards persons living with HIV and their testing for HIV (AOR = 1.61, 95% CI: .53, 4.92) controlling for the same covariates. Pregnant women with higher levels of education and those living in urban areas were more likely to test for HIV than those with no education and those living in rural areas. By designing policies and strategies that specifically address these factors, policymakers and healthcare stakeholders may increase HIV testing among pregnant women in Nigeria, advancing prevention efforts and expanding care and support services in the country, hence facilitating positive social change.

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Dedication

This study is dedicated to my wife Uchenna Nzelu and my three lovely daughters, Ifeoma, Chimamanda, and Chikamso Nzelu, for their patience, understanding, and support during the period of the Ph.D. program and Dissertation writing process that I committed most of my time.

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Finally, I want to thank God for making my dream of having a Ph.D. degree come true. Everything comes from him, and I return all honor and glory to Him.

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Chapter 1: Introduction to the Study

In this study, I explored the effect of stigmatizing attitudes and personal knowledge of discriminatory practices towards persons living with HIV/AIDS on the decision by pregnant Nigerian women aged 15-49 years to test for HIV during antenatal visits or childbirth. Research shows that sociocultural, economic, and biological factors contribute to women's vulnerability to contracting HIV infection (Frew et al., 2016; Sia et al., 2016; Yaya et al., 2016). HIV testing assists individuals to know their HIV status so that those who are seronegative may continue to engage in safe behaviors, while seropositive individuals may make an informed treatment decision regarding care and accessing available support services (World Health Organization [WHO], 2019).

The findings of this study may assist policy makers and healthcare stakeholders in designing strategies and programs to address the effect of stigma and discrimination on pregnant women's uptake of HIV testing. The study may have a positive social impact by reducing HIV transmission among the study population and reducing the number of children born with HIV. It may also conserve scarce funds to combat the spread and treatment of HIV/AIDS for other social services. This chapter includes the background of the study; the problem statement; the study purpose; the research questions (RQs) and hypotheses; the theoretical framework; the nature of the study; definitions of key terms; the assumptions, scope and delimitations, limitations, and significance of the study; and a summary. The chapter summary includes a transition to Chapter 2.

Background

Globally, about 37.7 million people were living with HIV at the end of 2020, with 1.5 million becoming newly infected each year with the virus and 0.68 million dying from AIDS-related illnesses (UNAIDS, 2020). Eighty-four percent of all the people living with HIV knew their status; 73% had access to treatment, while 66% were virally suppressed in 2020 (UNAIDS, 2020). The burden of HIV can be mostly found in sub-Saharan Africa, which accounts for an estimated two-thirds of all global HIV cases and 58% of global new HIV infections (UNAIDS, 2020). In 2020, out of the estimated 4.7 million people living with HIV in western and central Africa, women aged 15 years and above accounted for approximately 60% of the total number of cases (UNAIDS, 2020). Correct knowledge, positive attitudes, and appropriate behaviors concerning HIV/AIDS and its prevention methods are the pillars for preventing and controlling the disease (Atnafu Gebeyehu et al., 2019; Nubed & Akoachere, 2016; Teklehaimanot et al., 2016; UNAIDS, 2020). However, globally, it is estimated that about 16% of the individuals who are HIV positive do not know their status (UNAIDS, 2020). Testing for HIV is the entry point for treatment, care, and support among people living with HIV, and early treatment initiation facilitates reduced likelihood of transmission of the infection, better treatment outcome, and reduced morbidity and mortality (Evangeli et al., 2016; WHO, 2019). The availability of antiretroviral therapy has made it imperative to scale up testing strategies among populations at risk of HIV, and that has necessitated studying factors that may impact the HIV testing decision (Evangeli et al., 2016; WHO, 2019).

Women are more susceptible to HIV infection because transmission is mainly through the sexual route, making them prone to stigmatizing attitudes and discriminatory practices by individuals and the community if they are HIV infected. Women aged 15 years and above comprised 960,000 (56.47%) out of the 1.7 million Nigerians living with HIV/AIDS at the end of 2020 (UNAIDS, 2020). The rate of HIV infection in women of reproductive age in Nigeria (1.6 % in women 15-49 years vs. 0.6% in girls < 15 years) has contributed to the increasing number of HIV-infected children due to mother-to-child transmission (Federal Ministry of Health [FMoH], 2019; UNAIDS, 2020; WHO, UNICEF, & UNAIDS, 2011). Statistics from other West African countries show that the prevalence rate of HIV infection in women of reproductive age was 1.20%, 2.0%, 1.4 %, and 0.2% for Benin, Sierra Leone, Liberia, and Niger, respectively (UNAIDS, 2020). New infections occur 39, 18.6, 78, and 39 times more among Nigerian women 15 years and more than women from Benin, Sierra Leone, Niger, and Liberia, respectively. The prevalence of HIV infection in Nigeria is not considered high in terms of percentage but is of note due to the large population of Nigeria compared to these countries. New HIV infections in Nigeria occur 1.6 times more often among women 15 years and older than their male counterparts (UNAIDS, 2020). The impact of HIV/AIDS among Nigerian women and men includes rendering children orphans and vulnerable (UNAIDS, 2020). Increasing women's knowledge of, and positive attitude toward, HIV/AIDS preventive measures is necessary for reducing the overall prevalence of HIV at the population level (Atnafu Gebeyehu et al., 2019; Nubed & Akoachere, 2016; Teklehaimanot et al., 2016).

HIV counseling and testing are the leading strategies and pathways to prevention, treatment, care, and support services for HIV/AIDS. HIV testing is usually preceded by counseling so that individuals can be better positioned to make an informed decision about being tested for HIV (UNAIDS, 2020). HIV testing assists people to know their HIV status so that those who are seronegative may continue to engage in safe behavior while seropositive individuals may make an informed treatment decision and access available care and support services options (WHO, 2019). Although extensive literature exists on the effects of stigma and discrimination on pregnant women's self-reported HIV testing status (De Wet & Kagee, 2016; Jama et al., 2019; Meremo et al., 2016; Shodimu et al., 2017; Teklehaimanot et al., 2016), these issues persist and negatively impact the rate of HIV testing. Therefore, there is the need to explore further the associations between these barriers to HIV testing to gain more insight to develop appropriate interventions.

Problem Statement

The burden of HIV is highest in sub-Saharan Africa, which accounted for an estimated 58% of the global new HIV infections in 2020 (UNAIDS, 2020). In 2020, out of the estimated 4.7 million people living with HIV in Western and Central Africa, women accounted for approximately 60% of the total number of people living with HIV in these regions (UNAIDS, 2020). Correct knowledge, positive attitudes, and appropriate behaviors concerning HIV/AIDS and its prevention methods are the pillars for preventing and controlling the disease (Colombini et al., 2016; Nubed & Akoachere, 2016; Teklehaimanot et al., 2016). Nigeria is rated fourth globally among countries with the

highest HIV/AIDS burden, with an estimated 1,700,000 people living with HIV at the end of 2020 (UNAIDS, 2020). About 73% of Nigerians living with HIV/AIDS know their status (UNAIDS, 2020).

Sexual violence, poor negotiation of safe sex, poor economic empowerment, early or forced marriage, limited employment and educational opportunities, and other social and cultural practices account for the higher probability of HIV infection in women Globally (Frew et al., 2016; Sia et al., 2016). According to a study conducted in Nigeria, women of reproductive age 15-49 years are two times more likely to acquire new HIV infections than men of the same age group (FMoH, 2019). In Nigeria, the prevalence of HIV among women of this age group was 1.6%, while the antiretroviral coverage of women undergoing prevention of mother-to-child transmission program was 44% in year 2019 (FMoH, 2019; UNAIDS, 2020). Access to antiretroviral drugs requires that individuals know their status and that they have appropriate HIV knowledge and a positive attitude towards HIV prevention strategies such as HIV testing (WHO, 2016). To achieve HIV/AIDS epidemic control, Nigeria must meet the UNAIDS 90-90-90 Target by 2020. The performance on these targets as of 2020 showed that out of the 1.7 million Nigerians living with HIV, 90% (1.6 million) knew their status, with 86% (1.5 million) of them being on treatment (UNAIDS, 2020). Seventy-two percent of the 1.2 million Nigerians living with HIV were virally suppressed (UNAIDS, 2020). These performances have left some gaps to be met to end the HIV epidemic in Nigeria. Women of reproductive age 15 years and above in Nigeria represent 56% of the HIV-infected population and contribute significantly (45%) to the new infections (UNAIDS, 2020).

Women of reproductive age (15 years and above) are largely responsible for population growth through reproduction. Therefore, it is important that they have the appropriate HIV knowledge, the right attitude, and the prevention strategies to reduce HIV transmission among themselves and from mother to child by partaking in HIV testing. These prevention strategies begin with knowing one's status through HIV testing and the associated determinants. Inner City Fund (ICF) International implements United States Agency for International Development (USAID) funded Demographic and Health Surveys in over 90 countries of the world (The DHS Program, 2013). In Nigeria, ICF International provides technical and financial support to the National Population Commission (NPC) to implement Demographic and Health Surveys in Nigeria (National Population Commission (NPC) [Nigeria] and ICF International, 2014). The 2013 Nigeria Demographic and Health Survey (NDHS) reported that only about 27% of the women showed a comprehensive knowledge about HIV/AIDS, with 12% showing a positive attitude towards HIV/AIDS. The 2018 NDHS showed an increase in the comprehensive knowledge of HIV/AIDS, with 46% of women aged 15-49 years showing comprehensive knowledge and 50% showing a positive attitude toward HIV-infected persons (NPC & ICF, 2019). The 2018 NDHS did not collect data on HIV testing. A comparison between the findings of 2013 and 2018 NDHS shows an improvement in the comprehensive knowledge of HIV/AIDS and positive attitudes towards HIV-infected persons among women of reproductive age. Heterosexual sexual activity is the main mode of HIV transmission, and this contributes to the vulnerability of pregnant women to contracting the infection (FMoH, 2016; NPC & ICF, 2019). The consequences of pregnant women

contracting HIV include making children vulnerable to contracting the disease during pregnancy, labor, delivery, and breastfeeding or becoming orphans because of the death of their parents (Musarandega et al., 2020, Thapar et al., 2019). These risks have consequential effects on the already stretched health and social systems.

HIV counseling and testing are the main strategies and pathways to prevention, treatment, care, and support services for HIV/AIDS (WHO, 2019). Although extensive literature exists on the determinants of HIV testing among pregnant women, knowledge gaps still exist about determinants of testing among pregnant women infected with the virus (Alemu et al., 2017; Gunn et al., 2016; Meremo et al.,2016; Shodimu et al., 2017; Teklehaimanot et al., 2016). Stigmatizing attitudes and discriminatory practices, whether manifested by an individual against others or manifested against an individual by the community, other individuals, or healthcare workers, are reported barriers impacting HIV testing (Meremo et al., 2016; Shodimu et al., 2017). These stigmatizing attitudes and discriminatory practices by pregnant women, family members, and society are why individuals, including pregnant women, refuse HIV testing, avoid antenatal care services, and drop out of prevention of mother-to-child transmission programs (Colombini et al., 2016; Shodimu et al., 2017). HIV testing is influenced by many social and demographic factors such as marital status, educational level, socioeconomic status, gender, and age (Meremo et al., 2016; Shodimu et al., 2017; Teklehaimanot et al., 2016). Psychosocial and behavioral factors such as HIV/AIDS-related knowledge, attitudes, confidentiality, stigma and discrimination, knowledge or proximity to an HIV testing center, self-

perceived risk, and perceived benefits also influence HIV testing (Teklehaimanot et al., 2016).

Some of these factors facilitate the uptake of HIV testing by pregnant women, while some pose barriers. Only five of these factors that data were collected in the primary study (the 2013 NDHS data set) were analyzed in this study, and they include age categories, educational level, place of residence, religion, and marital status. The two types of stigma associated with HIV/AIDS are enacted and felt (internalized) stigma (Brennan-Ing, 2019). According to Brennan-Ing (2019), enacted stigma refers to "the prejudice, discrimination, and mistreatment that individuals and societies use to sanction people with HIV" (p. 240), while felt stigma refers to "the internalized feelings of shame, guilt, and fear that arise from the experience of enacted stigma" (p. 240). Stigma and discrimination remain some of those factors from the literature that negatively impact HIV testing by pregnant women (Alemu et al., 2017; De Wet & Kagee, 2016; Jama et al., 2019; Meremo et al., 2016; Shodimu et al., 2017; Teklehaimanot et al., 2016). They are interrelated concepts because stigma leads to or facilitates discrimination. A search of the literature showed a paucity of studies on the effect of pregnant women's knowledge of discriminatory practices towards persons living with HIV/AIDS on their decision to test for HIV.

Most of the existing literature is focused on pregnant women's stigmatizing and discriminatory attitudes against persons living with HIV/AIDS (Alemu et al., 2017; De Wet & Kagee, 2016; Jama et al., 2019; Meremo et al., 2016; Shodimu et al., 2017; Teklehaimanot et al., 2016). According to my review of the literature, researchers have

not considered pregnant women's knowledge of discriminatory practices against persons living with HIV/AIDS. The knowledge of discriminatory practices may serve as a barrier to HIV testing. When individuals know about these discriminatory practices, it may negatively impact their partaking in testing for HIV due to the fear of being a victim of these practices (Mohlabane et al., 2016). Therefore, this study may contribute to the knowledge gap by examining the impact of pregnant women's stigmatizing attitudes and their personal knowledge of discriminatory practices towards persons living with HIV/AIDS on their self-reported HIV testing. I also considered the effects of sociodemographic variables on these associations. I added some of the sociodemographic variables included in the primary study as covariates in this study's multiple regression model. In doing so, I sought to determine the effects, if any, of pregnant women's stigmatizing attitudes and personal knowledge of discriminatory practices towards persons living with HIV/AIDS on their self-reported testing for HIV. These covariates included age, education, place of residence (urban/rural), religion, and marital status.

Purpose of the Study

The purposes of this study were to examine the association between (a) stigmatizing attitudes towards other persons living with HIV/AIDS and (b) personal knowledge of discriminatory practices by other individuals, health workers, and community against persons living with HIV/AIDS in self-reported HIV testing during antenatal visits or childbirth among pregnant women aged 15- 49 years. Age, education, place of residence (urban/rural), religion, and marital status served as covariates. Self-reported HIV testing was the outcome variable. I used a quantitative approach featuring a

cross-sectional design to address this issue. Secondary data obtained from the 2013 NDHS were analyzed to determine the association, if any, between the variables of interest. The dependent variable was HIV testing by the pregnant woman, which is defined as the woman having tested for HIV and received her results during antenatal care or childbirth at least once in any previous or current pregnancy. The independent variables were stigmatizing attitudes of pregnant women towards persons living with HIV/AIDS and knowledge of discriminatory practices towards persons living with HIV/AIDS. Stigma was defined as an individual's feelings, opinions, or beliefs that convey devalued stereotypes that impact the unjust or prejudicial treatment or behavior towards persons living with HIV/AIDS. Discrimination was defined as the actual manifestation of unjust or prejudicial treatment or behavior towards persons living with HIV/AIDS based on an individual's feeling, opinions, or beliefs that conveys devalued stereotypes (UNAIDS, 2015b). I used positive/negative attitudes to grade stigma.

Research Questions and Hypotheses

RQ1: Is there an association between the stigmatizing attitudes of pregnant women aged 15-49 years towards other persons living with HIV/AIDS and their self-reported testing for HIV during antenatal visits or childbirth when controlled for sociodemographic characteristics (age categories, educational level, place of residence (urban/rural), religion, and marital status)?

$H_0$1: There is no association between stigmatizing attitudes of pregnant women aged 15-49 years towards other persons living with HIV/AIDS and self-reported testing for HIV during antenatal visits or childbirth when controlled for

sociodemographic characteristics (age categories, educational level, place of residence (urban/rural), religion, and marital status).

H_a1: There is an association between stigmatizing attitudes of pregnant women aged 15-49 years towards other persons living with HIV/AIDS and their self-reported testing for HIV during antenatal visits or childbirth when controlled for sociodemographic characteristics (age categories, educational level, place of residence (urban/rural), religion, and marital status).

RQ2: Is there an association between knowledge of discriminatory practices of pregnant women aged 15-49 years towards other persons living with HIV/AIDS and their self-reported testing for HIV during antenatal visits or childbirth controlled for sociodemographic characteristics (age categories, educational level, place of residence (urban/rural), religion, and marital status)?

$H_0$2: There is no association between the knowledge of discriminatory practices of pregnant women aged 15-49 years towards other persons living with HIV/AIDS and their self-reported testing for HIV during antenatal visits or childbirth when controlled for sociodemographic characteristics (age categories, educational level, place of residence (urban/rural), religion, and marital status).

H_a2: There is an association between knowledge of discriminatory practices of pregnant women aged 15-49 years towards other persons living with HIV/AIDS their self-reported testing for HIV during antenatal visits or childbirth when controlled for sociodemographic characteristics (age categories, educational level, place of residence (urban/rural), religion, and marital status).

Theoretical Framework

The health belief model developed by Rosenstock (1966) and updated by Rosenstock et al. (1988) was the theoretical framework for this study. The health belief model is a behavioral model that has as its premise that individuals will act to protect themselves from risks or engage or not engage in behaviors or practices that will impact their health (Rosenstock, 1966; Rosenstock et al., 1988). Because of this, the model has been widely used to study the relationship between knowledge, attitude, and the practice of HIV prevention behaviors (Rosenstock, 1966; Rosenstock et al., 1988). Researchers have used the six constructs of the model to address the relationship between HIV/AIDS knowledge, attitude, and behaviors.

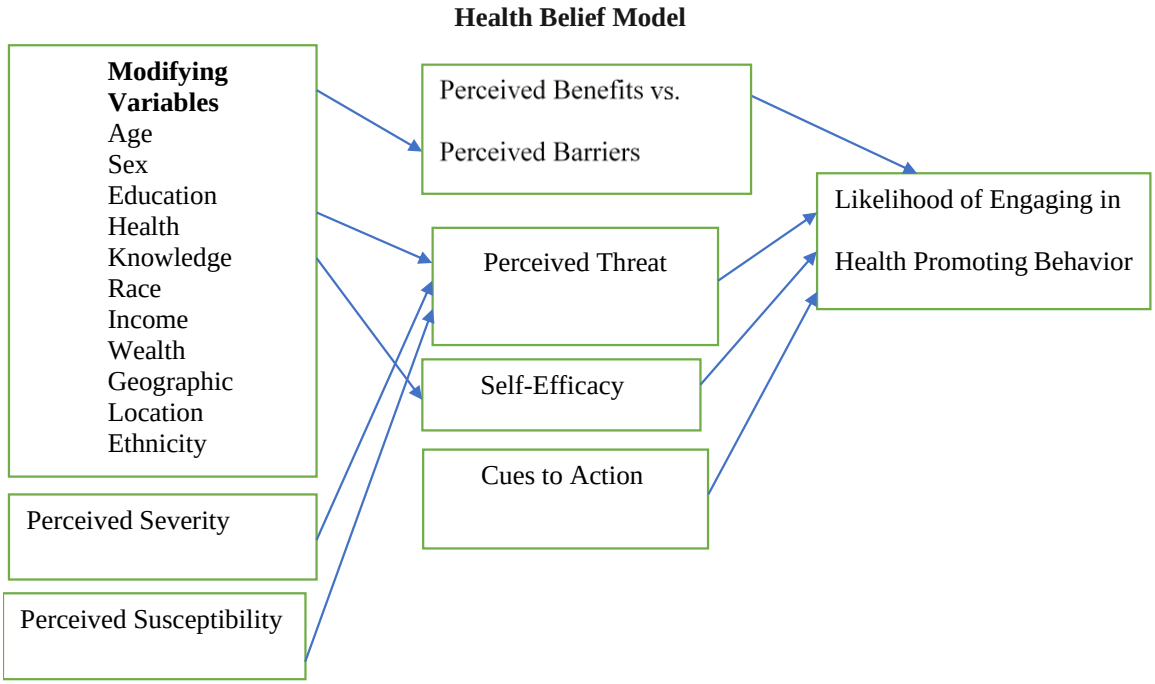
The health belief model assumes that when people believe that they are at risk of a health problem, their understanding of the gains of taking action to avoid the problem facilitates their readiness to act (Rosenstock, 1966; Rosenstock et al., 1988). Rosenstock and collaborators (Rosenstock, 1966; Rosenstock et al., 1988) developed the model to address individuals' lifestyle behavior and why they used or did not use public health prevention services. The basic principles of this model are found in its key constructs. They are perceived susceptibility, perceived severity, perceived benefits, perceived barriers, cues to action, and self-efficacy (Rosenstock1966; Rosenstock et al., 1988). Perceived susceptibility deals with an individual's assessment of their vulnerability to a condition. Perceived severity addresses a person's opinion of how serious or severe a condition and its effects are. Perceived benefits relate to an individual's belief in the ability of the recommended action to reduce the impact of the condition consequences.

Perceived barriers deal with a person's opinion about the physical and psychological costs associated with the recommended action. Cues to action deal with the strategies to trigger readiness to engage in the recommended actions. Self-efficacy deals with an individual's confidence in his or her ability to perform the recommended action.

The health belief model explains that when people have the belief that they are at risk of a health problem, their understanding of the advantages of taking action and barriers to the action, the belief in their ability to take action, including the triggers to act, provide the reason(s) individuals will engage or not engage in health-promoting behavior (Rosenstock1966; Rosenstock et al., 1988). I used these constructs to evaluate the factors that impact pregnant women's uptake of HIV testing. The constructs of this model were used to operationalize the RQs and hypotheses using the information available from the 2013 NDHS. The perceived barrier was the central construct for this investigation. Figure 1 includes a visual rendering of the health belief model.

Figure 1

Schematic Representation of the Health Belief Model as Applied to This Study



Note. Adapted from "The Role of Health Beliefs and Health Literacy in Women's Health Promoting Behaviours Based on the Health Belief Model: A descriptive Study" by M. Ghorbani-Dehbalaei, M. Loripoor and M. Nasirzadeh, 2021, *BMC Women's Health*, *21*(1), 421 (https://doi.org/10.1186/s12905-021-01564-2). Copyright under the Creative Commons Attribution 4.0 International License.

The health belief model is based on the assumptions that an individual will engage in a health-related action if they feel that they can avoid a negative health condition and can successfully take a recommended health action (Rosenstock, 1966; Rosenstock et al., 1988).

Nature of the Study

I used a quantitative cross-sectional design to answer the RQs and test the hypotheses. Using the health belief model as the theoretical framework, I evaluated the association between some perceived barriers of HIV testing among pregnant women, such as their stigmatizing attitudes towards persons living with HIV/AIDS, personal knowledge of discriminatory practices towards persons living with HIV/AIDS, and their self-reported HIV testing. I also evaluated the association between covariates, namely age categories, educational level, place of residence, religion, and marital status, and self-reported HIV testing by pregnant women.

Definitions

HIV counseling and testing: A process that enables an individual to be counseled to be in a better position to make an informed decision about being tested for HIV (UNAIDS, 2015b).

HIV incidence: The number of new HIV infections occurring in a defined population in a specific period (UNAIDS, 2015b).

HIV prevalence: The total number of persons living with HIV in a defined population in a specified period (UNAIDS, 2015b).

HIV testing by pregnant women: The dependent variable for the study was defined as a pregnant woman having tested for HIV and received her results during antenatal care or childbirth at least once in any of previous or current pregnancies.

Knowledge of HIV/AIDS discriminatory practices: A variable that was defined as responding "yes" to any of the three questions used to assess discriminatory practices towards persons living with HIV/AIDS in the 2013 NDHS.

Prevention of mother-to-child transmission of HIV: The Nigerian intervention programs to prevent vertical transmission of HIV infection during pregnancy, labor, delivery, and breastfeeding (FMoH, 2016).

Stigmatizing attitudes: Negative or positive attitudes conveyed in responses given by the pregnant women to questions used to assess stigmatizing attitudes in the 2013 NDHS. Negative attitudes were scored when the mean score was < .56 whereas positive attitudes were scored when the mean score was ≥ .56.

Assumptions

Based on the constructs of the health belief model, I I assumed that the practice of HIV testing among Nigerian pregnant women 15-49 years is influenced by barriers to HIV testing such as their stigmatizing attitudes and personal knowledge of discriminatory practices towards persons living with HIV/AIDS (Alemu et al., 2017; De Wet & Kagee, 2016; Jama et al., 2019; Meremo et al., 2016). I also assumed that other social-demographic variable such as educational level, age, marital status, place of residence, or religion may also impact the likelihood of pregnant women's uptake of HIV testing (Meremo et al., 2016; Shodimu et al., 2017; Teklehaimanot et al., 2016).

Scope and Delimitations

I limited the study population to pregnant women aged 15-49 years because the data collected by the 2013 NDHS that were analyzed in this study were for reproductive-

age women between 15 and 49 years. I assumed the generalizability of this study's results but did not verify this. The assumed representativeness of this study was based on the application of the sample weights. The findings of this study will be generalized to the population of pregnant women aged 15-49 years who expressed stigmatizing attitudes towards persons living with HIV/AIDS and self-reported testing or not testing for HIV during their antenatal visits or childbirth. It will also be generalized to the pregnant women who have personal knowledge of discriminatory practices towards persons living with HIV/AIDS and self-reported testing or not testing for HIV during antenatal visits or childbirth.

Limitations

I assumed but did not confirm, the generalizability of this study's results. The findings of this survey will be generalized only to the population of women under consideration in this study. The 2013 NDHS relied on the self-report of HIV testing by pregnant women, and therefore the accuracy of the information provided by them cannot be established. Furthermore, recall bias may have an impact on the accuracy of the provided information (Althubaiti, 2016). Also, the cross-sectional design of the original study design makes it not possible to establish causality between the independent and the dependent variables (Iyun et al., 2018).

Significance

In this study, I addressed HIV prevention by focusing on the factors that impact HIV testing among pregnant women between the ages of 15 and 49 years in Nigeria. HIV infection among pregnant women increases children's risk of contracting the disease

during delivery or becoming orphans because of the death of their parents (Thapar et al., 2019). These circumstances have consequential effects on the already stretched health and social systems (Thapar et al., 2019). HIV counseling and testing are among the leading strategies and pathways to prevention, treatment, care, and support services for HIV/AIDS (Gebreemedhin et al., 2018; WHO, 2019). The findings from this study may contribute to HIV/AIDS intervention and prevention efforts among this vulnerable group. Also, insights from this study may encourage policy and advocacy group decision-makers to make policies and decisions that promote access to HIV testing to reduce the transmission of the disease. In addition, health education has been identified as one of the pillars of HIV/AIDS prevention and control (Siuki et al., 2018). Therefore, further exploration of this topic may provide insights on how to design or tailor health education, including what factors to target, to reduce the disease transmission among pregnant women and their babies, resulting in a positive social change.

Social Change Implications

According to UNAIDS (2015a) estimates, in Africa, about half of the children who acquire HIV from their mothers will die before their second birthday. The reduction in mother-to-child transmission of HIV may improve this statistic and better the health indices of Nigeria. This study's findings may help policymakers, researchers, and healthcare stakeholders to design appropriate interventions to address the effect, if any, of stigmatizing attitudes and personal knowledge of discriminatory practices towards persons living with HIV/AIDS on the HIV testing of pregnant women aged 15-49 years. This may impact the social system by increasing pregnant women's uptake of HIV

testing, which, research shows, is the gateway to HIV prevention, care, support services, and control of the epidemic (Evangeli et al., 2016; WHO, 2019). Also, the social system may be impacted through the expected reduction of the funds spent by the government on the control of the HIV epidemic in Nigeria so that it can be used for other social services.

Summary

In this chapter, I provided an overview of the study. This chapter consists of an introduction to the study topic, the background of the study, the problem statement, the study purpose, RQs and hypotheses, the theoretical framework, the nature of the study, definitions of key terms, assumptions of the study, and the significance of the study. In Chapter 2, I review current literature related to the effect of stigma and discrimination and some relevant sociodemographic factors on HIV testing by pregnant women. The introductory information provided in Chapter 1 will provide a foundation for identifying and reviewing the relevant current literature for the study.

Chapter 2: Literature Review

The purpose of this study was to examine the effect of stigmatizing attitudes and personal knowledge of discriminatory practices towards persons living with HIV/AIDS on self-reported HIV testing of Nigerian pregnant women aged 15-49 years during antenatal visits or childbirth. Globally, about 37.7 million people lived with HIV at the end of 2020, with 1.5 million becoming infected newly with the virus and 0.68 million dying from AIDS-related illnesses (UNAIDS, 2020). The burden of HIV is most present in sub-Saharan Africa, accounting for an estimated two-thirds of all global HIV cases and 58% of global new HIV infections (UNAIDS, 2020). In 2020, women aged 15 years and above accounted for approximately 60% of the total number of people living with HIV (an estimated 4.7 million people) in western and central Africa (UNAIDS, 2020). Heterosexual sexual activity accounted for most of the HIV transmission, and this contributes to the vulnerability of pregnant women to contracting the infection (NPC & ICF, 2014). The two types of stigma associated with HIV/AIDS are enacted and felt stigma. Felt or internalized stigma facilitates the denial of status by people living with HIV, guilt, shame, blame, and self-isolation, while enacted stigma enables ridicule, rejection, violence, and neglect of healthcare and needs of people living with HIV/AIDS by family, society and healthcare providers (Brennan-Ing, 2019).

Stigmatizing attitudes and discriminatory practices are some of the reported barriers that impact HIV testing (Alemu et al., 2017; Ejigu & Tadesse, 2018; Gebremedhin et al., 2018; Jama et al., 2019; Meremo et al., 2016; Teklehaimanot et al., 2016). The practices reported in these studies are some of the reasons why pregnant

women and their family members refuse HIV testing, avoid antenatal care services, and drop out of programs designed to prevent mother-to-child HIV transmission. The consequences of pregnant women contracting the HIV infection include making children vulnerable to contracting the disease during pregnancy, labor, delivery, and breastfeeding or becoming orphans because of the death of their parents (Musarandega et al., 2020). These potential outcomes have consequential effects on the already stretched health and social systems. Therefore, these barriers need to be addressed to detect early HIV infection in pregnant women to reduce the transmission of the infection to their children.

The major sections of this chapter are devoted to the literature search strategy, theoretical foundation, a literature review related to key variables or concepts, and summary and conclusions. In the Literature Search Strategy section, I provide information on the databases and search engines and the key terms and combinations I used to find literature. I also provide information on the scope of literature reviewed in terms of years searched, types of literature and sources searched, including seminal literature and current peer-reviewed literature, and how the issue of paucity of the current research was handled. In the Theoretical Foundation section that follows, I discuss the health belief model, which underpinned the study, including previous applications of its constructs. Next, I review key literature. In reviewing the literature associated with the study's main variables, I describe previous studies in this area and the methodology of inquiry by previous researchers, including the limitations. I review and synthesize studies related to the key independent, dependent, and covariate variables to explain what is known about the variables, what is controversial, and what remains to be studied. I also

review studies related to the RQs. The Summary and Conclusions section includes a synopsis of major findings in the literature, including the gaps that need to be addressed.

Literature Search Strategy

To find the gaps in the existing literature, I searched peer-reviewed articles, seminal literature, relevant dissertations, textbooks, and theoretical work. The literature search included searching databases in the Walden University Library such as PubMed, Academic Complete, MEDLINE, CINAHL, and ProQuest as well as the Google Scholar search engine. Key search terms broken into concepts were used to get relevant articles from the databases. They include *stigma and discrimination*, *pregnant women*, *HIV testing,* and *HIV testing determinants*. The results yielded by the search were further refined by inclusion criteria such as year of publication (5 years) and full-text article. The articles' abstracts were screened, and the ones that did not adequately address the topic were excluded, while the references were screened to identify more relevant articles. Two hundred relevant articles were found and reviewed.

Theoretical Foundation

The health belief model was the theoretical framework for this study. Social scientists working at the Public Health Service in the United States developed the health belief model in the 1950s to understand why individuals fail to engage in preventive disease strategies or adopt screening tests for early disease detection (Rosenstock,1966; Rosenstock et al., 1988). The original model had four constructs, namely perceived susceptibility, perceived severity, perceived benefits, and perceived barriers. Later, Rosenstock et al. (1988) provided an improved version of the health belief model that

included two more constructs: cues to action and self-efficacy. The health belief model assumes that when individuals believe that they are at risk of a health problem and understand the gains of taking action to avoid the health problem, they will be better prepared to take action (Rosenstock,1966; Rosenstock et al., 1988).

The health belief model is a behavioral model that provides the rationale for why individuals will act to protect themselves from risks or engage or not engage in behaviors or practices that will impact their health. Because of this, the model has been widely adopted to study varieties of health behaviors, including sexual risk behaviors and HIV/AIDS transmission (Abdolaliyan et al., 2017; O'Dwyer et al., 2019; Ofori, 2019). Researchers have used the six constructs of the expanded model to address the relationship between HIV/AIDS knowledge, attitude, and behaviors (Rosenstock, 1966; Rosenstock et al., 1988). The tenets of the health belief model include two elements of behaviors relating to health: the wish or eagerness to avoid being sick or to get well if already sick (Rosenstock, 1966; Rosenstock et al., 1988). This model implies that when people have the belief that they are at risk of a health problem and understand the advantages of taking action and the associated barriers to the action, the belief in their ability to act, including the trigger to act provides the reason(s) people practice or not practice behaviors that promote health (Rosenstock, 1966; Rosenstock et al., 1988). The combination of perceived susceptibility and severity form the perceived threat of a condition or disease (Rosenstock, 1966; Rosenstock et al., 1988). When a perceived benefit of engaging in a preventive behavior is more than the perceived threat of a disease, there is the likelihood that a person will engage in the recommended health

action or behavior and vice versa (Rosenstock, 1966; Rosenstock et al., 1988). Also, when the perceived barrier to engaging in health behavior is considered more than the harm that can result from the disease, there is less likelihood that an individual will engage in preventive health behavior (Rosenstock, 1966; Rosenstock et al., 1988). In summary, when the perceived benefits of engaging in a healthy behavior by an individual are greater than the perceived barriers to the healthy behavior, there is an increased likelihood that the individual will engage in the preventive health behavior (Rosenstock, 1966; Rosenstock et al., 1988).

Constructs and Tenets of the Health Belief Model

The basic tenets of the health belief model are found in the key constructs of the theory. They are perceived susceptibility, perceived severity, perceived benefits, perceived barriers, cues to action, and self-efficacy (Rosenstock, 1966; Rosenstock et al., 1988).

Perceived Susceptibility

This deals with individuals' assessment of their vulnerability to a condition. According to the health belief model, when individuals perceive themselves to be at risk or vulnerable to a disease, they act in a way to prevent contracting the disease (Rosenstock, 1966; Rosenstock et al., 1988). This prevention action includes testing for HIV, which is considered preventive (Abdolaliyan et al., 2017; Meremo et al., 2016). Studies have applied this construct to study how it impacts the uptake of HIV testing services (Ofori, 2019; Teklehaimanot et al., 2016).

Perceived Severity

This addresses a person's opinion of how severe a condition and its effects are. It deals with an individual's feeling about the seriousness of contracting a disease or leaving it untreated and the medical and social consequences associated with it (Rosenstock, 1966; Rosenstock et al., 1988).

Perceived Benefits

This construct relates to an individual's belief in the ability of the recommended action to reduce the impact of the condition consequences. It implies that the likelihood of engaging in the behavior is contingent on the strength of the desire to engage in it influenced by the behavioral attitudes that include beliefs about the advantages and disadvantages of testing for HIV (Rosenstock, 1966; Rosenstock et al., 1988).

Perceived Barriers

This deals with a person's opinion about the physical and psychological costs associated with the recommended action. It is an individual's feeling about the barriers to engaging in a prescribed health action that make him or her do a cost-benefit analysis and weigh the prescribed health actions effectiveness against the perception of being convenient or inconvenient (Rosenstock, 1966; Rosenstock et al., 1988). Studies have related the impact of perceived barriers to uptake of HIV testing (Muhinda & Pazvakawambwa, 2017; Ofori, 2019).

Cues to Action

It deals with the strategies to trigger the process of decision-making or readiness to engage in the recommended health actions. The cues can be internally triggered by

disease symptoms which can prompt an individual to seek medical attention, or externally triggered, such as sickness by a family member, articles read, or advice given by others (Rosenstock et al., 1988).

Self-Efficacy

This deals with an individual's confidence in his or her ability to perform the recommended action. According to Peifer et al. (2020), Self-efficacy impacts the quality and quantity of recommended action performance.

Applicability of the Health Belief Model

The perceived barrier is the construct of the health belief model that applies to this study. Stigma and discrimination have been documented as some of the barriers that prevent individuals from seeking appropriate healthcare services or engaging in preventive health activities that will protect their health. Individuals who stigmatize and discriminate against other persons perceive that they will also be treated that way. Therefore, it becomes a barrier for them in seeking the appropriate healthcare services, including testing for HIV. This model has been applied to many areas of preventive health to understand different population health behaviors. These areas include health behaviors relating to health promotion such as exercise and diet, the practice of vaccination and contraception, and health-risk such as smoking. It has also been applied to study an individual's sick role behavior that refers to the practice of recommended health action following a professional diagnosis of sickness and the use of health services for medical reasons (Jeihooni et al., 2016; Rakhshanderou et al., 2017); condom use (Huang et al., 2020), exercise (Abdolaliyan et al., 2017; Sas-Nowosielski et al., 2016;

Villar, 2017), HIV testing barriers, benefits, the cue for action, self-efficacy and other prevention measures (Alemu et al., 2017; Meremo et al.,2016; Ofori, 2019; Teklehaimanot et al., 2016). The choice of this theory is because of its broad applicability to the current area of study and areas related to it. The model provided the rationale why people will engage or not engage in preventive health activities or use or not use preventive health services.

This study examines the effect of stigma and discrimination on HIV testing by pregnant women. Stigmatizing attitudes and discriminatory practices are some of the reported factors that pose a barrier to HIV testing (Meremo et al., 2016; Shodimu et al., 2017). These practices by family members and society are some reasons why individuals, including pregnant women, will refuse HIV testing, avoid antenatal care services and drop out of the prevention of mother-to-child HIV transmission program (Colombini et al., 2016; Shodimu et al., 2017). The health belief model assumes that when individuals believe that they are at risk of a health problem and understand the gains of taking action to avoid the health problem, it will facilitate their preparedness to take action (Rosenstock, 1966; Rosenstock et al., 1988). However, the engagement in this action requires overcoming the individual's perceived barrier (a construct of the model) that deals with a person's opinion about the physical and psychological costs associated with the recommended action. Therefore, this model provides the appropriate background and explanation for why barriers such as stigma or discrimination may impact HIV testing by pregnant women. The research questions relate to the theory because they seek to elicit answers to the relationship between barriers to HIV testing (stigmatizing attitudes of

pregnant women aged 15-49 years and their personal knowledge of discriminatory practices towards persons living with HIV/AIDS) and HIV testing in Nigeria by pregnant women aged 15-49 years.

Literature Review Related to Key Variables and/or Concepts

Global Overview of HIV/AIDS

Globally about 37.7 million people live with HIV at the end of 2020, with 1.5 million becoming infected newly with the virus and 0.68 million dying from AIDS-related illnesses. The new infections include about 150,000 children who mostly live in sub-Saharan Africa and got the infection from their mother during pregnancy, delivery, or breastfeeding. Out of the people living with HIV, only about 84% know their status, while the remaining 16% still need to test for HIV to know their status. About 27.5 million people living with HIV are on antiretroviral therapy, while only about 66% of persons living with HIV are virally suppressed (UNAIDS, 2020). Also, women aged 15 to 49 years have a higher HIV prevalence (0.8%) than men (0.6%), while the new HIV infections are higher in women (660,000) than men (640,000). The majority of persons infected with HIV live in low and middle-income countries. The burden of HIV is most in sub-Saharan Africa, which accounts for an estimated two-thirds of all global HIV cases and 58% of global new HIV infections (UNAIDS, 2017). In 2021, out of the estimated 4.7million people living with HIV in western and central Africa, women aged 15 years and above accounted for approximately 60% of the total number of people living with HIV in these regions (UNAIDS, 2020). Southern and Eastern Africa has the highest number of people living with HIV (20.6 Million), while North Africa and the Middle

East have the least (230,000). About 85% of pregnant women globally have access to antiretroviral therapy to prevent mother-to-child infection, while new infections in children have reduced by 53% since 2010 (UNAIDS, 2017). The reasons for this decrease include a reduction in the infectivity of people living with HIV due to increased access to antiretroviral therapy, expansion of mother-to-child prevention programs, and the introduction of other prevention programs that target safer sex practices and outreaches to key populations (UNAIDS, 2017, 2020). This global picture calls for concerted and sustained efforts towards the global prevention and control of HIV/AIDS.

HIV/AIDS in Nigeria

The first case of HIV/AIDS was reported in Nigeria in 1986. With a population of about 200 million people, Nigeria is ranked the fourth country globally with the highest HIV/AIDS burden, with approximately 1,700,000 people living with HIV/AIDS at the end of 2020. New HIV infections in 2020 were 86,000, and the HIV/AIDS-related mortality was 49,000 (UNAIDS, 2020). The current prevalence rate of HIV is 1.3% (Federal Ministry of Health Nigeria, 2019; UNAIDS, 2020). The HIV prevalence for women aged 15-49 years is 1.6% (1.6 per 100 persons) and is higher than men of the same age range, which is 1% (UNAIDS, 2020). The epidemic pattern or trend in the general Nigerian population showed a steady decline in the prevalence rate of the disease from 5.8% in 1991 to 1.3% in 2020 (FMOH, 2014 & 2019; UNAIDS, 2020). The HIV testing and treatment cascade for Nigeria showed a deficit between people living with HIV who know their HIV status and those who know their status and are on treatment. The key populations continue to be the driving factor for the HIV epidemic, with a

prevalence rate of 14.4% for sex workers, 23.0% for men who have sex with men, and 3.4% for people who inject drugs. New infections or incidence occur at 0.42 per thousand-all adults aged 15-49 years in Nigeria (UNAIDS, 2020).

Transmission Modes of HIV

HIV is an acronym for Human Immunodeficiency Virus, which causes Acquired Immunodeficiency Syndrome (AIDS). HIV destroys an individual's body immune system making the person susceptible to other infections. The virus can be transmitted from a person to another through the exchange of body fluids from infected individuals, such as blood, breast milk, semen, and vaginal secretions, and it has no known cure. It can also be transmitted from a pregnant mother to a child. Certain behaviors and risk factors predispose or increase the chances of an individual contracting the infection. These include having unprotected anal or vaginal sex, the presence of another sexually transmitted infection, sharing of contaminated sharp objects, receiving unsafe injections, blood transfusions, tissue transplantation, medical procedures that involve unsterile cutting or piercing, and accidental needle stick injuries (WHO, 2021). The primary mode of HIV transmission in sub-Saharan Africa and Nigeria is unprotected sexual intercourse (Federal Ministry of Health Nigeria, 2016; NPC & ICF International, 2019). Also, in Nigeria, the major routes of HIV transmission include heterosexual sexual activity, blood transfusions, and mother-to-child transmission, with 80-90% of transmission being accounted for by heterosexual sex (Federal Ministry of Health Nigeria, 2014 & 2016; National Population Commission NPC & ICF International, 2019).

HIV Testing and Counseling

Definition and Goals

HIV counseling and testing are the leading strategies and pathways to prevention, treatment, care, and support services for HIV/AIDS. HIV testing and counseling is a process through which a person is counseled about HIV so that he or she may be able to make an informed decision about being tested for the virus. It is a process that requires confidentiality and that the decision is made solely by the individual. The goal of HIV testing is to assist people in knowing their HIV status so that those who are seronegative will continue to engage in safe behavior while seropositive individuals will make an informed decision about treatment, care, and support services options available (WHO, 2019).

Processes

According to the World Health Organization's (WHO) guiding principles for expanded testing and counseling, certain processes should be followed in providing HCT services to clients. These processes include conducting pretest counseling that provides information on the purpose of the testing and the options available to the clients based on the test result outcome. It also includes that the process is voluntary and confidential such that the client is not forced to test and that the information provided is kept confidential and out of reach to unauthorized persons. Furthermore, it includes that following informed consent by the client to test, post-test counseling is given to those with positive and negative results to explain the meaning of the test result and positive clients referred to care, treatment, and support services. The post-test counseling serves the purpose of

ensuring that those who are seronegative will continue to engage in safe behavior, while seropositive individuals will make an informed decision about treatment, care, and support services options available (WHO, 2019). In line with the 90-90-90 target set by UNAIDS, which requires that 90% of people living with HIV should know their HIV status by 2020, WHO has developed a consolidated guideline for HIV testing services that is the gateway for people to know their status (UNAIDS, 2017; WHO, 2019). These guidelines require that the 5Cs principles, namely Consent, Confidentiality, Counseling, Correct Result, and Connections, be applied when testing an individual for HIV (WHO, 2019).

- Consent. This implies that an individual being tested for HIV should approve the test after receiving the information needed to make the decision for counseling.
- Confidentiality. This implies that the discussion or what transpires between the HIV testing provider and the client should not be made know to a third party without the approval of the client and that the exercise should be conducted in a confidential setting.
- Counseling. This is divided into Pre-test and Post-test counseling. The Pre-test is done before the HIV testing and provides information on the purpose of the testing and the options available to the clients based on the outcome of the test result. The post-test counseling serves the purpose of explaining the result of the test and the options available depending on the result, including linkage to care, treatment, and support services.

- Correct Result. HIV testing services providers should strive to provide services that are of high quality, including putting in place quality assurance systems to guarantee that correct diagnosis is received by clients. Part of the assurance system include that positive persons are retested before linking them to treatment, care, and support services.
- Connection. Individuals with positive tests are linked to treatment, care, and support service that is the primary goal of HIV testing.

Testing Approaches

The traditional approach to HIV testing is voluntary counseling and testing, where an individual initiates the process of being tested for HIV. Another approach to HIV testing is provider-initiated testing and counseling. This occurs routinely in health facilities during clinical activities such as antenatal care and sexually transmitted infections clinics where the provider offers HIV testing to clients after counseling them. Those that gave consent will be tested for HIV. Community-based HIV testing involves the strategies of door-to-door testing, mobile outreach campaigns, testing in educational and workplace settings. HIV self-testing is another approach where individuals wishing to know their status purchase the test kit and test and interpret the results by themselves. It is considered a screening test that requires further validation in line with an established testing algorithm (WHO, 2019).

Testing Techniques and Diagnosis

HIV diagnosis has usually been made using rapid diagnostic tests to detect HIV antibodies in the serum of an individual. The WHO testing algorithm requires that a

sensitive test, specific test, and either of them as tie-breaker be used respectively as first, second-, and third-line assays for detecting HIV infection. Diagnosis of HIV can be made using Immunoassays such as enzyme immunoassays, electrochemiluminescence immunoassays, and chemiluminescence immunoassays to detect the antibodies in the serum of an individual. During the window period of HIV infection (first ten days), when the infection cannot be detected, no test, whether the virological or serological test, has been able to detect the marker of HIV infection. In HIV exposure infants, the diagnosis of HIV is made with virological assay before 18 months because of the maternal transfer of HIV antibodies, which can give a false-positive result, while children above 18 months with suspected HIV infections are diagnosed with serological tests (WHO, 2019).

Benefits of Testing for HIV

The benefits of HIV testing include that it assists in preventing mother-to-child transmission in women of reproductive age (Mohlabane et al., 2016; WHO, 2019). It also serves as the gateway to HIV prevention, care, support, and treatment services (Mohlabane et al., 2016; WHO, 2019). It assists those who are negative to engage in safer HIV prevention practices (WHO, 2019).

Gateway to Prevention, Care, Support, and Treatment Services

HIV testing and Counseling acts as the gateway or link to HIV prevention, care, support, and treatment services (Evangeli et al., 2016; WHO, 2019). Drugs for managing HIV infections are now available and serve to reduce the virus level in an infected individual and therefore reduce his or her infectivity (WHO, 2016). WHO recommended that HIV testing should be offered to both the general and key populations with linkage to

prevention, care, and support services (WHO, 2019). This assists individuals who test positive to be linked to services to get care, support, and treatment for HIV (WHO, 2016 & 2019). In pregnant women, HCT serves the purpose of early identification of HIV-infected mothers so that they can be linked to care and treatment services to prevent mother-to-child transmission (WHO, UNAIDS, UNICEF, 2011). Furthermore, the linkage allows an infected individual to access other care and treatment services for HIV comorbidities such as tuberculosis and opportunistic infections (WHO, 2016, 2019).

Prevention of Mother-to-Child Transmission of HIV

According to the 2013 NDHS, 49% of women of reproductive age had accurate knowledge or understood issues concerning mother-to-child prevention of HIV correctly (NPC & ICF International, 2014). This knowledge or correct understanding varies between the urban and rural areas of pregnant women dwellers with education and wealth. The 2018 NDHS showed an increase in the number of women of reproductive age who had correct knowledge about the prevention of mother-to-child transmission of HIV, with 57% showing correct knowledge while 72% knew that taking antiretrovirals will reduce the risk of HIV transmission to the child from the mother (NPC & ICF International, 2019). Mukhtar et al. (2020) conducted a cross-sectional hospital-based study on knowledge, attitude, and practice regarding mother-to-child transmission of HIV, its prevention, and associated factors among antenatal women attending a healthcare facility in Srinagar district, North India. Three hundred and sixty-six (366) pregnant women attending the healthcare facilities were included in the study over a period of 3 months. The findings of the study showed that although 85.8% of the

pregnant women knew the mode of HIV transmission, only 50.8% knew about mother-to-child transmission of HIV/AIDS. It was concluded in the study that although the pregnant women had adequate knowledge about HIV infection, this does not include knowledge about mother-to-child transmission of HIV infection and its prevention measures. Abtew et al. (2016) conducted a facility-based cross-sectional involving 398 pregnant women who attended antenatal care services at governmental health institutions in Assosa town, Ethiopia. They reported in the study that knowledge of prevention of mother-to-child transmission of HIV among pregnant women was positively associated with those who had favorable attitudes regarding HIV counseling and testing (AOR, 4.27; 95% CI:1.95, 9.34). Atnafu Gebeyehu et al. (2019) conducted a study on the acceptance of HIV testing and associated factors among pregnant women attending antenatal care in the Gunino health center, southern Ethiopia. It was an institutional-based cross-sectional study design with a sample size of 340. Bivariate and multivariable regression analysis was used to determine relationships between independent and dependent variables. Results showed that the odds of HIV testing among pregnant women who had awareness about MTCT of HIV was higher than their counterparts who had low awareness (*AOR*, 2.60; 95% CI:1.41, 4.81). Also, pregnant women who were knowledgeable about the prevention of mother-to-child transmission were more likely to test for HIV (*AOR*, 1.72; 95% CI:1.03, 2.86) than their counterparts. Besides, the odds of testing acceptance among pregnant women who attended two and above antenatal appointments were higher (*AOR*, 2.49, 95% CI:1.46, 4.22) than participants who attended only one appointment. These findings were consistent with what was also found by Alemu et al. (2017). Using a cross-sectional

design, Alemu et al. (2017) studied pregnant women HIV testing in Ethiopia. The study findings showed that pregnant women with a complete understanding of mother-to-child transmission of HIV were more likely to test for HIV than those with lower understanding (*AOR*, 3.73; 95% CI: 1.56, 8.94). They also found that those who had a comprehensive knowledge of PMTCT were more likely to be tested (*AOR*, 2.56; 95% CI:1.26, 5.19). Irinyenikan (2019 - Nigeria) assessed the knowledge of prevention of mother-to-child transmission (PMTCT) of HIV among pregnant women and their attitude and practice of HIV counseling and testing. The study was an institutional-based descriptive cross-sectional study that used a systematic random sampling technique to select 400 pregnant women. Results showed that although there was high awareness of MTCT of HIV among the women, this has not translated into corresponding higher testing for HIV by pregnant women.

Knowledge of HIV Prevention Methods

When most individuals have the correct prevention methods knowledge about HIV/AIDS, it impacts the control of the epidemic. The knowledge includes knowing the transmission routes of HIV, behaviors, and practices that reduce the infection, such as faithfulness to an uninfected partner and the use of condoms. The 2013 Nigeria demographic and health survey found that 58% of women of reproductive age knew that correct and consistent use of condoms could reduce the transmission of HIV;78% of them knew that having sex with only one uninfected partner reduces the spread of the disease while 54% knew that both could limit the spread of HIV (NPC and ICF International, 2014).

A study done on the knowledge, acceptance, and utilization of the female condom among women of reproductive age in Ghana showed a low level of awareness, knowledge, acceptance, and use of the female condom (Ananga et al., 2017). This study applied a descriptive cross-sectional survey design to survey 380 women aged15-49 years using the structured questionnaires as the data collection instrument. Uchendu et al. (2019) conducted a cross-sectional study among 964 youths aged 15 to 24 years old using questionnaires to collect information on the awareness and utilization of female condoms among street youths in Ibadan, an urban setting in South-West Nigeria. This study showed that although 47.9% of the respondents have heard about female condoms, only 16.8% have ever seen them, while only 4.3% have ever used them. These findings corroborated the one by Ananga et al. (2017).

Shehu et al. (2016) conducted a study on knowledge of contraception and contraceptive choices among human immunodeficiency virus-positive women attending antiretroviral clinics in Zaria, Nigeria. Three hundred and forty (340) HIV-positive women selected by simple random sampling technique were surveyed using cross-sectional descriptive design and structured interviewer-administered questionnaire. Associations between the variables were tested using a Chi-square test with a *p*-value set at .05. The findings showed that about 87% of the respondents know about the transmission of HIV from mother to child, while 73% have heard about contraception. Past use of contraceptives was about 56.1%, while the male condom (60.4%) was the most used either alone or in combination with another method, although the 2016 use of contraceptives was low (36.3%). Ankuda and Asiimwe (2017) conducted a study among

reproductive-age women in Uganda on the factors responsible for their comprehensive knowledge of HIV/AIDS. They found that comprehensive knowledge of HIV was possessed by 38% of the respondents with higher wealth facilitating more knowledge than lower wealth. They also found that being an older woman, access to radio, and level of education facilitated comprehensive knowledge of HIV. Furthermore, HIV testing was significantly related to a better knowledge of HIV. Other studies have corroborated these findings (Ankuda & Asiimwe, 2017; Teshome et al., 2016).

Barriers to HIV Testing

HIV testing is influenced by many social and demographic factors such as marital status, educational level, socioeconomic status, gender, and age (Mohlabane et al., 2016; Muhinda & Pazvakawambwa, 2017; Shodimu et al., 2017; Teklehaimanot et al., 2016). Also, psychosocial and behavioral factors such as HIV/AIDS-related knowledge, attitudes, confidentiality, stigma and discrimination, Knowledge or proximity to HIV testing center, self-perceived risk, and perceived benefits also influence it (Colombini et al., 2016; Ojikutu et al., 2016; Teklehaimanot et al., 2016). Some of these factors facilitate uptake of HIV testing, while some pose barriers to it. Teklehaimanot et al. (2016) used a cross-sectional design to study HIV counseling and testing determinants in Ethiopia. The findings showed that women with higher perceived risk for HIV, comprehensive knowledge of HIV, higher educational level, married, female, higher age, positive attitude, closer proximity to HCT facility, and lower level of stigmatization and discrimination are more likely to test for HIV. Also, Alemu et al. (2017) reported in their study done in Ethiopia that women with a favorable attitude towards individuals living

with HIV are more likely to test for HIV than those with unfavorable attitudes (*AOR* = 2.42, 95% CI, 1.20, 4.86). These were corroborated in other studies (Muhinda & Pazvakawambwa, 2017; Shodimu et al., 2017).

Stigma and discrimination have been identified as some of the factors impacting negatively on the uptake of HIV counseling and testing. Because of the main route of HIV transmission, people living with the disease are degraded, discredited and their worthiness is reduced in the eyes of the community (UNAIDS, 2015b; Zhang et al., 2016). The two types of stigma associated with HIV/AIDS are enacted and felt stigma (Brennan-Ing, 2019). Felt stigma facilitates the denial of status by people living with HIV, guilt, shame, blame, and self-isolation, while enacted stigma (actual acts of discrimination and abuse) enables ridicule, rejection, violence, and neglect of healthcare and needs of people living with HIV/AIDS by family, society and healthcare providers (Brennan-Ing, 2019).

HIV Testing Correlates Among Pregnant Women

HIV testing is a personal decision made by an individual and is subject to some factors that influence whether an individual will decide to test or not. Studies have identified many socio-demographic and psychosocial, and behavioral correlates of HIV testing. They include

marital status, educational level, socioeconomic status, gender, and age, HIV/AIDS-related knowledge, and attitudes, confidentiality, stigma and discrimination, knowledge and proximity to HIV testing center, knowledge of mother-to-child

transmission, and prevention of mother-to-child transmission of HIV, self-perceived risk and perceived benefits of HIV testing (Teklehaimanot et al., 2016).

Association of Stigmatizing Attitudes With HIV Testing

This study is based on the perceived barrier construct of the health belief model. The perceived barrier is an individual's assessment of obstacles or hindrances to engaging in an action or behavior change. Many previous studies have applied this model in relating the effects of these barriers on HIV testing. Mohlabane et al. (2016) conducted a cross-sectional survey of 67 HCT-providing health facilities in 8 South African provinces (N = 489). Bivariate and multiple logistics regression were used to identify the association between the study variables. Results showed that fear of positive results, stigmatization, and privacy of the test result was among the commonly perceived barriers to HIV testing. De Wet and Kagee (2016), in their qualitative study on perceived barriers and facilitators to HIV testing in South African communities, corroborated this when they reported that the reasons against seeking HIV testing included barriers such as fear of testing HIV positive, HIV-related stigma, and long distances to HIV testing sites. An institutional-based unmatched case-control study was conducted to ascertain the determinants of HIV test uptake among women of reproductive age attending a hospital in Somaliland, Somali. Results showed that HIV test uptake was negatively associated with the perception that the test confidentiality will not be kept (*AOR*, 0.09; 95% CI: 0.02, 0.51), and positive fear of stigma (*AOR*, 0.05; 95% CI: 0.01, 0.24) (Jama et al., 2019). Teklehaimanot et al. (2016) tested the perceived barrier construct of the health belief model in a study done in Ethiopia. This is a secondary data analysis of participants

that participated in a national health extension program evaluation. Data from 11,919 adults (6278 women aged 15–49 years and 5641 men aged 15–59 years) residing in rural areas of Ethiopia were included in the study. The participants were selected through stratified multi-stage cluster sampling. Multivariate logistic regression analysis was conducted to determine factors related to the use of VCT service. The results showed that those perceiving themselves as having a small risk of HIV infection, having comprehensive knowledge of HIV/AIDS, and having no stigmatization attitudes were more likely to go for HIV testing. Meremo et al. (2016) used a mixed-method cross-sectional design approach to study the barriers to accessibility and utilization of HIV testing and counseling services in Tanzania. The quantitative method used a stratified random sampling technique (N=492), while the qualitative used a purposive sampling technique to recruit the participants. Structured questionnaires were used to collect the participants' responses in the quantitative phase, while in-depth interviews and focused group discussions were conducted in the qualitative phase. A Chi-square test of significance was conducted with a *p* value set at .05 for the quantitative aspect of the study, while content analysis was done for the qualitative aspect. Study findings showed that proximity to the HCT center through mobile service increased the uptake of HIV testing services by the participants; however, stigmatization and discrimination did not significantly affect the uptake of HIV testing by the participants. Interestingly, while most studies reported a negative impact of stigmatization and discrimination on HIV testing, this study did not corroborate it. Gazimbi and Magadi (2017) conducted a secondary data analysis of 2010/2011 Zimbabwe Demographic and Health Surveys to

ascertain the determinants of HIV testing. They used a nationally representative sample of 17,797 women and 14,587 men. Multilevel logistic regression analysis was used as the test statistics. Results showed that being a woman and younger, wealthy, urban residence and stigma were associated with more likelihood of testing for HIV. In Nigeria, Shodimu et al. (2017) did a secondary data analysis of 15,639 women of reproductive age (15 to 49 years) from the 2012 Nigeria National HIV/AIDS and Reproductive Health Survey (NARHS Plus II). The study was conducted on the determinants of perceived stigmatizing and discriminating attitudes towards people living with HIV/AIDS among women of reproductive age in Nigeria. The primary study design was a cross-sectional study that used a stratified multistage cluster sampling method to select the men (15-64years) and women (15-49 years) living in households in the component states of Nigeria. Chi-square test of association and multinomial regression analyzes were used to determine and predict the study's variable relationships. The results of the study showed that having low stigmatization attitudes by the respondents was significantly associated with the respondents' willingness to test for HIV compared to those with moderate and high stigmatization ($p < .01$). Also reported is that individuals with primary education are more likely to manifest stigma than those with higher education (*OR*, 3.80; 95% CI: 2.36, 6.13, $p < .01$), while poor HIV knowledge is significantly associated with stigmatization.

Erena et al. (2019) did a cross-sectional survey on the determinants of HIV testing among women of reproductive age using data from the 2016 Ethiopian Demographic Health Survey. Logistic regression analysis was used as the test statistics to predict HIV testing by the women. Results showed that higher socioeconomic status,

having risky sexual behavior, and ever being married positively predicted HIV testing by the women. Determinants that negatively predicted HIV testing were stigmatizing attitudes and comprehensive HIV knowledge while living in rural areas. Muhinda and Pazvakawambwa (2017) applied the health belief model to study HIV testing patterns and determinants among women in Namibia using secondary data from the Namibian 2013 DHS. The study's purpose was to determine patterns and determinants of HIV testing among women and to propose strategies to increase HIV testing among women. The results showed that lower educational status and perceived low risk of contracting the virus constituted barriers to the likelihood of being tested for HIV. Ojikutu et al. (2016) conducted a longitudinal observational multi-country study on the impact of stigma on women living with HIV disclosure of their HIV status to sexual partners. The study's findings indicated that anticipated and community-level stigma significantly predicted HIV-infected women's non-disclosure of their HIV status to sexual partners. A cross-sectional design study (N = 1554) of psychosocial determinants of HIV testing across stages of change in the Spanish population using a computer-assisted telephone interview was conducted in Spain (Fuster-RuizdeApodaca et al., 2017). Results showed that perception of risk, perceived self-efficacy, proximity to people who had been tested, perceived benefits of knowing the diagnosis were significantly associated with HIV testing decisions. The underestimation of the risk of HIV infection, stigma, and perceived severity of HIV were associated with the decision not to be tested for HIV. Treves-Kagan et al. (2017) used a population-based sample to determine the association of HIV testing behaviors and community-level and individual-level stigma in rural South Africa. They

found that for each percentage point reduction in community-level stigma, the likelihood of testing for HIV by women increased by 3% ($p < .01$). Women will refuse HIV testing, avoid antenatal care services and drop out of the prevention of the mother-to-child program due to stigma and discrimination by family members and the society (Anígilájé et al., 2016; Merga et al., 2016). An institutional-based cross-sectional study on the determinants of Provider-Initiated HIV Testing and Counseling use among pregnant women was conducted in Ethiopia by Gebremedhin et al. (2018). All Pregnant women aged 15–49 years who attended antenatal care services during the study period were included. Results showed that out of the 441 respondents, 309 (70.1%) accepted Provider initiated testing and counseling. Results showed that women with perceived negative attitudes from their partners toward HIV-positive results (*OR*, 0.31; 95% CI: 0.10, 0.94) were less likely to accept the provider-initiated testing and counseling (PITC) service. In a multi-country study, Gunn et al. (2016) did a meta-analysis using a cross-sectional design to ascertain the association between antenatal care attendance of pregnant women in sub-Saharan Africa and their testing for HIV. Nigeria ranked third on the rate of HIV testing as part of ANC. Findings from the study showed that women who manifest stigma towards persons living with HIV were less likely to have an HIV test as part of ANC (37%) than those who did not express stigma (54.8%, $p < .01$). Takarinda et al. (2016) conducted a secondary data analysis using data from 7,313 women and 6,584 men who completed interviewer-administered questionnaires and provided blood specimens for HIV testing during the Zimbabwe Demographic and Health Survey (ZDHS) 2010–11. They used multivariable logistic regression to predict the determinants of ever being

tested for HIV. Study findings showed that women with less stigmatizing attitudes towards persons living with HIV (*AOR,* 1.24; 95% CI:1.08, 1.42) were more likely to test for HIV. Haffejee et al. (2016) used open and closed-ended questionnaires to collect information from women on the prevention of mother-to-child transmission of HIV and attitude and knowledge about HIV infection in South Africa. Findings showed that the majority of the respondents (94%; n = 63) showed a positive attitude towards HIV testing, with the majority of them (90%, n = 60) reporting having done an HIV test. Ha et al. (2019) conducted a cross-sectional study on HIV stigma and testing in Mozambique. Correlates of this relationship were determined using measures of sociodemographic characteristics, stigma, and exposure to HIV interventions in the past in a logistic regression model stratified by gender to estimate the relationship between stigma and recent testing for HIV and also to identify other correlates. Interestingly, the result showed that stigma was not statistically significantly related to the women's HIV testing behaviors (*AOR*, 0.95; 95% CI: 0.90, 1.01), $p = .11$.

Association of Knowledge of Discriminatory Practices Towards Persons Living With HIV/AIDS and HIV Testing

Although it has been reported in studies (Colombini et al., 2016; Ojikutu et al., 2016) that discriminatory practices towards persons living with HIV/AIDS impacted negatively on testing for HIV, there is a paucity of literature on the impact of personal knowledge of discriminatory practices toward persons living with HIV/AIDS on testing for HIV by the pregnant women measured by (1) Do you personally know someone who has been denied health services in the last twelve months because he or she has or is

suspected to have the AIDS virus (2) Do you personally know someone who has been denied involvement in social events, religious services, or community events in the last twelve months because he or she has or is suspected to have the AIDS virus (3) do you personally know someone who has been verbally abused or teased in the last twelve months because he or she has or is suspected to have the AIDS virus. The knowledge of discriminatory practices may serve as a barrier to HIV testing. When individuals know about these discriminatory practices, it may negatively impact their testing for HIV due to the fear of being victims of these practices. Furthermore, Ojikutu et al. (2016) also reported that some of the reasons women living with HIV/AIDS in different locations will not disclose their HIV status to sexual partners include being older, anticipated stigma, perceived HIV stigmatization from the community, and depressive symptoms. Suggested interventions to address these reasons among serodiscordant couples include community-level interventions.

Perceived risk or susceptibility to HIV has been reported to impact HIV testing. When people perceive themselves to be at no risk for HIV, the tendency to decide not to test for HIV is more (Alemu et al., 2016). This is in keeping with the construct of the health belief model (Rosenstock, 1966; Rosenstock et al., 1988). Teklehaimanot et al. (2016) found in a study conducted in Ethiopia that reproductive-age women who perceived themselves to be at a small risk of contracting HIV infection were 2.3 times more likely to test for HIV than those who perceived themselves to be at no risk. Fuster-RuizdeApodaca et al. (2017 - Spain) conducted a cross-sectional survey on the psychosocial determinants of HIV testing across stages of change in the Spanish

population using a computer-assisted telephone interview. They used One-way Analysis of variance and Chi-square for the analysis. The results showed that perception of risk was significantly associated with HIV testing decisions.

Association of Age Categories With HIV Testing

Age has been reported to significantly influence the behavior towards HIV testing (Muhinda and Pazvakawambwa, 2017). This study conducted in Namibia reported that being younger was significantly associated with the likelihood of being tested for HIV. Takarinda et al. (2016) also found the same relationship in their study in Zimbabwe. Gunn et al. (2016) reported in their study on antenatal care and uptake of HIV testing among pregnant women in sub-Saharan Africa that HIV testing as part of ANC was highest among women aged 20–29 years (62.2%) followed by 30-39 years (61.3%), 15–19 years (56.7%), and 40–49 years (53.4%). However, Muyunda et al. (2018) reported in their study in Zambia that older women aged 25-34 years had more uptake of HIV testing compared to the young women 15–19 years (*AOR*, 2.3; 95% CI, 1.3, 4.3; $p < .01$). These findings presented a mixed picture of the relationship between age and HIV testing.

Association of Educational Level With HIV Testing

Alemu et al. (2017) reported in their study on the use of HIV testing services among pregnant mothers that increasing levels of education were statistically significantly related to HIV testing. They found that women with higher than primary education were more likely to test for HIV than those who did not have formal education (*AOR*, 3.49; 95% CI: 1.56, 7.77). Ndege et al. (2016) conducted a study on attendance to antenatal care services and prevalence of HIV in Kenya. It was an observational study

conducted based on a secondary data set. Women of reproductive age 13-50 were included in the study. The study found that 38.1% of the women had previously tested for HIV: 62.2% among pregnant women compared to 36.6% among those not-pregnant ($p < .01$). Educational level statistically significantly predicted the previous history of HIV testing. Muyunda et al. (2018) studied the determinants of HIV testing among women of reproductive age using secondary data from the 2014 Zambia Demographic and Health Survey. The analysis consisted of all women aged 15–49 years who responded to the question about HIV testing in the survey. Multivariable logistic regression analysis was conducted to determine the association between educational level attainment and uptake of HIV testing among women of reproductive age in Zambia. The results of the study showed that women with secondary or higher educational attainment were four times more likely to test for HIV than those with no education (*AOR*, 3.8; 95% CI:1.7–8.2; $p = .01$).

Ejigu and Tadesse (2018) did a secondary data analysis of 2016 Ethiopian Demographic and Health Survey using a cross-sectional design. The inclusion criteria in the analysis were being pregnant in the last year before the survey. Out of the 2114 women included, 35.1% tested for HIV and received their results during pregnancy. The study findings showed that pregnant women who were educated were more likely to be tested for HIV during pregnancy than those without formal education (primary level education *AOR*, 1.55; 95% CI: 1.12 ± 2.15; secondary level education *AOR*, 2.56; 95% CI: 1.36 ± 3.82; higher education *AOR*, 3.95, 95% CI:1.31±11.95). Atnafu Gebeyehu et al. (2019) found in their study on the acceptance of HIV testing and associated factors

among pregnant women attending antenatal care in Ethiopia that participants who had no formal education (*AOR*, 0.39; 95% CI: 0.16, 0.97) and had a primary level of education (*AOR*, 0.35; 95% CI:0.15, 0.84) were less likely to test for HIV than those with higher levels of education. Ajayi et al. (2021) supported this finding in their cross-sectional survey of pregnant women's HIV testing coverage in Nigeria. They used a multi-stage stratified cluster sampling approach to recruit the participants. They found that women who were more likely to be tested for HIV during pregnancy had higher education (*AOR*, 6.94; 95% CI: 5.07, 9.49).

Association of Place of Residence With HIV Testing

Place of residence is a reported factor that impacted on uptake of HIV testing. Mohlabane et al. (2016), in their cross-sectional survey of 67 HCT-providing health facilities in eight South African provinces (N = 489), found that people living in urban areas (86%) tested for HIV as against (81%) that are living in the rural area. This finding by Mohlabane et al. (2016) was also corroborated by Worku et al. (2021), that reported that women living in rural areas had a lower odd of being tested for HIV compared with their counterparts living in urban areas (*AOR*, 0.69; 95% CI: 0.67, 0.72). Ajayi et al. (2021) conducted a study on Nigerian pregnant women's uptake of HIV testing using data retrieved from the 2016–2017 Nigeria Multiple Cluster Survey. They used an unadjusted and adjusted logistic regression model to predict demographic factors' relationship with the pregnant women HIV testing while controlling for the effects of geopolitical zones. The result indicated that pregnant urban dwelling women are more likely to test for HIV than the rural dwellers (*AOR*, 1.26; 95% CI: 1.07, 1.50). Gazimbi and Magadi (2017)

corroborated these findings that those residing in rural areas have a lower likelihood of testing for HIV. However, Takarinda et al. (2016) reported in their study conducted in Zimbabwe on factors associated with ever being HIV-Tested in Zimbabwe that living in either rural or urban area is not significantly related to the likelihood of ever being tested for HIV among the female respondents (*OR*, 0.93; 95% CI: 0.82, 1.06) $p = 0.29$).

Association of Religion With HIV Testing

Muhinda and Pazvakawambwa (2017) reported in their study done in Namibia that religion is not a predictor of HIV testing by women of reproductive age; however, this was not corroborated by Takarinda et al. (2016), who reported significant uptake of HIV testing by different religious sects. This study was a secondary analysis conducted using data from 7,313 women and 6,584 men who completed interviewer-administered questionnaires and provided blood specimens for HIV testing during the Zimbabwe Demographic and Health Survey 2010–11. Yaya et al. (2019) analyzed data from the Mozambique Demographic and Health Survey conducted in 2011. They reported that religion is a predictor of HIV testing among pregnant women. Pregnant women of other religions were 0.87 (95% CI: 0.77, 0.98) times statistically significantly less likely to test for HIV than their Islamic counterparts. Also, a study done in Ethiopia by Ejigu and Tadesse (2018) corroborated Yaya et al.(2019) finding that religion is a predictor of HIV testing by pregnant women. They reported that pregnant women of Orthodox religion were 3.77 times (95% CI: 2.52, 5.66) more likely to test for HIV than those of Islamic religion. Udoh & Ushie (2020) did a study in Nigeria using data from the 2013 NDHS.

They reported that religion did not statistically significantly predict HIV testing by women of reproductive age.

Association of Marital Status With HIV Testing

Mixed findings have been reported on the association of marital status with HIV testing by pregnant women. Takarinda et al. (2016) reported in their study conducted in Zimbabwe on factors associated with ever being HIV-Tested in Zimbabwe that being in a union is significantly related to the likelihood of ever being tested for HIV (*AOR,* 1.65; 95% CI: 1.17, 2.34; $p = .01$). Ndege et al. (2016), in their observational study, reported otherwise that being married or living together is associated with the likelihood of not being previously tested for HIV. Muhinda and Pazvakawambwa (2017) did a secondary data analysis from the 2013 Namibia demographic and health survey on HIV testing among women in Namibia. They also reported that women's marital status is not a positive predictor of HIV testing. Also, Muyunda et al. (2018) further corroborated this finding in their study that reported that marital status is not significantly associated with the likelihood of testing for HIV. Although the bivariable regression analysis established a significant finding between marital status and HIV testing, multivariable regression analysis after adjustment for covariates did not support the bivariate finding. Akinleye et al. (2017) conducted a cross-sectional study on integrating HIV testing services into maternal, newborn, and child health week in Nigeria. Their findings showed that being currently married is not statistically significantly related to the pregnant women's HIV testing (*OR,* 1.1; 95% CI: 0.2, 8.6), $p = .90$.

Other Correlates' Association With HIV Testing

A socioeconomic status measure such as wealth index has been associated with uptake of HIV testing (Muhinda, & Pazvakawambwa, 2017; Takarinda et al., 2016). While in the study conducted by Takarinda et al. (2016), the wealth index was significantly related to increased uptake of HIV testing, Muhinda and Pazvakawambwa (2017) found the opposite relationship. Muyunda et al. (2018) corroborated the finding by Takarinda et al. (2016) that women with a higher wealth index are more likely to test for HIV than those with wealth index (*AOR*, 4.4; 95% CI: 1.9, 9.9) $p = .01$. The finding by Muhinda and Pazvakawambwa (2017) was also corroborated by Worku et al. (2021), that found in their study that individuals from rich (*AOR*, 0.93; 95% CI: 0.89, 0.97) and richest (*AOR*, 0.80: 95% CI: 0.76, 0.84) households were less likely to test for HIV

Takarinda et al. (2016) found in their study that being female than male is significantly correlated with the likelihood of ever being tested for HIV. This study used secondary data from the 2010-2011 Zimbabwe Demographic and Health Survey. The sample consisted of 7,313 women and 6,584 men who completed interviewer-administered questionnaires and provided blood specimens for HIV testing. The determinants of ever being tested for HIV were predicted using multivariate logistic regression. Study findings showed that being a woman was significantly associated with being tested for HIV. This finding was corroborated by Jooste et al. (2020), who also reported that women are statistically significantly more likely to test for HIV than men (*AOR*, 2.05; 95% CI:1.88, 2.23).

Proximity to an HIV testing center has been reported as one of the correlates of uptake of HIV testing (Alemu et al., 2017; Meremo et al., 2016). When an HIV testing center is located far from a potential client, it may impact the use of the service. Alemu et al. (2017 - Ethiopia), in their cross-sectional study on the use of HIV testing services among pregnant mothers in Ethiopia, reported that proximity or distance to an HIV testing center constitutes a barrier to HIV testing. Meremo et al. (2016), in their study on the barriers to accessibility and utilization of HIV testing and counseling services in Tanzania, corroborated this finding. Ogbonna et al. (2020) conducted a cross-sectional study on HIV counseling and testing barriers among undergraduate students in Enugu State, Nigeria. Results of the survey showed that proximity or distance to an HIV testing center posed a barrier to the HIV testing by the students. Kolawole et al. (2019) assessed the use of HIV counseling and testing services in Nigeria. Their findings showed proximity or location of the HIV Testing center impacted the uptake of HIV testing.

Negative Consequences of Testing for HIV

Although HIV testing has been acknowledged as the gateway to prevention, care, support, and treatment services (Meremo et al., 2016; WHO, 2019), it is not without negative consequences, which include stigmatization and discrimination, and abuse.

Abuse

HIV serostatus disclosure has been suggested to be a heightened risk period for women abuse, discrimination, and withdrawal of financial support (Colombini et al., 2016). According to UNAIDS (2014), one in three women is estimated to have been beaten, forced into sex, or abused by an intimate partner during her lifetime. The violence

by an intimate partner has been shown to have increased the HIV transmission risk by about 50% and prevented them from seeking services associated with prevention, treatment care, and support for HIV (UNAIDS, 2014). The 2018 NDHS report showed that intimate partner violence prevalence among women of reproductive age was 15% (NPC] and ICF International, 2019). Hampanda and Rael (2018) conducted a cross-sectional study on HIV status disclosure among postpartum women with varied intimate partner violence experiences in Zambia. The study aimed to assess the association between intimate partner violence against women and their HIV status disclosure behaviors. The survey collected information on the women's self-reports of different forms of intimate partner violence and if their HIV status were disclosed to their male partners. The findings showed a strong negative dose-response relationship between the severity and frequency of intimate partner violence against women living with HIV/AIDS and the odds of disclosing their HIV status to male partners (*AOR*, 0.32; 95% CI: 0.11, 0.95); $p < .05$. Matseke et al. (2016) conducted a study to determine the prevalence of intimate partner violence (IPV) and the determinants among HIV-infected pregnant women in South Africa. The respondents were 673 women. The result showed that 19.6% of the women reported physical intimate partner violence, while 56.3% reported having undergone physical or psychological IPV. The multivariable regression model result showed that stigma and higher levels of depression and stigma were associated with physical IPV. Colombini et al. (2016) did a study in Kenya using the qualitative method to study the risks of partner violence following HIV status disclosure in Kenya. The

findings showed that about one-third of the respondents reported suffering physical and or emotional abuse due to serostatus disclosure.

Stigmatization and Discrimination

Stigmatization and discrimination remain some reasons why women will not go for HIV testing and disclose their results to their partners (Colombini et al., 2016; Ojikutu et al., 2016). Ojikutu et al. (2016) reported that perceived community-level HIV stigma, anticipated stigma, being older and depressive symptoms predict why women living with HIV in different geographic locations will not reveal their HIV status to their sexual partners. According to UNAIDS (2005), globally, there are reported cases of HIV-positive persons being denied their right to employment, healthcare, freedom of movement, and education. Fear of the above, anticipated and community-level HIV stigma, and gender violence are some of the reasons why individuals, particularly women, will shy away from HIV testing (Colombini et al., 2016; Ojikutu et al., 2016). According to the report of people living with HIV stigma index Asia and Pacific regions analysis, 16% and 50% of those surveyed in Fiji and Cambodia respectively have lost their jobs or source of income in the last 12months on account of their HIV status (UNAIDS, 2011). Also, an estimated 9% in Bangladesh and 38% in the Philippines have been denied job opportunities (UNAIDS, 2011).

Psychological Problems

HIV-positive persons are more likely to have depressive symptoms than HIV-negative persons (Kiene, 2018). A study done in Ethiopia showed that HIV/AIDS-related depression and anxiety prevalence was high (Tesfaw et al., 2016). This study reported

that the prevalence of depression and anxiety among HIV-positive patients were 41.2 % and 32.4 %, respectively. Peltzer et al. (2016) conducted a cross-sectional study of 663 HIV-positive prenatal women to determine the prevalence of depressive symptoms and factors associated with it in prenatal HIV-positive women in South Africa. The participants were recruited by systematic sampling method. Findings of the study showed that 48.7% (95% CI: 44.80, 52.60) of women reported having depressed moods due to their HIV status during the prenatal period. Also reported as a cause of the depressed mode is intimate partner violence. A cross-sectional study was conducted on depression among HIV-positive pregnant women in Zimbabwe by Nyamukoho et al. (2019). A total of 198 pregnant women were recruited into the study out of the approached 234 pregnant women using simple random sampling. A finding of the study showed that 78 of the women met the criteria for antenatal depression according to Edinburgh Postnatal Depression Scale (EPDS). Multivariable regression analysis showed that factors associated with antennal depression were the previous history of depression (*OR*, 4.1; 95% CI; 2.00, 8.00) and intimate partner violence (*OR*, 3.2; 95% CI:1.50, 6.70).

Summary and Conclusions

This chapter reviewed what the literature found relating to stigma and discrimination, including other HIV testing predictors and sociodemographic variables on HIV testing by pregnant women between the ages of 15-49 years. The goals, objectives, meaning, and implications of HIV testing among this study group were examined. The reviewed literature showed that many research designs and approaches were used by studies related to HIV counseling and testing. Different methodologies used include

cross-sectional quantitative, cross-sectional qualitative, longitudinal (cohort) quantitative study, mix-method, and secondary data analysis method. HIV testing and counseling is a process through which a person is counseled about HIV so that he or she may be able to make an informed decision about being tested for the virus. It is a process that requires confidentiality and that the decision is made solely by the individual. The goal of HIV testing is to assist people in knowing their HIV status so that those who are seronegative will continue to engage in safe behavior while seropositive individuals will make an informed decision about treatment, care and support services options available.

Studies reviewed showed that women are more vulnerable to HIV infection because of socio-cultural, economic, and biological factors. Some variables impacting the uptake of HIV testing by pregnant women were examined in the context of health belief model constructs. These constructs include perceived susceptibility or risk, perceived benefits, perceived barriers, and their applicability was used to understand and predict HIV testing uptake among pregnant women aged 15-49 years in Nigeria. Most of the reviewed studies showed that perceived susceptibility and benefits positively impacted the uptake of HIV testing among pregnant women and women of reproductive age, while perceived barriers had a negative impact. In Nigeria, studies conducted on pregnant women aged 15 to 49 years who have knowledge of discriminatory practices towards persons living with HIV/AIDS and the effect it had on their HIV testing are non-existent. Many of the studies focused on the effect of stigmatizing attitudes and discriminatory attitudes (not knowledge) of pregnant women on their HIV testing. Also, many of the studies are not grounded in a theoretical framework. Theories provide the basis for

understanding why people engage or do not engage in HIV testing. The health belief model provides an understanding of why pregnant women will or will not practice HIV testing. The literature review has provided further insights into factors that impact HIV testing that requires further investigation. This includes the paucity of theory-driven studies on factors impacting the uptake of HIV testing among pregnant women. It also includes that the later additions to the health belief model, namely cue to action and self-efficacy, and their impact on HIV testing among the study population have not been fully explored. This study will add to the body of knowledge by exploring the effect of stigmatizing attitudes and knowledge of discriminatory practices towards persons living with HIV/AIDS of the pregnant women aged 15-49 years on their HIV testing controlling for Educational level and Place of Residence. The use of a quantitative cross-sectional design method will provide a relationship between the effect of stigma and discrimination on HIV testing by pregnant women aged 15-49 years in Nigeria, including the impact of some selected sociodemographic variables.

Chapter 3: Research Method

The purposes of this study were to examine the effect of stigmatizing attitudes and personal knowledge of discriminatory practices towards persons living with HIV/AIDS on self-reported HIV testing of Nigerian pregnant women aged 15-49 years during antenatal visits or childbirth. I also examined the association between age, education, place of residence (urban/rural), religion, and marital status as covariates. I used a quantitative cross-sectional design. A stratified three-stage cluster design sampling technique was used in the primary study to select the study participants (NPC & ICF, 2014). The dependent variable in this study was self-reported HIV testing by the pregnant woman, which was defined as a pregnant woman having tested for HIV and received her results during antenatal or childbirth at least once in any previous or current pregnancy. The RQs and hypotheses for the study were as follows:

RQ1: Is there an association between the stigmatizing attitudes of pregnant women aged 15-49 years towards other persons living with HIV/AIDS and their self-reported testing for HIV during antenatal visits or childbirth when controlled for sociodemographic characteristics (age categories, educational level, place of residence (urban/rural), religion, and marital status)?

$H_0$1: There is no association between stigmatizing attitudes of pregnant women aged 15-49 years towards other persons living with HIV/AIDS and self-reported testing for HIV during antenatal visits or childbirth when controlled for sociodemographic characteristics (age categories, educational level, place of residence (urban/rural), religion, and marital status).

H_a1: There is an association between stigmatizing attitudes of pregnant women aged 15-49 years towards other persons living with HIV/AIDS and their self-reported testing for HIV during antenatal visits or childbirth when controlled for sociodemographic characteristics (age categories, educational level, place of residence (urban/rural), religion, and marital status).

RQ2: Is there an association between knowledge of discriminatory practices of pregnant women aged 15-49 years towards other persons living with HIV/AIDS and their self-reported testing for HIV during antenatal visits or childbirth controlled for sociodemographic characteristics (age categories, educational level, place of residence (urban/rural), religion, and marital status)?

$H_0 2$: There is no association between the knowledge of discriminatory practices of pregnant women aged 15-49 years towards other persons living with HIV/AIDS and their self-reported testing for HIV during antenatal visits or childbirth when controlled for sociodemographic characteristics (age categories, educational level, place of residence (urban/rural), religion, and marital status).

$H_a 2$: There is an association between knowledge of discriminatory practices of pregnant women aged 15-49 years towards other persons living with HIV/AIDS their self-reported testing for HIV during antenatal visits or childbirth when controlled for sociodemographic characteristics (age categories, educational level, place of residence (urban/rural), religion, and marital status).

Research Design and Rationale

The study design was a secondary data analysis of randomly selected responses to HIV questions by pregnant women aged 15-49 years in the 2013 NDHS. The design of the primary study was cross-sectional. A quantitative cross-sectional design provides a numeric picture of the study participants' responses that can be generalized to a representative sample population (Spector, 2019). It is a research design that is less time-consuming and economical in answering the RQ and ascertaining the relationship between the study variables. It was appropriate for the study because the research questions' cause and effect are not being established (Iyun et al., 2018). The dependent variable was HIV testing in Nigeria by pregnant women aged 15-49 years during antenatal visits or childbirth. The main independent variables were HIV/AIDS stigmatizing attitudes and knowledge of discriminatory practices towards persons living with HIV/AIDS, and the covariates included age, education, place of residence (urban/rural), religion, and marital status.

Pederson et al. (2020) noted some advantages and disadvantages for secondary data analysis. It is cheaper, less time-consuming, and is easily accessible, especially in this era of internet technology. It usually has a pre-established degree of validity and reliability, which need not be reexamined by the researcher who is reusing such data, especially if the source of the data sets is reputable. Another strength is that it facilitates the analysis of past changes and/or developments that will inform decision-making going forward; new surveys or research may not allow for such analysis. Disadvantages of secondary data analysis include that it may not cover all the population samples the

researcher wants to sufficiently examine or answer the RQs. It may be outdated, and the validity and reliability may not be known.

Methodology

Population

The study population was pregnant women aged 15-49 years residing in the 36 states of Nigeria plus the federal capital territory, Abuja. The last population and housing census conducted in Nigeria was in 2006, which put its population at 140,431,790 (Federal Republic of Nigeria Official Gazette, 2009; NPC & ICF, 2014). With an estimated growth rate of 3.2% per annum (Federal Republic of Nigeria Official Gazette, 2009; NPC & ICF International, 2014), the country's estimated population, as of year 2020, is about 206 million people. More than half its citizens are under the age of 30 years, and the country has a federalism system of government (Federal Republic of Nigeria Official Gazette, 2009; NPC & ICF, 2014). Within the boundaries of Nigeria, there are about 374 distinct ethnic groups with distinct cultural traits, with the Igbo, Hausa, and the Yoruba being the major ethnic groups (NPC & ICF, 2014).

Sampling and Sampling Procedures

Women of reproductive age between 15-49 years and men between the ages of 15-59 years were included in the primary study. However, only pregnant women aged 15-49 years were included in this study. To meet the inclusion criteria, I filtered the data in SPSS to include only women aged 15-49 years who had reported being currently pregnant or pregnant at least once before the conduct of this study. I combined three variables from the 2013 NDHS Questionnaire to recode the ever been pregnant variable

in SPSS; they included total child ever born (V201), currently pregnant (V213), and ever had a terminated pregnancy (V228). A simple random sampling technique using SPSS was used to select the required sample size of pregnant women for the study.

Sample Size Calculation

The sample size describes the number of women who met the study entry criteria selected from the target population from which data are collected. G*power sample size calculator version 3.1.9.1 was used to calculate the minimum sample size for this study (Faul et al., 2009). The calculated minimum sample size based on a two-sided confidence level (1-alpha) of 95% was 292 participants. According to a cross-sectional study by Gunn et al. (2016 -Congo, Mozambique, Nigeria, and Uganda) on antenatal care and uptake of HIV testing among pregnant women in sub-Saharan Africa, 11,766 women from Nigeria who participated in the study were characterized according to their HIV/AIDS Stigmatizing Attitudes. The breakdown of this number showed that 4,460 women have No Stigma or Positive Stigmatizing Attitudes while 7,306 have Stigma or Negative Stigmatizing Attitudes. The study finding shows that pregnant women who expressed stigma towards someone with HIV were less likely to have an HIV test as part of ANC (37.0%) than those who did not express stigma (54.8%, $p < .01$). This implies that 54.8% (2,912) of the 4,460 pregnant women who showed no stigmatizing or have positive stigmatizing attitudes were more likely to test for HIV than 37% (3,485) out of the 7,306 women who expressed more stigma or Negative Attitudes. Therefore, the probability of testing for HIV by pregnant women with less stigma or positive attitudes

was calculated to be 2,912/4460 = 0.65, while that of those with stigma or negative attitudes was 3,485/7,306 = 0.48.

Therefore, under the two probabilities option in the G*Power calculator, the probability of testing for HIV (Pr (Y=1 | X=1) H1) was inputted as 0.65, where (Y=1) is the testing for HIV when the pregnant woman has a positive attitude (X=1) and (Pr (Y=1 | X=0) H0) as 0.48, where (Y=1) is the testing for HIV when the pregnant woman has a negative attitude (X=0). Based on these two probabilities, the G*power calculator estimated an odds ratio (effect size) of 2.0. The other parameters for determining this sample size include 80% power, 5% alpha level, R-squared other X=0.02 gotten by regressing the main predictor variable, Stigmatizing Attitudes onto all other covariates using binary logistic regression, X-Distribution = binomial, and X param $\prod$ = 0.38 (The proportion of cases that have positive attitude). Therefore, with a calculated sample size of 292, there is an 80% chance of correctly rejecting the null hypothesis that a particular category of stigmatizing attitudes is not related to the value of testing for HIV by pregnant women aged 15-49 years. The output of the G*power calculator is shown below:

Input:	Tail(s)	=	Two
	Odds ratio	=	2.01
	Pr(Y=1|X=1) H0	=	0.48
	α err prob	=	0.05
	Power (1-β err prob)	=	0.80
	R^2 other X	=	0.02

	X distribution	=	Binomial
	X parm π	=	0. 38
Output:	Critical z	=	1.96
	Total sample size	=	292
	Actual power	=	0.80

The number of women who had reported being pregnant before the 2013 Nigeria Demographic and Health Survey and captured in the survey is more than the required minimum sample size. Design effect was applied in the primary study to compensate for the clustering effect and non-use of simple random sampling technique. Design effect refers to the ratio of the variance gotten with the stratified 3-stage cluster sampling method used in 2013 NDHS and the variance that would have been gotten using a simple random sampling technique for the same survey (NPC & ICF International, 2014). A value of one indicates that the cluster sampling technique is as efficient as the simple random sampling method, while a greater value indicates increased variance or standard errors that impact the survey finding precision (NPC & ICF International, 2014). The mean score value of design effect (DEFT) calculated for all the variables in 2013 NDHS was 2.24 (NPC & ICF International, 2014; p. 386), meaning that because of multi-stage clustering technique used for the selection of the samples, the average standard error was raised by a factor of 2.24 over that in an equivalent simple random sample. To account for this effect, the minimum sample size of 292 is increased by 2.24, giving a sample size of 654. This sample gave an achieved power of 99%. The increase in sample size

increased statistical power, reduced standard error, and increased the study estimates' precision (Armstrong, 2019). The output of the G*power calculator is shown below:

Analysis:	Post hoc: Compute achieved power		
Input:	Tail(s)	=	Two
	Odds ratio	=	2.02
	Pr(Y=1|X=1) H0	=	0.48
	α err prob	=	0.05
	Total sample size	=	654
	R^2 other X	=	0.02
	X distribution	=	Binomial
	X parm π	=	0.38
Output:	Critical z	=	1.96
	Power (1-β err prob)	=	0.99

Procedures for Recruitment, Participation, and Data Collection

A stratified three-stage cluster design sampling technique was used for the 2013 Nigeria Demographic and Health survey. This sampling strategy is justified because Nigeria is a large country with a vast area, and the application of a simple random sampling strategy which is the ideal sampling technique, will not be economical and practically feasible. Therefore, the use of the stratified three-stage cluster design sampling strategy addresses these problems through increasing sampling precision and efficiency by cost reduction and practicability of the technique, as reported by Zhou et al. (2016). The samples for the 2013 Nigerian Demographic and Health Survey were drawn

by developing a sampling frame that consists of the 36 states of Nigeria and the Federal Capital Territory (FCT) that were further divided into 774 local government areas and each area into localities. During the last census conducted in Nigeria in 2006, these localities were further subdivided into census enumeration areas otherwise regarded as clusters. The average number of households in each cluster in the corresponding locality frame was assigned to each cluster. Also, the states and FCT were regrouped into six geopolitical zones. However, because some of the enumeration areas or clusters were too small to yield the preferred minimum cluster size of 80 households, the 2013 NDHS included several EAs per DHS cluster

The 2013 NDHS used a stratified sample, independently selected in three stages from the sampling frame. Stratification was attained by dividing each state into urban and rural areas. Eight hundred and ninety-three (893) localities were selected with probability proportional to size with independent selection in each sampling stratum in the first stage. In stage two, one enumeration area (EA) was chosen randomly from these localities with an equal probability selection. In a few localities that are larger, more than one enumeration area was selected. The total number of EAs selected was 904. A listing of the households was carried out in all the selected EAs before the start of the survey. This was done by visiting each of the 904 selected EAs, drawing a detailed sketch map, and recording on the household listing forms all residential households occupied in the EA with the addresses and the names of the head of the households. If a selected EA included less than 80 households, a neighboring EA from the selected locality was added to the cluster and listed completely. The resulting list of households was used as the sampling

frame for the household's selection in the third stage. In the third stage, a fixed number of 45 households were selected in every urban and rural cluster through an equal probability systematic sampling method based on the updated household listing.

The total number of households sampled was 40,680 (Urban area 16,740 (41.15%) and Rural area 23,940 (58.85%), and the number of women of reproductive age that participated in the study was 38,948. Inclusion criteria include that a respondent must be a member of the selected household between 15-49 years. Exclusion criteria include non-conformity with the stated inclusion criteria. An informed consent presentation was given to members of selected households, and then eligible household members were invited to be study participants. When they indicated a willingness to participate, they were asked to complete an Informed Consent Form. The content of the form requires that respondents are at liberty to participate in the survey and can withdraw at any time without penalty. Also, the purpose of the survey was explained to them, including that the information they provided will be treated with the utmost confidentiality. Those who volunteered to participate and completed the consent form were then interviewed.

The Nigeria demographic and health survey 2013 data sets that were archived publicly by the DHS program were used to answer this study's research questions. I obtained approval from the DHS Program to use this data set (see the authorization letter in Appendix A). The Walden University Institutional Research Board (approval no. 11-11-20-0491011) also approved my use of the data set for the study. After receiving these approvals, I downloaded the data set. I used SPSS to recode the variables "total child ever

born, currently pregnant, and ever had a terminated pregnancy" to create the variable "women aged 15-49 years who had ever been pregnant before the conduct of the survey." Where applicable, recoding of relevant variables was done to answer the study's research questions.

The secondary data set from the 2013 Nigeria Demographic and Health Survey was obtained by applying on the Demographic and Health Survey Website to the administrators for permission to use the data through a request form requiring me to state what I want to use the data. I submitted the filled form that contains conditions of data use, and after some two days, I got an approval mail with a link to where to download the requested data sets.

Instrumentation and Operationalization of Constructs

The 2013 DHS Woman Questionnaire was the instrument of interest because it was used to collect data that answered the research questions of this study. It was used to collect information from all women (including pregnant women) age 15-49 years on topics such as background characteristics, reproductive history, antenatal, delivery and postnatal care, breastfeeding and infant feeding practices, marriage and sexual activities, occupation, awareness about HIV/AIDS and other sexually transmitted infections and testing for HIV. It was pretested in 120 households in selected locations in Benue State, Nigeria. Observations from the field and suggestions by the pilot team form the basis for the revisions made in the wording and translation of the questionnaire. The content validity of the NDHS questionnaire was established by a team of experts that made extensive contributions that were incorporated into the final version of the questionnaire

(NPC & ICF International, 2014). Appendix B contains the survey questions that were examined and the levels of measurement of the study variables.

The dependent variable is HIV testing by the pregnant woman, which is defined as having tested for HIV and received their results at least once by the pregnant women in any of their previous or current pregnancies before the conduct of the 2013 Nigeria demographic and health survey. The perceived barrier construct of the Health Belief Model is the applicable construct that will guide this study and will be operationalized by examining the relationship between the pregnant women aged 15-49 years in Nigeria who have stigmatizing attitudes against persons living with HIV/AIDS and the pregnant women's self-report of testing for HIV during antenatal visits or childbirth.

Stigmatizing attitudes (positive and negative) were graded by the responses given by the pregnant women to questions used to assess stigmatizing attitudes in the 2013 NDHS. The questions are (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 will be graded as positive or negative. For the stigmatizing attitude 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 attitude were classified as having negative attitudes, while those scoring equal or above the mean score were classified as having positive attitudes. A mean score of .56 (56%) ± .21 was taken as the cut-point.

The relationship between pregnant women aged 15-49 years in Nigeria who have knowledge of HIV/AIDS discriminatory practices towards persons living with HIV/AIDS and their self-report of testing for HIV during antenatal visits of childbirth. Knowledge of discriminatory practices (have knowledge and do not have knowledge) were operationalized by the responses given by the respondents to these questions (1) Do you personally know someone who has been denied health services in the last twelve months because he or she has or is suspected to have the AIDS virus (2) Do you personally know someone who has been denied involvement in social events, religious services, or community events in the last twelve months because he or she has or is suspected to have the AIDS virus (3) do you personally know someone who has been verbally abused or teased in the last twelve months because he or she has or is suspected to have the AIDS virus. A yes answer by the respondents to any or all of these three questions on the knowledge of discriminating practices against persons living with HIV/AIDS is

considered as knowledge of discriminating practices, while a no answer to all the questions is regarded as no knowledge.

I analyzed educational level, religion, place of residence, marital status, and age as covariates (see Appendix C for a comprehensive overview of covariates identified in other studies that may impact HIV testing). Other variables that their effect on HIV testing by the pregnant women in Nigeria aged 15-49 years will be predicted in the survey include age measured on an ordinal scale and categorized in 5-year groups. The age variable was converted from a continuous to categorical variable to facilitate comparisons among the different age groups, which is important for designing interventions and informed decision-making. This conversion impacts statistical power and can lead to the acceptance or non-rejection of the null hypothesis when it is false (Type II error), therefore, leading to conclusions that may not be valid (Ayilara et al., 2019). However, the level of power achieved in this study analysis was 99%, which is adequate (conventionally, it is set at 0.80 or 80%). Therefore, the conversion did not impact the study findings. Education measured on an ordinal scale and operationalized as "What is the highest level of school you attended" with response options as "primary, secondary, or higher." Place of Residence was measured on a nominal scale and operationalized as Urban (1) or Rural (2). Religion was measured on a nominal scale and operationalized as "What is your religion" with response options as "Catholic, Other Christians, Islam, Traditionalist." Marital status was measured on a nominal scale and operationalized as "Are you currently married or living together with a man as if married?" with response options as "yes, currently married, yes, living with a man, no,

not in a union" and "What is your marital status now: are you widowed, divorced, or separated?" with response options as "1. widowed 2. divorced 3. Separated." These two questions were merged and coded as 0 = Not currently married and 1= as currently married or living with a man as if married. The dependent variable is "Tested and Received HIV Result by pregnant women aged 15-49 years" measured on a nominal level and operationalized as a dichotomous variable with response options as (Did not test, Tested and did not Receive Result = 0; Tested and Received HIV Result = 1). Four questions from the questionnaire were combined as the dependent variable as follows: Were the pregnant women tested for HIV as part of antenatal visits, tested for HIV between the time they went for delivery and before the baby was born, got results of HIV test as part of antenatal visits, and got results of HIV test when tested before the baby was born? Appendix D contains the coding table. The dependent variable "self-reported HIV testing in Nigeria by pregnant women aged 15-49 years during antenatal visits or childbirth" was measured on the nominal scale, while the educational level was measured on the ordinal scale. The remaining independent variables or covariates were measured on the nominal scale.

Data Analysis Plan

SPSS version 25 software was used for the descriptive and inferential statistical analysis of this study. Descriptive analysis was used to describe or show the frequency and percentage distributions of the dependent variable "HIV testing in Nigeria by pregnant women aged 15-49 years during antenatal visits or childbirth" and the independent variables "pregnant women stigmatizing attitudes toward persons living with

HIV/AIDS" and "pregnant women personal knowledge of discriminatory practices towards persons living with HIV/AIDS." The descriptive statistics also showed the frequencies and percentage distributions of covariates, namely, age, education, place of residence, religion, and marital status of the pregnant women aged 15-49 years in Nigeria in 2013. Descriptive statistics summarize, describe, and present the variables in a way that can be understood easily (Kaliyadan & Kulkarni, 2019). Furthermore, it also facilitates the understanding of how data are distributed across a possible range of values and whether the shape of the variables' distribution is normal or not (Kaliyadan & Kulkarni, 2019). The data analysis plan was done by objectives of the study, which are the research questions. Binary logistic regression analysis was used because the outcome is dichotomous. The multiple logistic regression modeling was used to predict the best parsimonious model of the outcome. The overall significance of this regression analysis model was evaluated by the $\chi 2$ omnibus test of model coefficients (Boateng & Abaye, 2019). When compared to a baseline, if the -2LL is significantly reduced, the new model explains more of the variance in the outcome and is better than the baseline (Boateng & Abaye, 2019). The odd of an event occurring denoted by Exp (β) was applied to determine the predicted probabilities of an event happening (Boateng & Abaye, 2019; Ranganathan et al., 2017). Exp (B) is the odds ratio (OR) for the independent variable (Boateng & Abaye, 2019, Ranganathan et al., 2017). It indicated the amount of change in odds for the dependent variable due to a one-unit change in the predictor variables (Boateng & Abaye, 2019; Ranganathan et al., 2017). An Exp (B) 0.0 to less than 1.0 showed an inverse relationship between the predictor and the dependent variables

(Boateng & Abaye, 2019; Ranganathan et al., 2017). An Exp (B) >1.0 showed a positive relationship between the independent and dependent variables (Boateng & Abaye, 2019; Ranganathan et al., 2017). An odds ratio value of 1.0 indicated no difference in the risk of an event for individuals exposed compared to those who are not exposed to the same risk (Boateng & Abaye, 2019; Ranganathan et al., 2017). Odds ratios with 95% confidence interval and the p-values were reported in the results in chapter 4. Nagelkerke R^2 was used to evaluate the percent of the variance in the dependent variable accounted for by the independent variable (Boateng & Abaye, 2019; Ranganathan et al., 2017). The Hosmer and Lemeshow test was used to check how well the data fits the model (Boateng & Abaye, 2019; Ranganathan et al., 2017). It uses Chi-square to produce a p-value which, if greater than alpha = .05, indicates that the data fit the model. Nagelkerke R^2 evaluates the percent of the variance in the dependent variable accounted for by the independent variable while Hosmer and Lemeshow test check how well the data fits the model. The classification table, which showed the correct prediction percentage, was also used to evaluate the regression model (Boateng & Abaye, 2019; Ranganathan et al., 2017). The confounding effect of these covariates on the relationship between the main predictor variables and the dependent variable was tested to ascertain if they impacted the effects the predictors have on the dependent variable. These covariates have been reported in many other studies to impact HIV testing. Therefore, the regression model accounted for their effects to accurately explain the amount of variance in the dependent variable due to the main predictor or independent variables (Boateng & Abaye, 2019; Ranganathan et al., 2017). Simple Logistic Regression analysis is a correct statistic to use

when a study purpose seeks to evaluate if one or more categorical or continuous independent variable(s) predict the outcome of a dichotomous dependent variable (Boateng & Abaye, 2019; Ranganathan et al., 2017). The application of this statistic assumes that the study's data meet the criteria for its use that include that the independent variable(s) are continuous, categorical, or a combination of both while the dependent variable is categorical with two levels (Josephat & Ame, 2018). The assumptions also include a linear relationship between the independent variables and the log odds, no multicollinearity among the independent variables, and no outliers (Josephat & Ame, 2018). The application of this regression method is because it helps to overcome many of the restrictive assumptions made by linear regression, such as normality, equal variances assumed, and linearity (Josephat & Ame, 2018).

The statistical significance or non-significance of this study's findings were based on a preset p value of $\leq .05$ or $> .05$, respectively. A higher p value increases the probability of incorrectly rejecting the null hypothesis when it is correct (Type I error), while a lower p value increases the probability of accepting the null hypothesis when it is false (Type II error). Statistical conclusion validity was optimized in this study by using an acceptable alpha level (.05) to minimize the risk of Type I error and checking that logistic regression assumptions were not violated to make sure that valid conclusions about the predicted relationships are made. Furthermore, multiple imputations were done to address the issue of missing data, which introduced bias into the study since Little's MCAR test showed that the data were not missing at random (Puukko et al., 2020). A simple logistic regression analysis was conducted to predict the association between the

independent variables, covariates, and the dependent variable. Appendix C contains the list of covariates identified in other studies that may impact HIV testing. Only five of these sociodemographic covariates that had data in the primary survey, namely Educational Level, Religion, Place of Residence, Marital Status, and Age Categories, were included in the study. Out of these five covariates, only Educational Level, Place of Residence, and Religion were statistically significantly associated with the pregnant women HIV testing ($p < 0.05 <$ alpha =.05) and were included in the multivariable logistic regression analysis model. Other covariates identified in prior studies that had data but were not included in this study because only sociodemographic variables were considered include HIV/AIDS-related knowledge, income, wealth quintile, socioeconomic status, and knowledge of HIV testing centers.

Research Question 1

Simple Logistic Regression analysis was conducted to predict the relationship between stigmatizing attitudes against persons living with HIV/AIDS by pregnant women aged 15-49 years in Nigeria and their self-reported testing for HIV during antenatal visits or childbirth. The independent variable, stigmatizing attitudes towards persons living with HIV/AIDS, was coded as Negative Attitude = 0, Positive Attitude = 1; The binary dependent variable "HIV testing by pregnant women aged 15-49 years" was coded as No=0 and Yes=1. The odds of HIV testing outcomes by pregnant women aged 15-49 years were compared between those with negative and positive attitudes.

Also, a binary logistic regression analysis was conducted for research question one to predict the association between stigmatizing attitudes against persons living with

HIV/AIDS by pregnant women aged 15-49 years in Nigeria and their self-reported HIV testing adjusting or controlling for the effect of covariates which were significant in the bivariate model, namely, education level, place of residence, and religion. The independent variable, stigmatizing attitudes towards persons living with HIV/AIDS, was coded as Negative attitude = 0, Positive attitude = 1; The binary dependent variable HIV testing by pregnant women aged 15-49 years was be coded as; No=0 and Yes=1. The Enter method was used to enter data into the multivariable regression model by imputing all the variables at once or simultaneously into the model (Ranganathan et al., 2017). This method allows for the determination of the weight of contribution of each predictor in relation to other predictors in the set and facilitates the assessment of each predictor as though it was entered last, therefore, determining the predictive impact each predictor has over the ones attributable to the other predictors. A predictor or covariate will be assessed as if it was entered after the entry of other predictor variables and will be evaluated by its effect on the prediction of the dependent variable that is different from the prediction effects of the other variables entered in the model. The odds of HIV testing outcomes by pregnant women aged 15-49 years were compared between those with negative and positive attitudes. Also, the odds of HIV testing outcomes by pregnant women aged 15-49 years were compared between those with negative and positive attitudes adjusting or controlling for the effects of the covariates.

Research Question 2

Simple Logistic Regression analysis was conducted to predict the association between knowledge of discriminatory practices towards persons living with HIV/AIDS

and testing for HIV/AIDS by pregnant women aged 15-49 years in Nigeria during antenatal visits or childbirth. The independent variable, knowledge of discriminatory practices towards persons living with HIV/AIDS by pregnant women aged 15-49 years, was coded as No knowledge = 0, Have knowledge = 1; The binary dependent variable "HIV testing by pregnant women aged 15-49 years was coded as; No=0 and Yes=1. Also, a binary logistic regression analysis was conducted for research question number two to predict the association between knowledge of discriminatory practices towards persons living with HIV/AIDS by pregnant women aged 15-49 years in Nigeria and their self-reported HIV testing during antenatal visits or childbirth adjusting or controlling for the effect of covariates which were significant in the simple logistics regression model, namely, education level, place of residence, and religion. The odds of HIV testing outcomes by pregnant women aged 15-49 years were compared between those with no knowledge and have knowledge. Also, the odds of HIV testing outcomes by pregnant women aged 15-49 years were compared between those with negative and positive attitudes adjusting or controlling for the effects of the covariates

The participant's responses to questions on the covariates were used to code them as follows: Age categorized into age bands of five years interval from 15 to 49 years (I = 15-19, 2 = 20-24, 3 = 24-29, 4 = 30-34, 5 = 35-39, 6 = 40-44, 7 = 45-49) and numbering them in ascending order. Education; No education = 0, primary = 1, secondary = 2, higher = 3. Place of Residence, Urban = 1and Rural = 2. Religion; Catholic = 1, Other Christians = 2, Islam = 3, Traditionalist = 4, Others = 97. Current Marital Status: Never in union, Married, living with a partner as if married, Widowed, Divorced, No longer

living together/Separated. These marital status categories were recoded as Not Currently Married (combining other options) = 0; Currently Married (combining married and living with a partner as if married options) = 1. Simple logistic regression analyses were conducted between the covariates (age, education, place of residence, religion, and marital status) and the dependent variable self-reported HIV testing among pregnant women during antenatal visits or childbirth. Covariates that were not statistically significant at alpha = .05 were omitted from the multiple logistic regression model.

Threats to Validity

Validity describes the extent or degree an instrument, a test, or a study measure what it is supposed to measure (Camargo et al., 2018). Two types of validity impacted this study's findings: internal and external validity.

Internal Validity

Internal validity refers to those factors such as survey procedure or participants' experiences that impact the researcher’s ability to make correct inferences from the data about a population in a survey or study (Flannelly et al., 2018). A study’s internal validity makes it possible to eliminate alternative factor(s) explanation of the observed relationship between the predictor and outcome variable (Flannelly et al., 2018). Confounding factors can impact the findings of this study by interacting with the relationship between the main predictors’ variables and the outcome variable. In this study, some of these confounders (covariates) that data were collected on in the primary study will be adjusted or controlled for in the multiple regression model to determine the actual relationship between the predictor and outcome variable. Also, the non-use of

simple random sampling technique in the primary study sample selection was compensated for by applying the design effect that resulted in sample size increase (NPC & ICF International, 2014). Furthermore, possible non-sampling errors, survey procedures, and instrumentation which can introduce bias into the study if not appropriately executed or used, were addressed in the primary study through proper supervision and adequate training for the survey field workers. The construct and face validity of the survey questionnaires was established by experts and the pretesting of the questionnaire in selected locations.

There was a high response rate in the primary DHS survey resulting in a lesser threat of non-response or attrition to the internal validity of the study (NPC & ICF International, 2014). From 896 sample clusters, 40,320 households (rural, 23,625; urban, 16,695) were selected, of which 38,904 had households living in them at the time of the survey conduct. Out of this, 38,522 (99%) households (rural, 22,663, 58.83%; urban, 15,859, 41.17%) were successfully interviewed. Thirty-nine thousand, one hundred and four women (39,104; 98%) were interviewed out of the eligible 39,902. Therefore, the household response rate was 99%, while the individual response rate for eligible women aged 15-49 years was 98% (NPC & ICF International, 2014). Also, the pregnant women living in rural areas responded more to the interview than those living in urban areas, giving the rural areas a higher response rate than the urban ones. Households and eligible women response rates were 98.7% (15, 859) and 97.3% (15,545) respectively for the urban areas and 99.3% (22, 663) for the Households and 97.8% (23, 403) for the eligible women for the rural areas (NPC & ICF International, 2014). The non-response rate was

0.7% (171) for households and 2.2% (527) for eligible women in the rural areas while it was 1.30% (211) for households and 2.7% (425) for eligible women for in the urban areas ((NPC & ICF International, 2014). The result of the Chi-square test of independence for comparison showed that there was a statistically significant difference between the response rates of households and eligible women in the urban and rural areas ($\chi 2$ (df =1) = 12.69); $p < .01$). Also, the same test conducted for non-response rate showed a statistically significant difference result ($\chi 2$ (df =1) = 12.26); $p < .01$). The primary study accounted for bias introduced into the study by the different non-response rates by adjusting the design weights for the household and individual non-response to obtain the sampling weights for the women. The details of the sampling methodology for the 2013 NDHS, including the sample design and implementation and design effect calculation, are found in the 2013 Nigeria Demographic and Health Survey Report (National Population Commission (NPC) [Nigeria] & ICF International, 2014).

External Validity

External validity refers to the degree, the result of a study is generalizable to the population that the sample represents or is taken from (Lesko et al., 2017). The non-application of the simple random sampling technique in the selection of participants in the primary study is a threat to the study's external validity because it impacts the representativeness of the sample (Lesko et al., 2017). However, this was addressed by the application of a design effect factor to compensate for the non-randomness of the samples (National Population Commission (NPC) [Nigeria] & ICF International, 2014). Small sample size impacts representativeness or generalizability of study findings, therefore,

impacting the external validity of a study (Vasileiou et al., 2018). Although the minimum sample size of this study is 292 participants, 659 participants considering the design effect and sample weight, were included in the study to facilitate the sample representativeness and increase the precision by reducing standard error (Armstrong, 2019). This study only infers correlational findings to the relevant population, as the cross-sectional design used in the primary study could not establish causality (Iyun et al., 2018).

Ethical Procedures

The primary NDHS study duly informed the participants in the study about the purpose of the study, including the benefits that may accrue from it. Participation in the survey was voluntary and willing participants were required to sign informed consent forms as documentation of their agreement to participate voluntarily. Parental consents were gotten for minors below 18 years, while adult minors (15-17 years) living on their own provided consents for themselves (NPC & ICF International, 2014). The data files used in this research contained no names of individuals or household addresses. The geographic identifiers used only identified down to the regional levels, which are large. Although the primary sampling units' numbers are contained in the data file, there are no labels to show their names or locations. Before the analysis of the NDHS data sets, approval was sought and obtained from the Walden University Institutional Review Board (approval no. 11-11-20-0491011) to ensure compliance with ethical guidelines involving human participants. The data was also used according to the terms and conditions stated in the approval letter to download and use the NDHS data sets for this

survey (see Appendix A). The downloaded data was securely stored with a password on my computer and will be deleted after the completion of the dissertation. It will also not be transferred to another person for another research or any other purpose.

Summary

A cross-sectional quantitative research design was used to examine the association of pregnant women aged 15-49 years HIV stigmatizing attitudes and discriminatory practices towards persons living with HIV/AIDS on their self-reported HIV during antenatal visits or childbirth. Secondary data analysis of the pregnant women's data in the 2013 NDHS was conducted to examine the relationship between pregnant women stigmatizing attitudes, knowledge of discriminatory practices towards persons living with HIV/AIDS, and their testing for HIV during antennal visits or childbirth. The effects of reported covariates in literature (age, marital status, place of residence, education, and religion) on HIV testing by pregnant women that may potentially confound the relationship between the study's main predictor variables and the dependent variable was explored. The exploration was to determine the variance in the dependent variable explained by the main independent variables and those due to these covariates. Simple and multiple logistic regression analyses were used as the inferential statistics to predict the relationship between these variables. Descriptive statistics were used to summarize, describe, and present the study variables in a way that can be understood easily. The results of the analysis using these statistics are presented in Chapter 4.

Chapter 4: Results

The purpose of this study was to examine the effect of stigmatizing attitudes and personal knowledge of discriminatory practices towards persons living with HIV/AIDS on self-reported HIV testing of Nigerian pregnant women aged 15-49 years during antenatal visits or childbirth.. In answering the RQs, I sought to ascertain whether any relationships existed between stigmatizing attitudes and personal knowledge of discriminatory practices towards persons living with HIV/AIDS and pregnant women engaging in HIV testing during antenatal visits or childbirth. I also examined the impact of some selected sociodemographic variables on these relationships. Testable hypotheses relating to the study's two RQs were tested using logistic regression analysis to predict the relationship.

The first section of this chapter, the Data Collection section, contains the descriptive and demographic characteristics statistics of the study population. In addition, I present the results of binary regression analyses that justify the inclusion of covariates in the multivariable regression model where applicable. The Results section that follows contains descriptive statistics that define the study sample and an evaluation of statistical assumptions for the study. It also has statistical analysis findings, organized by the RQs, including exact statistics and associated probability values, confidence intervals around the statistics, and effect sizes (see Tables 1–13). It contains relevant tables and figures to illustrate results, per the recommendations in the *Publication Manual of the American Psychological Association* (2020). The summary section contains an overview of the chapter's key points and an introduction to Chapter 5.

Data Collection

I drew the sample for this study on the effect of stigma and discrimination on HIV testing during antenatal visits or childbirth by pregnant women between the ages of 15-49 years from the 2013 NDHS (NPC and ICF, 2014). There are cases or observations with missing data or values on some of the study variables. The total unweighted number of women who have ever been pregnant before the administration of the survey was 28,742. The numbers and percentages of unweighted study cases or observations with missing data are as follows: stigmatizing attitudes, 2,321, 8.1%; knowledge of HIV/AIDS discriminatory practices, 10,894, 37.9%; age categories, educational level, place of residence, and current marital status = 0, 0.0%; religion, 142, 0.5%; and did not test, tested and did not receive or received results during antenatal visits or childbirth = 15,652, 54.5%. The variables did not test, tested, and did not receive or receive results during antenatal visits or childbirth, and knowledge of discriminatory practices towards persons living with HIV/AIDS have high percentages of missing data (> 30%). Therefore, I conducted Little's MCAR test to determine the pattern of missingness of the data. Missingness is the characterization of the pattern of missing data or the value of an observation (Mirzaei et al., 2021). Depending on the randomness of the missing data, it can be classified as missing completely at random (MCAR), missing at random (MAR), or missing not at random (MNAR; Mirzaei et al., 2021). The result shows that missingness was not random, $\chi 2 = 5{,}374.55$, $df = 76$, p value $< .01$. However, because women with HIV/AIDS negative attitudes are less likely to self-report their HIV testing status due to the fear of being asked the outcome of the test result (De Wet and Kagee

(2016), the data may still be missing at random (MAR) as the missingness may be based on another observable event or variable (Mirzaei et al., 2021).

I handled missing data by conducting multiple imputations using SPSS Version 25 to replace the missing data or imputed values. The multiple imputations were done using the regression method (Yu et al., 2020). An imputed data set with the name given to it was created. Because this data set contains all women of reproductive age 15-49 years and not only those who reported ever being pregnant before the survey, I omitted women of reproductive age who had not reported ever being pregnant from the data set. A random sample of 3,924 out of 172,452 cases was selected. The randomly selected sample of 3,924 included 654 cases selected from the original or unimputed data set + (654 x 5 imputations = 3,270). The unselected cases were filtered out. The selected cases were weighted using the women's individual sample weight recommended and provided by the DHS program. The women's individual weight coded as (v005) in the primary survey data set is the inverse of their response rates in the stratum multiplied by the household weight (hv005), per NPC & ICF (2014). I used the individual sample weight (provided by the DHS program) to weight the randomly selected 654 cases in SPSS. The application of this sample weight increased the number of cases to 659 because all the cases do not have the same weight assigned to them. The application of sample weights takes care of the disproportionate sample allocation to states, the rural and urban areas, including the response rate differences.

The assumed representativeness of this study is based on the application of the sample weights. The sample weights restore the sample representativeness so that the

distribution of the total sample appears consistent with Nigeria's actual population distribution (NPC & ICF, 2014). I used the selected sample for the analysis. The calculation of multiple imputations preserves all the cases, therefore, avoiding the reduction of sample size, reduction in statistical power for the study, and lack of sample representativeness, which can introduce selection bias to the study, especially if the data are not missing completely at random, leading to conclusions that may not be valid (Ayilara et al., 2019; Nissen et al., 2019).

Pregnant women who have positive attitudes accounted for 61.00% of the sample, while those with negative attitudes accounted for 30.00% (see figure 2). Pregnant women who have knowledge of discriminatory practices towards persons living with HIV/AIDS accounted for 6.53% of the sample, while those with no knowledge of discriminatory practices accounted for a higher percentage at 93.47% (see figure 2). The ages of the pregnant women ranged from 15-49 years and were categorized into seven 5-year groups (15-19, 20-24, 25-29, 30-34, 35-39, 40-44, 45-49). Women within the 25-29 years group were the largest group in the sample at 21.09%, while those within the 15-19 years group were the lowest at 5.77% (see Figure 4). Pregnant women with no education ranked highest in the sample (44.92%), followed by those with secondary education (27.92%), while those with higher education constituted (7.59%) of the sample (see Figure 5). Most of the women lived in rural areas (62.52%) (see Figure 6). Most pregnant women belong to the Islam religion (55.69%), followed by Other Christians (33.29%; see Figure 7). Pregnant women who were currently married (i.e., married or living with a man as if they are married) accounted for 90.14% of the sample, while those who were not currently

married (never in union, widowed, divorced, and no longer living together/separated) accounted for 9.86% (see Figure 8). Women who did not test or tested but did not receive HIV test results accounted for 63.28% of the sample, while those who tested and received results accounted for 36.72% (see figure 9).

This study is considered representative of the target population because of the application of sample weighs recommended and provided by the DHS program to account for the nonproportional allocation of samples to states, rural and urban areas, including response rate differences across the states (NPC & ICF, 2014, pp. 378-380). Because Nigeria is a large country, using the simple random sampling technique on a sampling frame is not feasible. Therefore, a stratified three-stage cluster design was appropriate for this study because of its statistical, cost, and logistical efficiency (Zhou et al., 2016). In the first stage of the three-stage cluster design sampling, 893 localities were selected with probability proportional to size and with independent selection in the urban and rural areas. The second stage was the random selection of enumeration areas from the selected localities with an equal probability selection. The third stage involved the use of the systematic sampling technique to select a fixed number of 45 households in the selected urban and rural areas. The total number of households sampled was 40,680 (urban area, 16,740, and rural area, 23,940).

Furthermore, the application of design effect in calculating the sample size in the primary study compensated for clustering effect and non-use of simple random sampling technique which cannot be used in the survey because of cost and size of Nigeria increased the sample size which together with the study sampling technique facilitated

representativeness of the study sample (National Population Commission (NPC) [Nigeria]& ICF International, 2014). Therefore, the result of this study will be generalized to the population of pregnant women in Nigeria who did not test, tested, and did not receive results or received HIV results during antenatal visits or childbirth. The increased sample size will impact the study findings by increasing the precision through standard error reduction (Armstrong, 2019). It gives the study greater power to detect the effect of interest, therefore, reducing Type II errror (Armstrong, 2019).

Results of simple logistic regression analyses that justify the inclusion of covariates in the multivariable regression model showed that only Educational Level, Place of Residence and Religion statistically significantly impacted HIV testing during antenatal visits or childbirth by the pregnant women aged 15-49 years at alpha = .05 ($p \leq .05$) (See Tables 1-5). Therefore, they were included in the regression model.

Results

The assumption of normality is not required for the use of logistic regression analysis and, therefore, was not assessed (Boateng & Abaye, 2019). The assumption of no multicollinearity among the independent variables was tested by calculating the Tolerance, which is the percentage of variance in a specified predictor variable that other predictor variables cannot explain. If the value of Tolerance approaches 1, little multicollinearity is indicated, but when the value is close to zero, it implies that there may be multicollinearity (Senaviratna et al., 2019). The reciprocal of Tolerance equals the Variance Inflation Factor, and a Variance Inflation Factor value exceeding ten is considered highly correlated (Senaviratna et al., 2019). The value of the Variance

Inflation Factor for all the independent variables in this study was less than 2.0. while Tolerance was above 0.6, therefore, there was no multicollinearity among the independent variables, and no variable was removed (see Appendix E).

The independent variables or covariates used in this study were measured on either nominal or ordinal levels. The dependent variable is a binary or dichotomous variable. The appropriate descriptive statistics for the nominal and ordinal data are frequencies and percentages. Figures 1-8 below show the descriptive statistics of the independent, covariates, and dependent variables.

Figure 2

Nigerian Pregnant Women HIV/AIDS Stigmatizing Attitudes

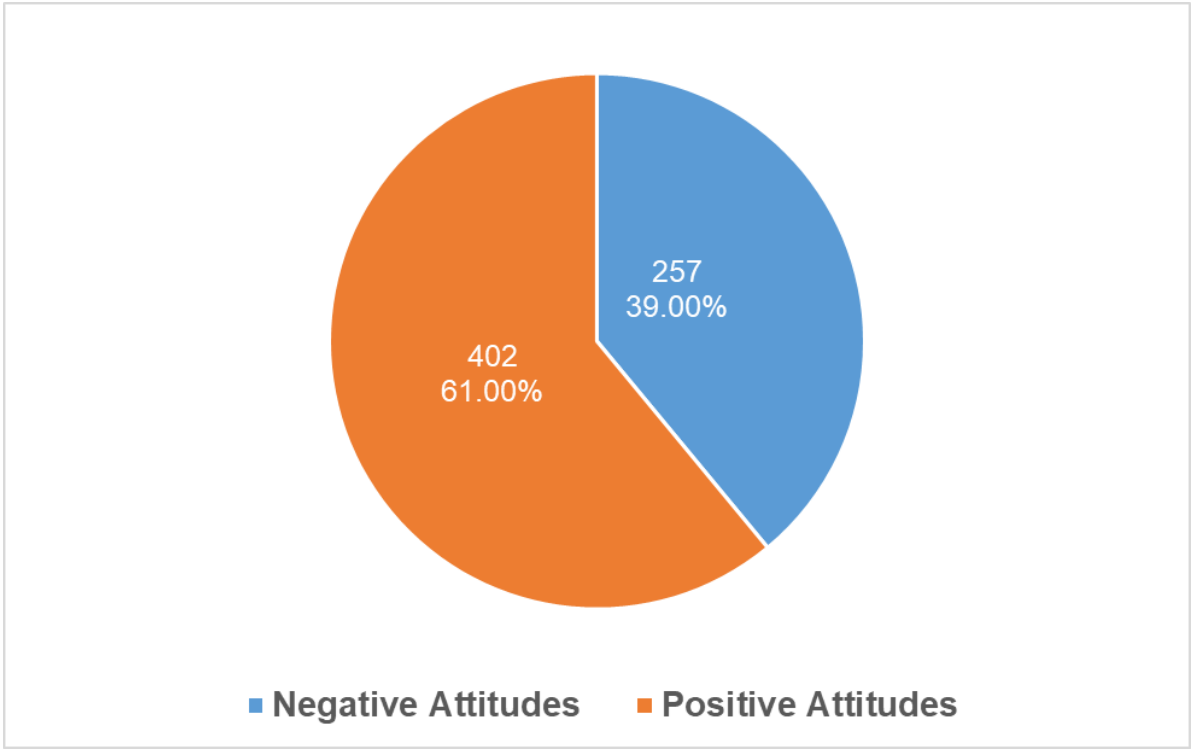
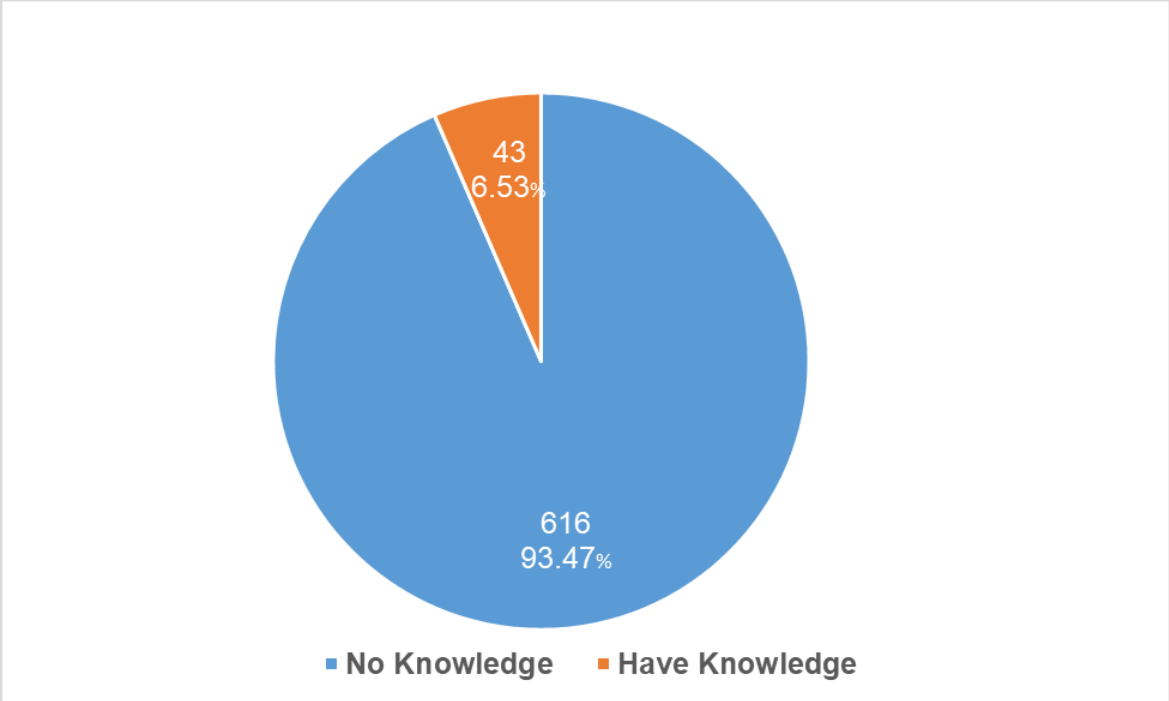


Figure 2 shows that out of the 659 pregnant women with stigmatizing attitudes, 257 (39.00%) had Negative Attitudes, while 402 (61.00%) had Positive Attitudes. Stigmatizing Attitude is defined as individuals with feelings, opinions, or beliefs that convey devalued stereotypes that impact the manifested unjust or prejudicial treatment or behavior towards persons living with HIV/AIDS (UNAIDS, 2015b). A Negative Attitude is defined as individuals with more feelings, opinions, or beliefs that convey devalued stereotypes that impact the manifested unjust or prejudicial treatment or behavior towards persons living with HIV/AIDS (UNAIDS, 2015b). Positive Attitude is defined as individuals with less feeling, opinions, or beliefs that do not convey devalued stereotypes that impact the manifested treatment or behavior towards persons living with HIV/AIDS (UNAIDS, 2015b).

Figure 3

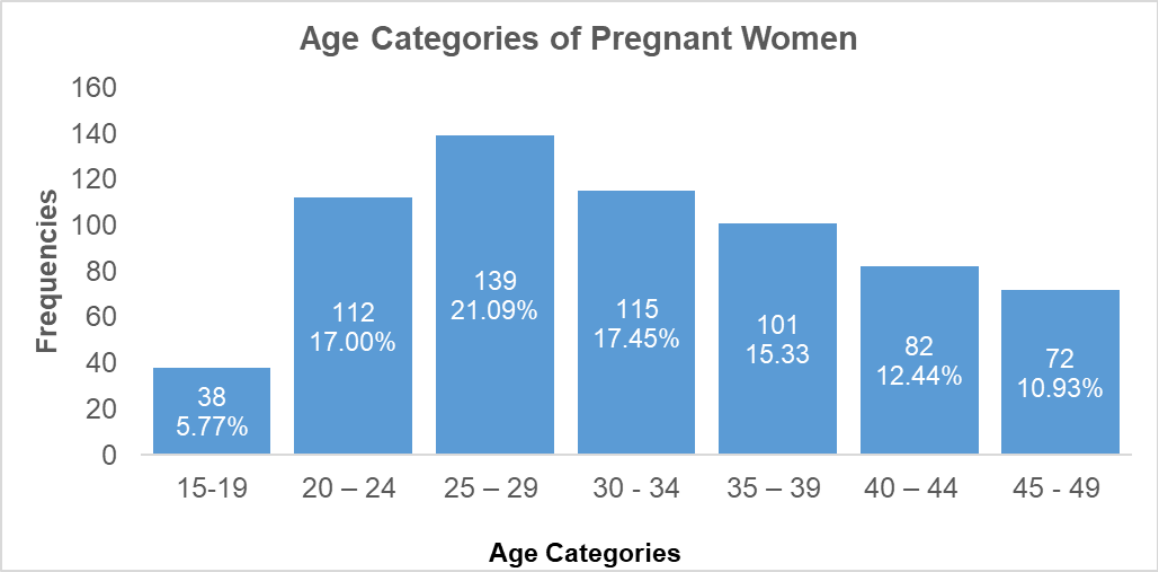
Distribution of Nigerian Pregnant Women Knowledge of HIV/AIDS Discriminatory Practices



Out of the 659 pregnant women participants, 616 (93.47%) reported no knowledge of HIV discriminatory practices, while 43 (6.53%) reported having knowledge about such practices.

Figure 3

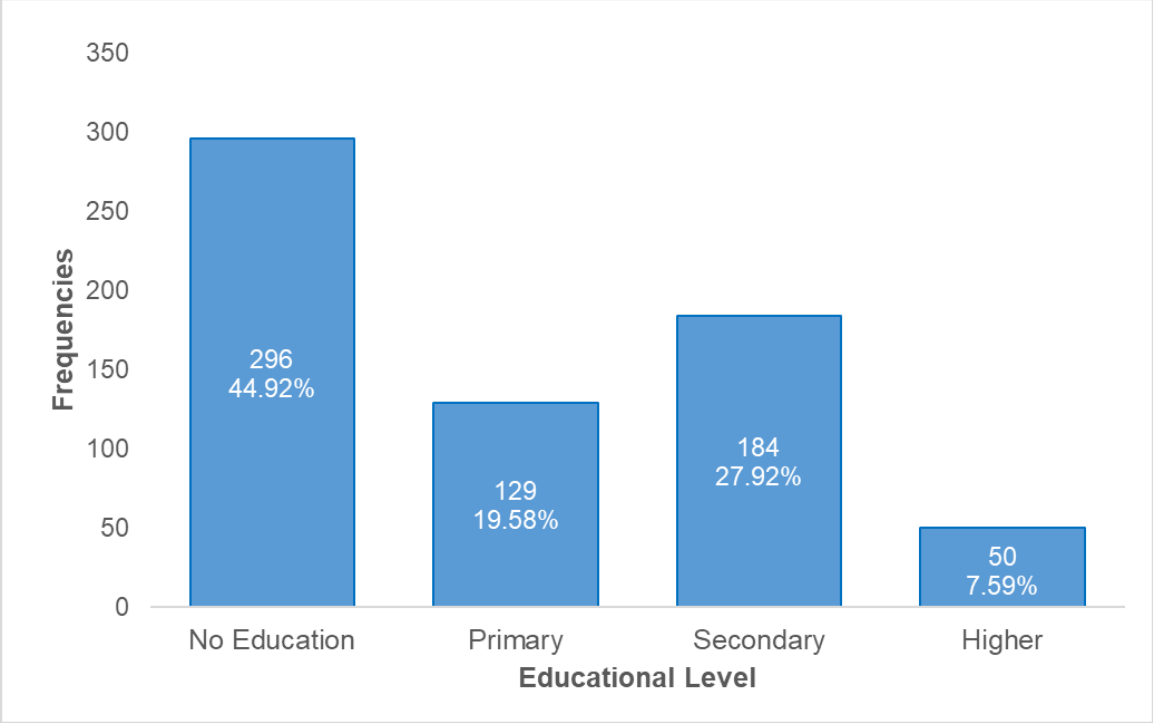
Age Categories (Years) of Pregnant Women in Nigeria



The bar chart shows that a total of 659 Pregnant women participated in this study. Those between the ages of 25-29 years were most in the study (21.09%), while those between the ages of 15-19 years were the least in the study (5.77%).

Figure 4

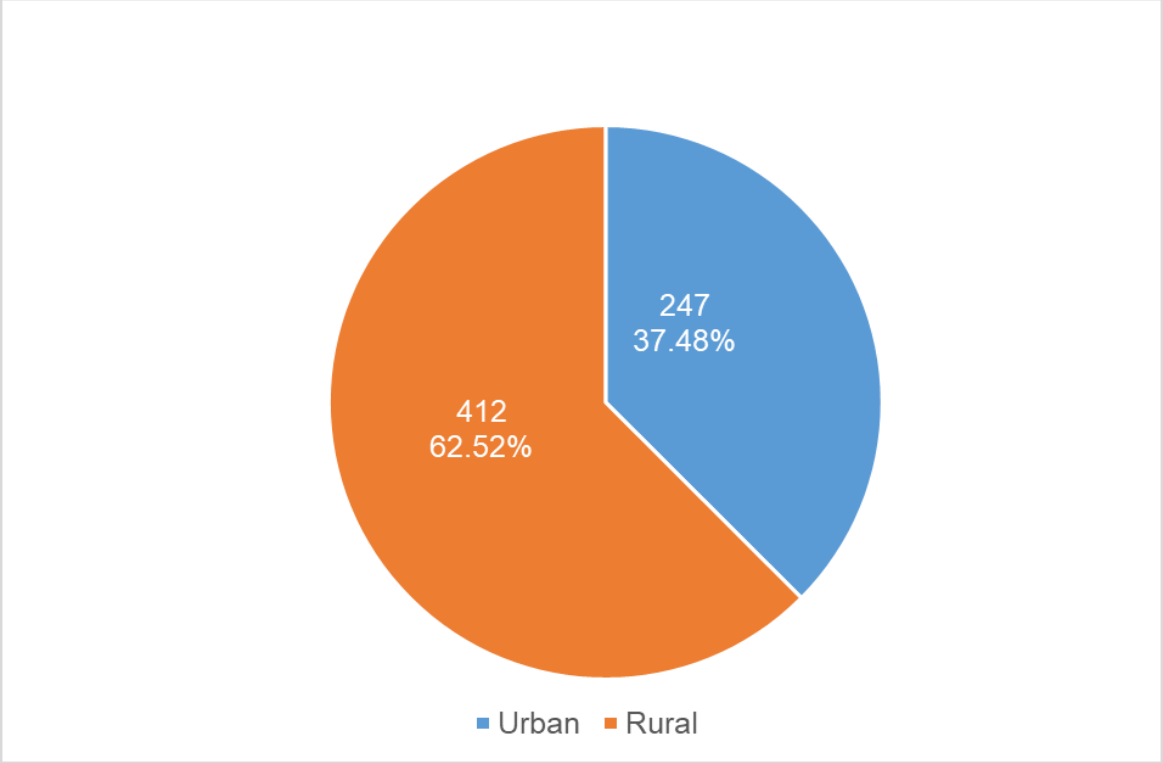
Educational Level of Nigerian Pregnant Women



The bar chart shows that out of the 659 participants, 296 (44.925%) had no education, while 129 (19.58%) had primary education, 184 (27.92%) had secondary education, and participants with higher education were the least with 50 (7.59%).

Figure 5

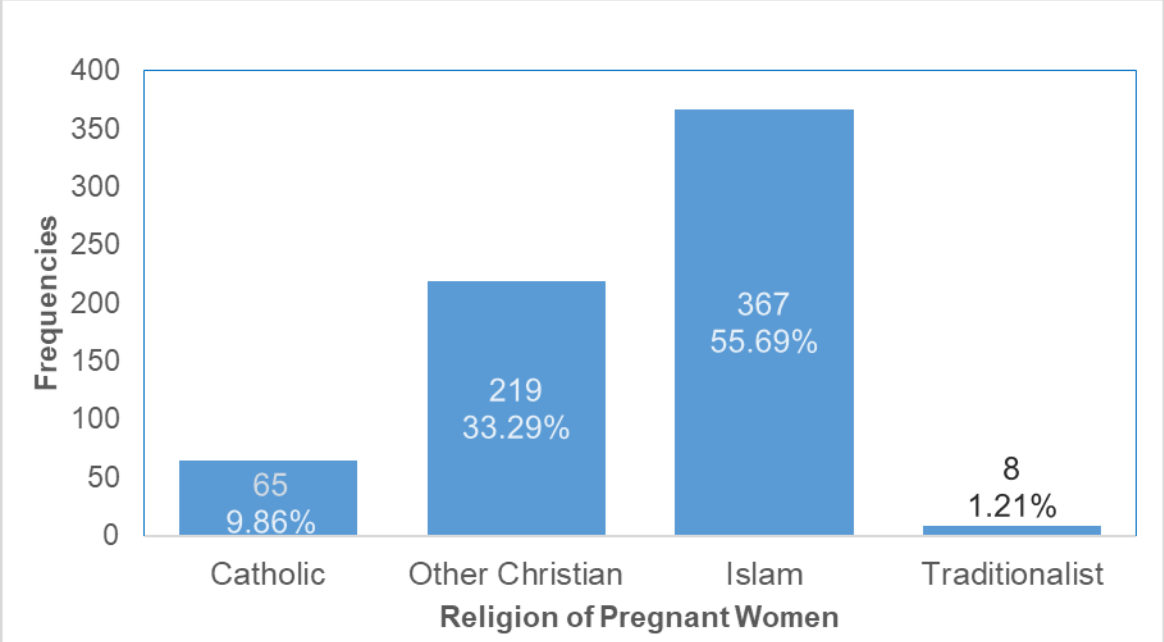
Place of Residence of the Nigerian Pregnant Women



The bar chart shows that 412 (62.52%) of the respondent pregnant women lived in rural areas while 247 (37.48%) lived in urban areas.

Figure 6

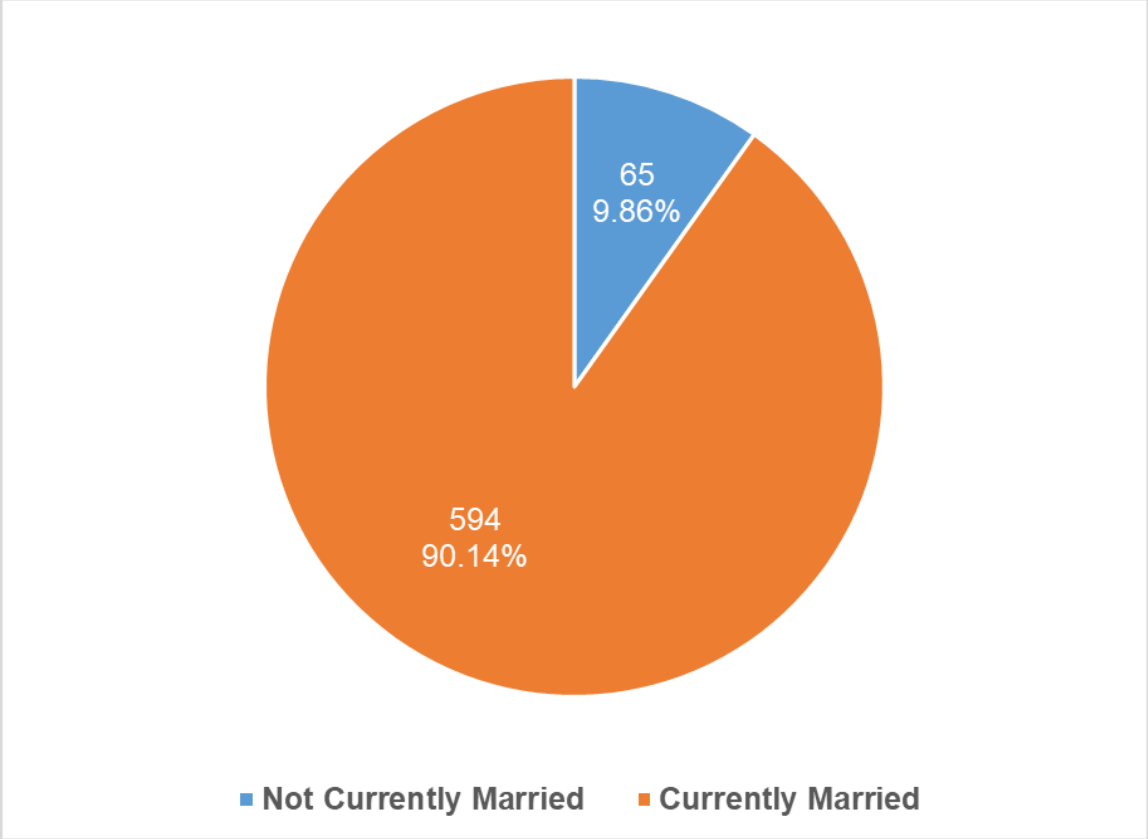
Religion of Nigerian Pregnant Women



The Bar chart shows that out of the 659 participants, 367 (55.69%) belong to Islamic Religion, 219 (33.29%) were of Other Christians Religion, and 65 (9.86%) were of Catholic Religion.

Figure 7

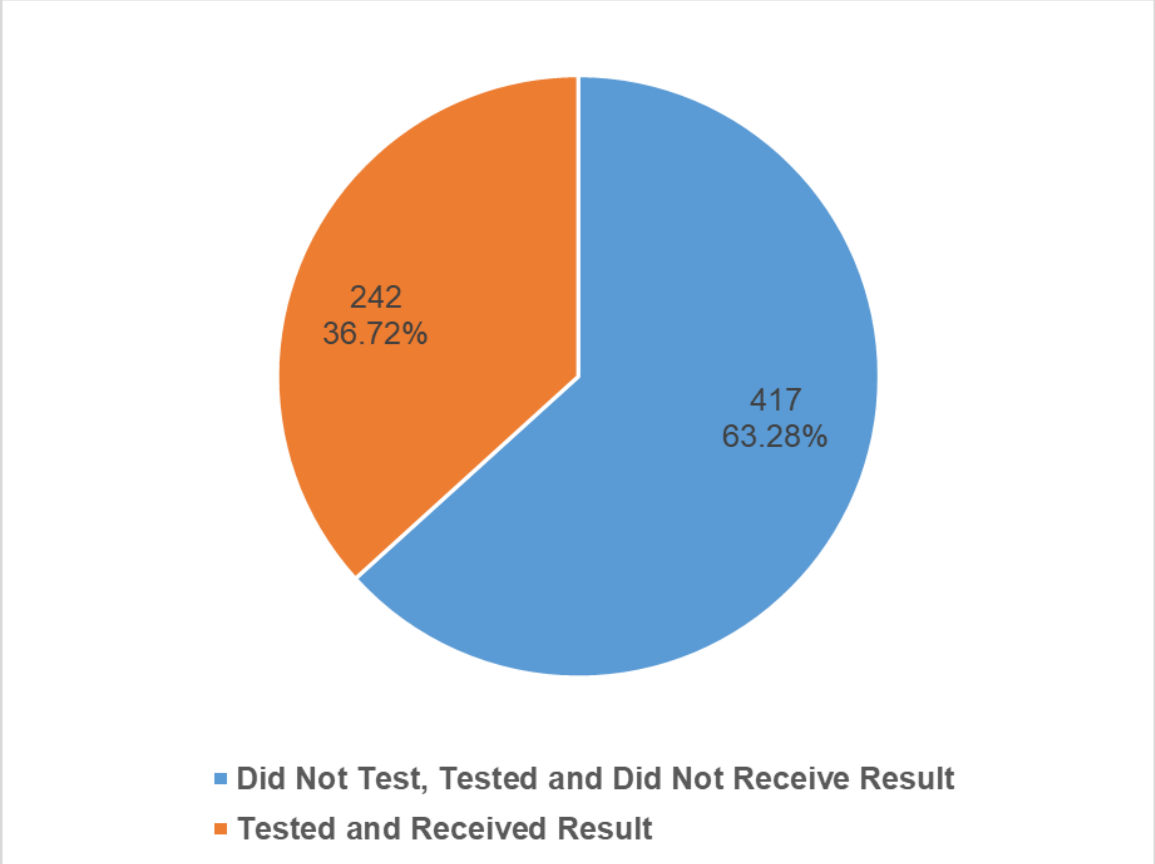
Nigerian Pregnant Women Current Marital Status



Out of 659 ever-been Pregnant Women that participated in the study, 65 (9.86%) were not currently married, while 594 (90.14%) were currently married.

Figure 8

Nigerian Pregnant Women HIV Testing Distribution



Out of the 659 pregnant women who 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.

Simple Logistic Regression Analyses Between the Covariates and the Dependent Variable

Simple logistic regression analyzes were conducted between the covariates and the dependent variable. Tables 1-5 show the results of the bivariable analyses that justify the inclusion of covariates in the multivariable regression model.

Table 1

Effect of Age Categories 15-49 Years on the Pregnant Women in Nigeria Who Self-Reported HIV Testing in 2013

				Binary logistic regression			
Age category (Years)	*Total* (*N*)	Did not test, tested, and did not receive result (*n*)	Tested and received result(*n*)	*p*-value	Odds ratio	Lower 95% Cl	Upper 95% Cl
15–19*****	38	30	8				
20–24	111	75	36	.45	2.00	.28	14.54
25–29	140	86	54	.36	2.56	.27	24.73
30–34	115	66	49	.23	3.15	.42	23.67
35–39	101	60	41	.31	2.75	.33	23.20
40–44	82	53	29	.47	2.26	.18	28.37
45-49	72	47	25	.48	2.12	.20	23.07
Total	**659**	**417**	**242**				

* Reference category.

Table 1 shows that age categories of the pregnant women did not statistically significantly predict their testing for HIV at alpha level = .05. The self-reported HIV testing and receiving result prevalence rate among pregnant women was highest among

the 30–34-years age category (42.61%) while that for other age categories were 15-19 (21.05%), 20-24 (32.14%), 25-29 (38.85%), 35-39 (40.59%), 40-44 (35.37%), and 45-49 (37.72%).

Table 2

Effect of Educational Level of Pregnant Women in Nigeria on Their Self-Reported HIV Testing in 2013

				Binary logistic regression			
Educational Level	Total (*N*)	Did not test, tested, and did not receive result (*n*)	Tested and received result(*n*)	p-value	Odds ratio	Lower 95% Cl	Upper 95% Cl
No Education*	296	235	61				
Primary	129	85	44	.01	2.04	1.16	3.46
Secondary	184	86	98	.01	4.45	2.50	7.96
Higher	50	11	39	.01	14.21	5.95	33.93
Total	**659**	417	**242**				

* Reference category.

Table 2 shows that educational level significantly predicted pregnant women in Nigeria tested for HIV at alpha level = .05. Those in the higher educational level category have the highest odds of testing for HIV (*OR* = 14.21; 95% CI [5.95, 33.93], $p < .01$) compared to those in the reference category of no Education. Also, those with primary education (*OR* = 2.02, 95% CI [1.18, 3.46], $p = .01$) and secondary education (*OR* = 4.45, 95% CI [2.49, 7.96], $p < .01$) are more likely to test for HIV compared to those with no

education. The HIV testing and receiving result prevalence increased with increasing education, with higher education the highest at 78.00%, while the prevalence among No Education, Primary Education, Secondary Education was 20.61%, 34.11%, and 53.26%, respectively.

Table 3

Effect of Urban and Rural Residence on Nigerian Pregnant Women Self-Reported HIV Testing in 2013

				Binary logistic regression			
Residence	Total(*N*)	Did not test, tested, and did not receive result (*n*)	Tested and received result(*n*)	p-value	Odds ratio	Lower 95% Cl	Upper 95% Cl
Rural *	412	296	116				
Urban	247	121	126	.01	2.67	1.79	3.98
Total	**659**	**417**	**242**				

* Reference category.

Table 3 shows that out of the pregnant women living either in urban or rural areas who did not test, tested and did not receive HIV results, or tested and received HIV results during antenatal visits or childbirth, those living in the urban areas are 2.67 times more likely to test for HIV than those living in the rural areas (*OR* = 2.67, 95% CI [1.79, 3.98], $p = .01$). The prevalence rate of HIV testing and receiving results for rural-dwelling pregnant women was 28.15%. Among the urban-dwelling pregnant women, the prevalence of testing for HIV and receiving test results was 51.05%.

Table 4

Effect of Nigerian Pregnant Women's Religion on Their Self-reported HIV Testing in 2013

				Binary logistic regression			
Religion	Total (*N*)	Did not test, tested, and did not receive result (*n*)	Tested and received result(*n*)	p-value	Odds ratio	Lower 95% Cl	Upper 95% Cl
Islam*	366	273	93				
Catholic	65	25	40	.00	4.67	2.47	8.85
Other Christian	220	112	108	.00	2.84	1.78	4.52
Traditionalist	8	7	1				
Total	**659**	**417**	**242**				

*Reference category.

Table 4 shows that Religion statistically significantly predicted HIV testing by pregnant women in Nigeria at alpha level = .05 ($p < .01$). Individuals belonging to the Catholic Religion and Other Christian Religion were 4.67 (95% CI: 2.47, 8.85) and 2.84 (95% CI: 1.78, 4.52) times respectively more likely to test for HIV than those of Islamic Religion at alpha = $.05 > p < .01$. The sample size for the Traditionalist category was small and insufficient to yield a reliable estimate and was not included in the analysis. The self-reported HIV testing and receiving result prevalence rate among pregnant women was highest among the Catholics (61.54%) while it is 49.32%, 25.34%, and 12.50%, respectively for Other Christians, Islamists, and Traditionalists in Nigeria.

Table 5

Effect of Nigerian Pregnant Women Marital Status on Their Self-Reported HIV Testing in 2013

				Binary logistic regression			
Marital Status	Total (*N*)	Did not test, tested, and did not received result (*n*)	Tested and received result(*n*)	p-value	Odds ratio	Lower 95% Cl	Upper 95% Cl
Currently Married*	594	382	212				
Not Currently Married	65	35	30	.13	1.61	.87	2.98
Total	659	417	242				

*Reference category.

Table 5 shows current marital status did not statistically significantly predict HIV testing by pregnant women in Nigeria at alpha = .05. The prevalence rate of testing and receiving HIV test results among pregnant women who are currently married was 35.69% and 46.15% for those not currently married. The results of the simple logistic regression showed that age categories and marital status were not statistically significant at alpha = .05 and, therefore, were omitted from the multiple logistic regression analysis.

Tables 6-9 show the results of simple logistic regression analysis between the study's main independent variables and the dependent variable.

Table 6

Effect of the Pregnant Women in Nigeria HIV/AIDS Stigmatizing Attitudes on Their Self-reported Testing for HIV in 2013

				Binary Logistic Regression			
Stigmatizing Attitudes	Total (*N*)	Did not test, tested, and did not receive result (*n*)	Tested and received result(*n*)	p-value	Odds Ratio	Lower 95% Cl	Upper 95% Cl
Negative Attitude*	257	176	81				
Positive Attitude	402	241	161	.36	1.47	.57	3.76
Total	**659**	**417**	**242**				

*Reference category.

Table 6 shows that pregnant women with positive attitudes were not statistically significantly more likely to test for HIV than those with negative attitudes towards persons living with HIV/AIDS (*OR* = 1.47, 95% CI [.57, 3.76], *p* = .36). The prevalence rate of testing and receiving HIV test results in 2013 among pregnant women in Nigeria with Negative Attitudes was 31.52%, while those with Positive Attitudes were 40.05%. The prevalence of not testing, testing, and not receiving results in Nigeria among pregnant women with Negative Attitudes was 68.48%, while for those with Positive Attitudes was 59.95%. The model summary of the effect of Nigerian Pregnant Women's HIV/AIDS stigmatizing attitudes on their self-reported HIV testing is shown in Table 7.

Table 7

Model Summary of the Effect of Nigerian Pregnant Women HIV/AIDS Stigmatizing Attitudes on Their Self-Reported HIV Testing in 2013

Model Summary

Step	-2 Log likelihood	Cox & Snell R Square	Nagelkerke R Square
1	834.34	.01	.02

Table 7 showed the Model Summary where the -2 log-likelihood value was 834.34, and Nagelkerke R-Square (R^2) value was .02, p = .01. The -2 log-likelihood value will be compared to the full model with the covariates to determine which model is a better predictor of HIV testing among pregnant women in Nigeria. The R-Square (R^2) value indicated that 2.0% (.02) of the variance or change in the pregnant women testing for HIV in Nigeria is explained by stigmatizing attitudes.

Table 8

Effect of Nigerian Pregnant Women's Knowledge of HIV/AIDS Discriminatory Practices on Their Self-Reported HIV Testing in 2013

				Binary Logistic Regression			
Personal Knowledge of Discriminatory Practices	Total (*N*)	Did not test, tested and did not receive result (*n*)	tested and received result(*n*)	p-value	Odd ratio	Lower 95% Cl	Upper 95% Cl
No knowledge of discriminatory practices*	616	395	221				
Have knowledge of discriminatory practices	43	22	21	.32	1.67	.57	4.92
Total	**659**	**417**	**242**				

*Reference category.

Table 8 showed that pregnant women in Nigeria with personal knowledge of HIV/AIDS discriminatory practices against persons living with HIV/AIDS were not statistically significantly more likely to test for HIV than those without personal knowledge of such discriminatory practices (*OR* = 1.67, 95% Cl [.57, 4.92], *p* = .32.) The prevalence rate of testing and receiving HIV test results among pregnant women with no knowledge of HIV discriminatory practices was 35.88%, while that of those with knowledge of HIV discriminatory practices was 48.84%. Among the pregnant women who did not test, tested, and did not receive their HIV result, those with no knowledge of

HIV discriminatory practice had a non-significantly higher prevalence (64.12%) than those with knowledge of the discriminatory practices (51.16%). The model summary showing the effect size is shown in Table 9. It showed that this model explained 1% (.01) of the variance in the HIV testing of pregnant women in Nigeria.

Table 9

Model Summary of the Effect of Pregnant Women in Nigeria With Knowledge of Discriminatory Practices Towards Persons Living With HIV/AIDS on Their HIV Testing in 2013

Model Summary

Step	-2 Log likelihood	Cox & Snell R Square	Nagelkerke R Square
1	834.96	.01	.01

Table 9 shows the model summary where the -2 log-likelihood value was 834.36, and Nagelkerke R-Square (R^2) value was .01, p = .01. The -2 log-likelihood value will be compared to the full model value with the covariates to determine which model is a better predictor of HIV testing among pregnant women in Nigeria. The R-Square (R^2) value indicated that 1.0% (.01) of the variance or change in the pregnant women testing for HIV in Nigeria is explained by knowledge of discriminatory practices.

Findings for Research Question 1

RQ1 was, Is there an association between pregnant women aged 15-49 years stigmatizing attitudes towards other persons living with HIV/AIDS and their self-reported testing for HIV during antenatal visits or childbirth controlled for covariates (educational level, place of residence, and religion)? Multiple logistic regression analysis was

conducted to determine the association between stigmatizing attitudes of pregnant women towards persons living with HIV/AIDS and their self-reported HIV testing controlling for the effects of covariates (educational level, place of residence, and religion). Table 10 shows the result.

Table 10

Pregnant Women in Nigeria HIV/AIDS Stigmatizing Attitudes on Self-Reported HIV Testing in 2013 Controlled for the Effects of Covariates

				Binary Logistic Regression			
Stigmatizing Attitudes	Total (*N*)	Did not test, tested, and did not receive result (*n*)	Tested and received result(*n*)	p-value	Odds ratio	Lower 95% CI	Upper 95% Cl
Neg Attitude*	257	176	81				
Positive Attitude	402	241	161	.34	1.54	.57	4.15
No Education*	296	235	61				
Primary	129	85	44	.261	1.46	.75	2.83
Secondary	184	86	98	.01	2.80	1.39	5.65
Higher	50	11	39	.00	7.92	2.87	21.87
Rural*	412	296	116				
Urban	247	121	126	.022	1.65	1.08	2.52
Islam*	366	273	93				
Catholics	65	25	40	.07	2.63	.92	7.53
Other Christians	220	112	108	.14	1.49	.87	2.56

*Reference category.

Table 10 showed that stigmatizing attitudes did not statistically significantly predict HIV testing during antenatal visits or childbirth by pregnant women in Nigeria (*p*

= .34). The covariates controlled for in this model are Educational Level, Religion, and Place of Residence. Controlling for the effects of these covariates did not change the association between stigmatizing attitudes and HIV testing among pregnant women in Nigeria at alpha = .05. The best parsimonious model of the outcome was fitted by omitting religion which was not statistically significant at alpha = .05, *p* value > .05. The result is shown in Table 11.

Table 4

Pregnant Women in Nigeria HIV/AIDS Stigmatizing Attitudes on Self-Reported HIV Testing in 2013 Controlled for the Effects of Covariates

				Binary Logistic Regression			
Stigmatizing Attitudes	Total (*N*)	Did not test, tested, and did not receive result (*n*)	Tested and received result(*n*)	*p*-value	Odds ratio	Lower 95% CI	Upper 95% Cl
Neg Attitude*	257	176	81				
Positive Attitude	402	241	161	.32	1.55	.59	4.06
No Education*	296	235	61				
Primary	129	85	44	.03	1.92	1.07	3.44
Secondary	184	86	98	.01	3.87	1.90	7.90
Higher	50	11	39	.000	11.29	4.43	28.79
Urban	247	121	126	.042	1.58	1.02	2.46
Rural (**Ref Cat**)	412	296	116				

*Reference category.

Table 11 showed that stigmatizing attitudes did not statistically significantly predict HIV testing during antenatal visits or childbirth by pregnant women in Nigeria (p = .32). The covariates controlled for in this model are Educational Level and Place of Residence. Controlling for the effects of these covariates did not change the association between stigmatizing attitudes and HIV testing among pregnant women in Nigeria at alpha = .05. Therefore, the null hypothesis was not rejected. The Model Summary shows that the -2 log-likelihood value is 722.18, and Nagelkerke R-Square (R^2) value is .24 (see Table 12). The baseline model -2 log-likelihood value of 834.34 (see Table 7) compared with the full model value of 722.18 showed a statistically significant reduction in the -2 log-likelihood value of the full model, indicating that it is a better predictor of HIV testing among pregnant women in Nigeria than the baseline model, $\chi 2$ (df = 5) = 120.54, $p < .01$. The Nagelkerke R^2 value of .24 indicated that stigmatizing attitudes and the covariates explained 24% of the variance or change in the HIV testing of pregnant women in Nigeria.

Table 5

Model Summary of the Effect of Pregnant Women HIV/AIDS Stigmatizing Attitude in Nigeria on their Self-reported HIV Testing during Antenatal Visits or Childbirth in 2013 Controlled for Covariates' Effects

Model Summary

Step	-2 Log likelihood	Cox & Snell R Square	Nagelkerke R Square
1	722.18	.17	.24

Note. Control covariates were educational level, religion, and place of residence.

Findings for Research Question 2

RQ2 was, What is the association between pregnant women in Nigeria aged 15-49 years with knowledge of HIV/AIDS discriminatory practices against persons living with HIV/AIDS, and their self-reported HIV testing during antenatal or childbirth controlled for covariates (educational level, place of residence, and religion)? A multivariable logistic regression analysis was conducted to determine the association between pregnant women in Nigeria aged 15-49 years with knowledge of HIV/AIDS discriminatory practices against persons living with HIV/AIDS and their self-reported HIV testing during antenatal or childbirth controlled for covariates (educational level, place of residence, and religion). The result is shown in Table 13.

Table 13

Effect of Nigerian Pregnant Women Knowledge of HIV/AIDS Discriminatory Practices as a Predictor of Their Self-Reported HIV Testing in 2013 Controlled for the Effects of Covariates

				Binary Logistic Regression			
Knowledge of Discriminatory Practices	Total (*N*)	Did not test, tested, and did not receive result (*n*)	Tested and received result(*n*)	p-value	Odds ratio	Lower 95% CI	Upper 95% Cl
No Knowledge*	616	395	221				
Have Knowledge	43	22	21	.46	1.51	.46	4.95
No Education*	296	235	61				
Primary	129	85	44	.30	1.42	.73	2.76

				Binary Logistic Regression			
Knowledge of Discriminatory Practices	Total (*N*)	Did not test, tested, and did not receive result (*n*)	Tested and received result(*n*)	p-value	Odds ratio	Lower 95% CI	Upper 95% Cl
Secondary	184	86	98	.01	2.78	1.40	5.51
Higher	50	11	39	.00	7.94	2.95	21.36
Rural Residence*	412	296	116				
Urban	247	121	126	.018	1.68	1.10	2.57
Islam*	366	273	93				
Catholic	65	25	40	.06	2.57	.98	6.74
Other Christian	220	112	108	.16	1.42	.87	2.32

*Reference category.

Table 13 showed that pregnant women in Nigeria with knowledge of discriminatory practices towards persons living with HIV/AIDS were not statistically significantly more likely to test for HIV/AIDS than those with no knowledge of the discriminatory practices (*AOR* = 1.5; 95% Cl [.46, 4.95], *p* = .46. The covariates their effects were controlled in this model are educational level, place of residence, and religion. Controlling for the effects of these covariates has not changed the association between knowledge of discriminatory practices towards persons living with HIV/AIDS and HIV testing among pregnant women in Nigeria. The best parsimonious model of the outcome was fitted by omitting religion which was not statistically significant at alpha = .05, p-value > .05. The result is shown in Table 14.

Table 6

Effect of Nigerian Pregnant Women Knowledge of HIV/AIDS Discriminatory Practices as a Predictor of Their Self-Reported HIV Testing in 2013 Controlled for the Effects of Covariates

				Binary Logistic Regression			
Knowledge of Discriminatory Practices	Total (*N*)	Did not test, tested, and did not receive result (*n*)	Tested and received result (*n*)	p-value	Odds ratio	Upper 95% Cl	Upper 95% Cl
No Knowledge*	616	395	221				
Have Knowledge	43	22	21	.37	1.61	.53	4.92
No Education*	296	235	61				
Primary	129	85	44	.039	1.81	1.03	3.18
Secondary	184	86	98	.001	3.73	1.92	7.25
Higher	50	11	39	.000	10.92	4.25	28.05
Rural Residence	412	296	116				
Urban Residence*	247	121	126	.032	1.62	1.04	2.51

*Reference category.

Table 14 showed that pregnant women in Nigeria with knowledge of discriminatory practices towards persons living with HIV/AIDS were not statistically significantly more likely to test for HIV/AIDS than those with no knowledge of the discriminatory practices (*AOR* = 1.61, 95% Cl [.53, 4.92], *p* = .37. Therefore, the null hypothesis was not rejected. The covariates controlled for in this model are Educational

level and Place of Residence. Controlling for the effects of these covariates has not changed the association between knowledge of discriminatory practices towards persons living with HIV/AIDS and HIV testing among pregnant women in Nigeria.

The Model Summary shows that the -2 log-likelihood value was 733.49, and Nagelkerke R-Square (R^2) value was .22 (see Table 15). The baseline model -2 log-likelihood value of 834.96 (see Table 9) compared with the full model value of 7334.49 showed a statistically significant reduction in the -2 log-likelihood value of the full model, indicating that it is a better predictor of HIV testing among pregnant women than the baseline model, $\chi 2$ (df = 5) = 109.23, $p < .01$, The baseline model Nagelkerke R-Square (R^2) value of .01 indicated that the model explained 1% of the variance in the HIV testing of pregnant women. The full model Nagelkerke R-Square (R^2) value of .22 indicated that personal knowledge of discriminatory practices against persons living with HIV/AIDS and the covariates explained 22% of the variance or change in the less likelihood of HIV testing of pregnant women.

Table 15

Model Summary for the Effect of Nigerian Pregnant Women Knowledge of HIV/AIDS Discriminatory Practices Towards Persons Living With HIV/AIDS and Their Testing for HIV in 2013 Controlled for the Effects of the Covariates

Model Summary

Step	-2 Log likelihood	Cox & Snell R Square	Nagelkerke R-Square
1	733.49	.16	.22

Summary

The results of basic bivariate analyses that justified the inclusion of covariates in the multivariable regression model showed that educational level, place of residence, and religion were statistically significantly associated with self-reported HIV testing by pregnant women aged 15-49 years during antenatal visits or childbirth. The results also showed that age categories and marital status were not statistically significantly associated with self-reported HIV testing of the pregnant women and, therefore, were not included in the multiple logistic regression models. For research question one, the study's findings showed no statistically significant association in self-reported HIV testing during antenatal visits or childbirth between pregnant women in Nigeria with positive and negative attitudes in the simple logistic regression model. Also, for research question one, the multiple logistic regression model controlling for the effects of educational level, place of residence, and religion showed no statistically significant association in self-reported HIV testing during antenatal visits or childbirth between pregnant women in Nigeria with positive and negative attitudes. A similar pattern was reported for research questions number two. In the simple and multiple logistic regression models of research question two, there was no statistically significant association between pregnant women with knowledge of discriminatory practices against persons living with HIV/AIDS and their self-reported HIV testing.

In Chapter 5, these results were interpreted and discussed in relation to other findings in the literature. Also, limitations of the study, the recommendations for further

relevant research where applicable, and implications for positive social change were stated. Finally, the conclusions that capture the key essence of this study were made.

Chapter 5: Discussion, Conclusions, and Recommendations

The purposes of this study were to examine the effect of stigmatizing attitudes and personal knowledge of discriminatory practices towards persons living with HIV/AIDS on self-reported HIV testing of Nigerian pregnant women aged 15-49 years during antenatal visits or childbirth. I also examined the association between age, education, place of residence (urban/rural), religion, and marital status as covariates and self-reported HIV testing as the outcome. The design of this study was a quantitative, cross-sectional survey using secondary data.

I conducted a simple logistic regression analysis to examine the effect of pregnant women's HIV/AIDS stigmatizing attitudes on their self-reported testing for HIV during antenatal visits or childbirth. The results showed that pregnant women with positive attitudes were not statistically significantly more likely to test for HIV than those with negative attitudes towards persons living with HIV/AIDS, $OR = 1.47$, 95% CI [.57, 3.76], $p = .36$. Multiple logistic regression was also conducted to examine the effect of stigmatizing attitudes on self-reported testing for HIV among pregnant women with HIV/AIDS controlling for the effects of educational level, place of residence, and religion as covariates. The result showed that there is no statistically significant difference in the HIV testing of pregnant women due to stigmatizing attitudes controlling for the effects of educational level, place of residence, and religion.

I conducted a simple logistic regression test on the effect of knowledge of HIV/AIDS discriminatory practice towards persons living with HIV/AIDS on HIV testing by Nigerian pregnant women during antenatal visits or childbirth. The finding

showed no statistically significant difference in HIV testing between those with personal knowledge of discriminatory practices and those without personal knowledge. A multiple logistic regression test was also conducted, controlling for the effects of educational level, place of residence, and religion as covariates. The result showed no statistically significant difference in the likelihood of HIV testing between the pregnant women who have knowledge of discriminatory practices towards persons living with HIV/AIDS and those without the knowledge when controlling for educational level, place of residence, and religion.

Interpretation of the Findings

For RQ1, I conducted a simple logistic regression analysis to determine the effect of stigmatizing attitudes on HIV testing of pregnant women during antenatal visits or childbirth. Results showed no association between the self-reported HIV testing of pregnant women who had positive and negative attitudes. I also conducted multiple logistic regression analysis on the association controlling for the effect of educational level, place of residence, and religion. The results showed that the effects of these covariates did not affect the association between stigmatizing attitudes and self-reported HIV testing of pregnant women. A parsimonious multiple regression model fitted with the omission of religion also did not statistically significantly change the association between stigmatizing attitudes and self-reported HIV testing. This finding is consistent with what Meremo et al. (2016) and Ha et al. (2019) reported in their study. However, it is not consistent with what many other studies have reported on the association of stigmatizing attitudes with self-reported HIV testing by pregnant women (Alemu et al.,

2017; Gebremedhin et al., 2018; Jama et al., 2019; Muhinda & Pazvakawambwa, 2017; Shodimu et al., 2017; Teklehaimanot et al., 2016). This finding may be associated with the HIV testing opt-out approach or model practiced in Nigeria that requires all pregnant women who attended antenatal care or were brought in at childbirth to a health facility to be tested for HIV unless they refused (Udoh & Ushie, 2020). 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 ones' status, including the danger of mother-to-child transmission of HIV (Udoh & Ushie, 2020). The mandatory provision of information on HIV/AIDS to these pregnant women about the risks of not testing and the benefits of testing for HIV may have impacted their readiness and testing decision. According to the health belief model, when people believe that they are at risk of a health problem, their understanding of the gains of taking action to avoid the problem facilitates their readiness to act to avoid the problem (Rosenstock, 1966; Rosenstock et al., 1988). The simple logistic regression model without the covariates explained 2% of the variance in HIV testing due to stigmatizing attitudes of the pregnant women (Nagelkerke R^2 = .02; p < .01). However, with the introduction of covariates in the multiple logistic regression model, the model explained 24% of the variance in the HIV testing of pregnant women due to the predictor variables (Nagelkerke R^2 = .24; p < .01). The multiple logistic regression model has a significantly reduced -2 log-likelihood value than the baseline model, indicating that it is a better predictor model by explaining more of the variance in the pregnant women HIV testing. The Nagelkerke (R^2) effect size of .24 (r = √.24 = .49), is considered according to Cohen's classification, a medium effect size (r = < .10 =

trivial; .10-.30 = small effect size; .30-.50 = medium effect size; > .50 = large effect size; see Evangeli et al., 2016; Hanel & Mehler, 2019). Of practical significance, this accounted for 24% of the variability in the pregnant women HIV testing due to the predictor variables.

For RQ2, I conducted a simple logistic regression analysis to determine the association between knowledge of discriminatory practices towards persons living with HIV/AIDS and self-reported HIV testing among pregnant women. Results showed that the pregnant women with knowledge of discriminatory practices were not statistically significantly more likely to test for HIV than those without the knowledge of the discriminatory practices, *OR* = 1.67, 95% Cl [.57, 4.92], *p* = .32. This finding was also corroborated in the multiple logistic regression analysis models where there was no statistically significant difference in the HIV testing between the pregnant women who have and those that do not have knowledge of HIV/AIDS discriminatory practices towards persons living with HIV/AIDS (*AOR* = 1.51, 95% Cl [.46, 4.95], *p* = .46) controlling for the effects of covariates (level of education, place of residence, and religion). A parsimonious multiple regression model fitted with the omission of religion also did not statistically significantly change the association between knowledge of discriminatory practices and self-reported HIV testing by pregnant women. These models' findings are surprising because the knowledge of discriminatory practices is supposed to serve as a barrier to HIV testing due to fear of positive results (De Wet & Kagee (2016), which is one of the postulates of the health belief model (Rosenstock, 1966; Rosenstock et al., 1988). When individuals know about these discriminatory

practices, it may negatively impact their testing for HIV due to the fear of being victims of these practices. Moreover, researchers have reported fear of positive results or stigma and discrimination as factors that hinder testing for HIV by pregnant women (Anígilájé et al., 2016; Jama, 2019; Mohlabane et al., 2016; Shodimu et al., 2017). Also, this finding is contrary to what has been reported in some other studies where having discriminatory attitudes towards persons living with HIV/AIDS impacted negatively on testing for HIV (Colombini et al., 2016; Meremo et al., 2016; Shodimu et al., 2017).

However, there is a need for additional research on whether the pregnant women's personal knowledge of discriminatory practices against persons living with HIV impacted their HIV testing as literature on this is nonexistent, according to my review of the literature. The opt-out HIV testing model practiced in Nigeria may have impacted this finding. Furthermore, the number of study participants "with personal knowledge" (n = 43) is much smaller than the number "without personal knowledge" (n = 616), and this could have impacted the study finding. A small sample size has been reported to facilitate Type II error (Ayilara et al., 2019). The simple logistic regression analysis model explained 1% of the variance in the HIV testing due to knowledge of HIV/AIDS discriminatory practices towards persons living with HIV by pregnant women (Nagelkerke R^2 = .01; p-value < .01). This effect size of 1%, although statistically significant, is practically insignificant or trivial according to Cohen's classification of effect sizes. However, with covariates in the multiple logistic regression, the model explained 22% of the variance in the HIV testing of pregnant women due to the predictor variables (Nagelkerke R^2 = .22; p < .01). There was a statistically significant reduction in

the -2-log likelihood value of the multiple logistic regression model compared to the simple logistic regression model showing that it is a better predictor model by explaining more of the variance in the pregnant women HIV testing. The prediction of HIV testing among pregnant women by the predictor variables is of practical significance because there is a 22% increase in the effect of the predictor variables on HIV testing.

Association of the Covariates With Self-Reported HIV Testing of the Pregnant Women

There was no statistically significant difference in HIV testing during antenatal visits or childbirth among the pregnant women in the different age categories. I expected older women to be more likely to test for HIV during antenatal visits or childbirth in this study because testing was limited to women who had ever-being pregnant before the administration of the primary survey. Therefore, older women were more likely to test for HIV during their previous pregnancies than younger women. Being older has been found in other studies to be a predictor of uptake of HIV testing (Gunn et al., 2016; Muyunda et al., 2018), although other sub-Saharan African studies by Muhinda and Pazvakawambwa (2017) and Takarinda et al. (2016) found the opposite.

Women with higher levels of education are more likely to test for HIV than those with no education in this study (*AOR* 14.21; 95% CI [5.95, 33.93], $p < .01$). Many other studies have corroborated this with a similar finding ((Ajayi et al., 2021; Ejigu and Tadesse, 2018, Muyunda et al., 2018). Also, Shodimu et al. (2017) reported that individuals with primary education are more likely to manifest stigma than those with higher education.

In this study, pregnant women dwelling in urban areas were 2.67 times more likely to test for HIV than those dwelling in rural areas (*OR* = 2.67; 95% CI [1.79, 3.98], $p < .01$. This finding is consistent with findings in the studies conducted by (Kirakoya-Samadoulougou et al., 2017; Mohlabane et al., 2016; Yaya et al., 2019). This finding may be related to the fact that urban dwellers usually belong to a higher socioeconomic class, and socioeconomic status measure such as wealth index has been associated with uptake of HIV testing (Muhinda, & Pazvakawambwa, 2017; Takarinda et al., 2016). Also, the urban areas have more HIV testing centers than the rural area, and studies have reported that proximity to HIV testing centers facilitated the more likelihood of testing for HIV (Kolawole et al., 2019; Meremo et al., 2016; Ogbonna et al., 2020; Teklehaimanot et al., 2016).

Pregnant women of the Catholic and Other Christians Religion were statistically significantly more likely to test for HIV than those in the reference Islamic Religion in the bivariate model. Takarinda et al. (2016) corroborated this finding that HIV testing by different religious sects was statistically significantly associated with pregnant women. This finding was not corroborated by Muhinda and Pazvakawambwa (2017) that reported that religion is not a predictor of HIV testing by women of reproductive age.

This study found no statistically significant difference in the self-reported HIV testing of pregnant women who are currently and not currently married ($p = .13$) in the simple logistic regression model. Mixed findings have been reported about the association between marital status and HIV testing. Takarinda et al. (2016) and Diress et al. (2021) reported that being married is significantly associated with testing for HIV.

Muhinda and Pazvakawambwa (2017) and Muyunda et al. (2018) reported that marital status is not statistically significantly associated with the likelihood of testing for HIV. Also, while Ajayi et al. (2021) reported that current marital status is significantly related to HIV testing in the simple logistic regression model, it was not corroborated in the multiple regression model. This study's finding on current marital status may be related to the confounding effect of ever-being pregnant (both married and unmarried pregnant women were included in this study) as Nigeria practices the opt-out Approach or Model of HIV testing where all pregnant women who attended antenatal care or were brought in at childbirth to a health facility are supposed to be tested unless they refused (Udoh & Ushie, 2020). This study finding is consistent with what was reported by other Nigerian studies on the relationship between marital status and HIV testing (Ajayi et al., 2021; Akinleye et al., 2017; Udoh & Ushie, 2020). Also, the findings by these Nigerian studies are consistent with what Ejigu and Tadesse (2018); Muhinda and Pazvakawambwa (2017), and Muyunda et al. (2018) reported in other countries that marital status is not statistically significantly related to HIV testing, although Gebremedhin et al. (2018) reported otherwise.

Interpretation of the Study Findings in the Context of the Theoretical Framework

Health Belief Model is the theoretical framework for this study. The perceived barrier is the construct of the health belief model that applies to this study. It was found in this study that pregnant women with negative attitudes are not less likely to test for HIV than those with positive attitudes, although negative attitudes and discriminatory practices towards persons living with HIV/AIDS have been documented as some of the

barriers that prevent individuals from seeking appropriate healthcare services or engaging in preventive health activities that will protect their health (Alemu et al., 2017; Gebremedhin et al., 2018; Jama et al., 2019; Muhinda & Pazvakawambwa, 2017; Shodimu et al., 201; Teklehaimanot et al., 2016). Individuals who stigmatize and discriminate against other persons perceive that they will also be treated the same way. Therefore, it becomes a barrier for them in seeking the appropriate healthcare services, including testing for HIV. The lack of difference in the likelihood of HIV testing between those with positive and negative attitudes, those with knowledge of discriminatory practices against persons living with HIV/AIDS, and those without the knowledge might be due to the opt-out approach or model of HIV testing in Nigeria. This approach requires all pregnant women that come for antenatal care or are brought in at childbirth to a health facility to be tested for HIV unless they refuse (Udoh & Ushie, 2020). In this approach or model, the pregnant women are counseled, which impacts their knowledge of HIV/AIDS, including the benefits of testing such as linkage to care, free treatment and support services for themselves and their babies if positive, and strategies of preventing mother-to-child transmission of HIV. According to Health Belief Model, when individuals understand the benefits of engaging in preventive behaviors to avoid a risk, it facilitates their engagement in such behaviors. The assumption that the practice of HIV testing among Nigerian pregnant women 15-49 years will be influenced by barriers to HIV testing such as stigma and discrimination was not supported by the findings of this study. The findings showed that both stigmatizing attitudes of the pregnant women aged 15-49 years and their personal knowledge of discriminatory practices towards persons living

with HIV/AIDS did not predict their self-reported testing for HIV at alpha = .05, p-value > .05. This may be because the pregnant women understand the benefits of HIV testing, which are always explained to the pregnant women under the opt-out model during their antennal visits or childbirth. These benefits are the enabler of engaging in preventive behavior in line with the perceived benefit constructs of the Health Belief Model. Also, the President Emergency Plan for AIDS Relief (PEPFAR) has spent over $6 Billion in Nigeria for the containment of the HIV epidemic in addition to other donor supports that made it possible to provide free HIV testing services for the general population and linkage to care and free treatment for HIV-positive individuals (The Global Fund, 2021; U.S. Embassy and Consulate in Nigeria, n.d.). This may have impacted the women's testing decision.

Limitations of the Study

This survey was conducted among pregnant women between 15-49 years of age in Nigeria who have stigmatizing attitudes and knowledge of discriminatory practices towards persons living with HIV/AIDS who self-reported being tested for HIV during antenatal or childbirth. I could not get the information on the composition of pregnant women in the general population, categorized by age groups. However, the assumed representativeness of this study's population was based on the use of sample weights provided by the DHS program, which accounted for the disproportionate sample allocation to states, the rural and urban areas, including the response rate differences (National Population Commission (NPC) [Nigeria] & ICF International, 2014). Therefore, this survey's findings will be generalized to the population of pregnant women

aged 15-49 years in Nigeria who have stigmatizing attitudes and knowledge of discriminatory practices towards persons living with HIV/AIDS that self-reported ever being tested for HIV during antenatal or childbirth. The 2013 NDHS relies on the self-report of HIV testing by pregnant women, and therefore, the accuracy of the information provided by them cannot be established. Also, the cross-sectional design of the original study design makes it unattainable to establish causality between the independent and the dependent variables. Furthermore, the small sample size of the individuals with personal knowledge of discriminatory practices towards persons living with HIV/AIDS compared to those without the knowledge may have impacted the precision of finding regarding research question 2. All the covariates identified in other studies which may impact or confound the study variables' relationship have not been exhaustively addressed in this study. Although there was expert validation and pilot testing of the survey questionnaire (National Population Commission (NPC) [Nigeria] & ICF International, 2014), I could not get the result or report of the validation because it is not published online or readily available in hard copy.

Recommendations

I also recommend further studies using a larger sample size to predict pregnant women aged 15-49 years personal knowledge of discriminatory practices towards individuals living with HIV/AIDS and its impact on their HIV testing during antenatal visits or childbirth. This is because a category of the predictor variable had a small sample size, which may have impacted the precision of the study findings (individuals with personal knowledge (n = 43); individuals without personal knowledge (n = 616).

The findings may add to the literature on whether there is a difference in how knowledge of HIV/AIDS discriminatory practices and attitudes of discriminatory practices against persons living with HIV/AIDS impact HIV testing of pregnant women in Nigeria.

I further recommend the evaluation of programs supported by development and donor partners in Nigeria such as WHO, UNAIDS, UNICEF, PEPFAR, Global Fund, and other partners working in the Nigerian national HIV response program, to assess intervention impacts (including those addressing stigma and discrimination) over the period of the implementation. Other identified covariates that impact HIV testing among pregnant women are recommended for inclusion in further studies.

Implications

This study made practical significance findings in the relationship between pregnant women who have stigmatizing attitudes, personal knowledge of discriminatory practice towards persons living with HIV/AIDS, and their self-reported HIV testing when controlling for the effect of age categories, educational level, place of residence, religion and marital status. The effects of these sociodemographic variables increased the effect size and odds of HIV testing among the pregnant women who have stigmatizing attitudes in the multiple logistic regression model. Therefore, designing policies and strategies that improve the benefits or remove the barriers posed by these sociodemographic variables to HIV testing may increase these pregnant women's likelihood of HIV testing in Nigeria. This study’s findings will help design appropriate interventions to reduce the effect of stigmatizing attitudes of pregnant women towards persons living with HIV/AIDS. These interventions will target education and place of residence, which are significantly

associated with HIV testing by pregnant women. This will facilitate social change by increasing the pregnant women's uptake of HIV testing, which is the gateway to HIV prevention, care, support services, and control of the epidemic. Also, the social system will be impacted through the expected reduction of the funds spent by the government on the control of the HIV epidemic in Nigeria so that it can be used for other social services.

Conclusion

This study examined the effect of HIV/AIDS stigmatizing attitudes and knowledge of discriminatory practices towards persons living with HIV/AIDS on HIV testing among pregnant women aged 15-49 years in Nigeria. These attitudes and practices have been reported by others to impact negatively on HIV testing by pregnant women. None of this reported impact of stigmatizing attitudes and knowledge of discriminatory practices was confirmed in this study, although these other studies on discriminatory practices addressed attitudes of HIV/AIDS discrimination while this study addressed knowledge or knowing of discriminatory practices. A bigger sample size is recommended for exploring further the association between the knowledge of discriminatory practices towards persons living with HIV/AIDS and HIV testing among pregnant women.

References

Abdolaliyan, N., Shahnazi, H., Kzemi, A., & Hasanzadeh, A. (2017). Determinants of the self-efficacy of physical activity for maintaining weight during pregnancy: The application of the health belief model. *Journal of Education and Health Promotion*, *6*, Article 93. https://doi.org/10.4103/jehp.jehp_175_16

Abtew, S., Awoke, W., & Asrat, A. (2016). Knowledge of pregnant women on mother-to-child transmission of HIV, its prevention, and associated factors in Assosa town, Northwest Ethiopia. *HIV/AIDS*, *8*, 101-107. https://doi.org/10.2147/HIV.S100301

Ajayi, A., Awopegba, O., Owolabi, E., & Ajala, A. (2019). Coverage of HIV testing among pregnant women in Nigeria: Progress, challenges, and opportunities. *Journal of Public Health*. https://doi.org10.1093/pubmed/fdz152

Althubaiti, A. (2016). Information bias in health research: Definition, pitfalls, and adjustment methods. *Journal of Multidisciplinary Healthcare*, *9*, 211–217. https://doi.org/10.2147/JMDH.S104807

Spector, P. E. (2019). Do Not Cross Me: Optimizing the Use of Cross-Sectional Designs. *Journal of Business and Psychology*, *34*(2), 125–137. https://doi.org/10.1007/s10869-018-09613-8

Treves-Kagan, S., Ayadi, A. M. E., Pettifor, A., MacPhail, C., Twine, R., Maman, S., Peacock, D., Kahn, K., & Lippman, S. A. (2017). Gender, HIV Testing, and Stigma: The Association of HIV Testing Behaviors and Community-Level and

Individual-Level Stigma in Rural South Africa Differ for Men and Women. *AIDS and Behavior*, *21*(9), 2579–2588. https://doi.org/10.1007/s10461-016-1671-8, *43*(1), e77-e84. https://doi.org10.1093/pubmed/fdz152

Akinleye, O., Dura, G., de Wagt, A., Davies, A., & Chamla, D. (2017). Integration of HIV testing into maternal, newborn, and child health weeks for improved case finding and linkage to prevention of mother-to-child transmission services in Benue State, Nigeria. *Frontiers in Public Health*, *5*, Article 71. https://doi.org/10.3389/fpubh.2017.00071

Alemu, Y. M., Ambaw, F., & Wilder-Smith, A. (2017). Utilization of HIV testing services among pregnant mothers in low-income primary care settings in northern Ethiopia: A cross-sectional study. *BMC Pregnancy and Childbirth*, *17*, Article 199. https://doi.org/10.1186/s12884-017-1389-2

American Psychological Association. (2020). *Publication manual of the American Psychological Association* (7th ed.).

Ananga, M. K., Kugbey, N., Akporlu, J. M., & Asante, K. O. (2017). Knowledge, acceptance and utilisation of the female condom among women of reproductive age in Ghana *Contraception and Reproductive Medicine*, *2*, Article 15**.** https://doi.org/10.1186/s40834-017-0042-9

Anígilájé, E. A., Ageda, B. R., & Nweke, N. O. (2016). Barriers to uptake of prevention of mother-to-child transmission of HIV services among mothers of vertically infected HIV-seropositive infants in Makurdi, Nigeria. *Patient Preference and Adherence*, *10*, 57–72. https://doi.org/10.2147/PPA.S87228

Ankuda, D., & Asiimwe, J. B. (2017). Determinants of comprehensive knowledge of HIV/AIDS among women of the reproductive age (15-49) in Uganda. *International Journal of Community Medicine and Public Health*, *4*(10), 3530-3535. https://doi.org/10.18203/2394-6040.ijcmph20174215

Atnafu Gebeyehu, N., Yeshambel Wassie, A., & Abebe Gelaw, K. (2019). Acceptance of HIV testing and associated factors among pregnant women attending antenatal care in Gunino Health Center, Southern Ethiopia 2019: An institutional-based cross-sectional study. *HIV/AIDS*, *11*, 333–341. https://doi.org/10.2147/HIV.S226077

Ayilara, O. F., Zhang, L., Sajobi, T. T., Sawatzky, R., Bohm, E., & Lix, L. M. (2019). Impact of missing data on bias and precision when estimating change in patient-reported outcomes from a clinical registry. *Health and Quality of Life Outcomes*, *17*(1), Article 106. https://doi.org/10.1186/s12955-019-1181-2

Boateng, E. Y., & Abaye, D. (2019). A review of the logistic regression model with emphasis on medical research. *Journal of Data Analysis and Information Processing*, *7*(4), 190–207. https://doi.org/10.4236/jdaip.2019.74012

Brennan-Ing, M. (2019). Diversity, stigma, and social integration among older adults with HIV. *European Geriatric Medicine*, *10*(2), 239–246. https://doi.org/10.1007/s41999-018-0142-3

Camargo, S. L., Herrera, A. N., & Traynor, A. (2018). Looking for a consensus in the discussion about the concept of validity. *Methodology*, *14*(4), 146–155. https://doi.org/10.1027/1614-2241/a000157

Colombini, M., James, C., Ndwiga, C., & Mayhew, S. H. (2016). The risks of partner violence following HIV status disclosure, and health service responses: Narratives of women attending reproductive health services in Kenya. *Journal of the International AIDS Society*, *19*(1), Article 20766. https://doi.org/10.7448/IAS.19.1.20766

De Wet, H., & Kagee, A. (2016). Perceived barriers and facilitators to HIV testing in South African communities. *Journal of Health Psychology*, *23*(2), 1635–1645. https://doi.org/10.1177/1359105316664140

The DHS Program. (2013, September 18). *ICF international wins $189 million contract with U.S. Agency for International Development*. USAID. https://dhsprogram.com/Who-We-Are/News-Room/ICF-International-wins-DHS-7-Contract-with-US-Agency-for-International-Development.cfm

Ejigu, Y., & Tadesse, B. (2018). HIV testing during pregnancy for prevention of mother-to-child transmission of HIV in Ethiopia. *PloS One*, *13* (8), e0201886. https://doi.org/10.1371/journal.pone.0201886

Erena, A. N., Shen, G., & Lei, P. (2019). Factors affecting HIV counselling and testing among Ethiopian women aged 15–49. *BMC Infectious Diseases*, *19* (1), 1076. https://doi.org/10.1186/s12879-019-4701-0

Evangeli, M., Pady, K., & Wroe, A. L. (2016). Which Psychological Factors are Related to HIV Testing? A Quantitative Systematic Review of Global Studies. *AIDS and Behavior*, *20* (4), 880–918. https://doi.org/10.1007/s10461-015-1246-0

Faul, F., Erdfelder, E., Buchner, A., & Lang, A.-G. (2009). Statistical power analyses

using G*Power 3.1: Tests for correlation and regression analyses. *Behavior Research Methods, 41*, 1149-1160. https://www.psychologie.hhu.de/arbeitsgruppen/allgemeine-psychologie-und-arbeitspsychologie/gpower

Federal Ministry of Health, Nigeria (FMoH). (2014). Nigeria Integrated Biological and Behavioral Surveillance Survey (IBBSS) 2020. Federal Ministry of Health. https://naca.gov.ng/wp-content/uploads/2016/11/Final-Nigeria-IBBSS-2014-report.pdf

Federal Ministry of Health, Nigeria (FMoH). (2016). National Guidelines for HIV Prevention, Treatment, and Care. Federal Ministry of Health. https://www.prepwatch.org/wp-content/uploads/2017 /08/nigeria _national _guidelines_2016.pdf

Federal Ministry of Health, Nigeria (FMoH). (2019). Nigeria HIV/AIDS Indicator and Impact Survey. Federal Ministry of Health. http://ciheb.org/media/SOM/Microsites/CIHEB/documents /NAIIS-Report-2018.pdf

Federal Republic of Nigeria Official Gazette. (2009). *Report On the Census 2006 Final Results*. https://gazettes.africa/archive/ng/2009/ng-government-gazette-dated-2009-02-02-no-2.pdf

Flannelly, K., Flannelly, L., & Jankowski, K. (2018). Threats to the Internal Validity of Experimental and Quasi-Experimental Research in Healthcare. *Journal of Health Care Chaplaincy*, *24*, 1–24. https://doi.org/10.1080/08854726.2017.1421019

Frew, P. M., Parker, K., Vo, L., Haley, D., O'Leary, A., Diallo, D. D., Golin, C. E., Kuo, I., Soto-Torres, L., Wang, J., Adimora, A. A., Randall, L. A., del Rio, C., Hodder, S., & the HIV Prevention Trials Network 064 (HTPN) Study Team. (2016). Socioecological factors influencing women's HIV risk in the United States: Qualitative findings from the women's HIV Sero Incidence study (HPTN 064). *BMC Public Health*, *16* (1), 803. https://doi.org/10.1186/s12889-016-3364-7

Fuster-RuizdeApodaca, M. J., Laguia, A., Molero, F., Toledo, J., Arrillaga, A., & Jaen, A. (2017). Psychosocial determinants of HIV testing across stages of change in Spanish population: a cross-sectional national survey. *BMC Public Health*, *17* (1), 234. https://doi.org/10.1186/s12889-017-4148-4

Gazimbi, M. M., & Magadi, M. (2017). A Multilevel Analysis of the Determinants of HIV Testing in Zimbabwe: Evidence from the Demographic and Health Surveys *HIV/AIDS Research and Treatment*, *4*, 14–31. https://doi.org/10.17140/HARTOJ-4-124

Gebremedhin, K. B., Tian, B., Tang, C., Zhang, X., Yisma, E., & Wang, H. (2018). Factors associated with acceptance of provider-initiated HIV testing and counseling among pregnant women in Ethiopia. *Patient Preference and Adherence*, *12*, 183–191. https://doi.org/10.2147/PPA.S148687

Ghorbani-Dehbalaei, M., Loripoor, M., & Nasirzadeh, M. (2021). The role of health beliefs and health literacy in women's health promoting behaviours based on the health belief model: A descriptive study. *BMC Women's Health*, *21*(1), 421. https://doi.org/10.1186/s12905-021-01564-2

Gunn, J. K. L., Asaolu, I. O., Center, K. E., Gibson, S. J., Wightman, P., Ezeanolue, E. E., & Ehiri, J. E. (2016). Antenatal care and uptake of HIV testing among pregnant women in sub-Saharan Africa: a cross-sectional study. *Journal of the International AIDS Society*, *19* (1), 20605. http://doi.org/10.7448/IAS.19.1.20605

Ha, J. H., Lith, L. M. V., Mallalieu, E. C., Chidassicua, J., Pinho, M. D., Devos, P., & Wirtz, A. L. (2019). Gendered relationship between HIV stigma and HIV testing among men and women in Mozambique: A cross-sectional study to inform a stigma reduction and male-targeted HIV testing intervention. *BMJ Open*, *9* (10), e029748. https://doi.org/10.1136/bmjopen-2019-029748

Haffejee, F., Ports, K. A., & Mosavel, M. (2016). Knowledge and attitudes about HIV infection and prevention of mother to child transmission of HIV in an urban, low-income community in Durban, South Africa: Perspectives of residents and health care volunteers. *Journal of Interdisciplinary Health Services*, *21*, 171-178. 10.1016/j.hsag.2016.02.001

Hampanda, K. M., & Rael, C. T. (2018). HIV Status Disclosure Among Postpartum Women in Zambia with Varied Intimate Partner Violence Experiences. *AIDS and Behavior*, *22* (5), 1652–1661. https://doi.org/10.1007/s10461-017-1909-0

Hanel, P. H., & Mehler, D. M. (2019). Beyond reporting statistical significance: Identifying informative effect sizes to improve scientific communication. *Public Understanding of Science*, *28*(4), 468–485. https://doi.org/10.1177/0963662519834193

Huang, Y., Yu, B., Jia, P., Wang, Z., Yang, S., Tian, C., Lai, W., & Yang, S. (2020). Association between Psychological Factors and Condom Use with Regular and Nonregular Male Sexual Partners among Chinese MSM: A Quantitative Study Based on the Health Belief Model. *BioMed Research International*, *2020*, e5807162. https://doi.org/10.1155/2020/5807162

Irinyenikan, T. A. (2019). Knowledge and practice of HIV testing for PMTCT among antenatal clinic attendees. *Tropical Journal of Obstetrics and Gynaecology*, *36* (2), 232–237. 10.4103/TJOG.TJOG_96_18

Iyun, V., Brittain, K., Phillips, T. K., Roux, S. le, McIntyre, J. A., Zerbe, A., Petro, G., Abrams, E. J., & Myer, L. (2018). Prevalence and determinants of unplanned pregnancy in HIV-positive and HIV-negative pregnant women in Cape Town, South Africa: A cross-sectional study. *BMJ Open*, *8* (4), e019979. https://doi.org/10.1136/bmjopen-2017-019979

Jama, M. Y., Asfaw, S. A., & Gezahegu, Y. (2019). Determinants of HIV test uptake among women of reproductive age group attending to Hargeisa group hospital, Somaliland, Somalia. *International Journal of Scientific & Engineering Research*, *10* (5), 12. https://www.researchgate.net/publication/333353828_Determinants_of_HIV_testuptake_among_women_of_reproductive_age_group_attending_to_Hargeisa_group_hospital_Somaliland_Somalia

Jeihooni, A. K., Hidarnia, A., Kaveh, M. H., Hajizadeh, E., & Askari, A. (2016). Application of the health belief model and social cognitive theory for osteoporosis preventive nutritional behaviors in a sample of Iranian women. *Iranian Journal of*

Nursing and Midwifery Research, *21* (2), 131–141. http://doi.org/10.4103/1735-9066.178231

Jooste, S., Mabaso, M., Taylor, M., North, A., Tadokera, R., & Simbayi, L. (2020). Trends and determinants of ever having tested for HIV among youth and adults in South Africa from 2005–2017: Results from four repeated cross-sectional nationally representative household-based HIV prevalence, incidence, and behaviour surveys. *PLOS ONE*, *15* (5), e0232883. https://doi.org/10.1371/journal.pone.0232883

Josephat, P. K., & Ame, A. (2018). Effect of Testing Logistic Regression Assumptions on the Improvement of the Propensity Scores. *International Journal of Statistics and Applications*, *8* (1), 9–17. doi:10.5923/j.statistics.20180801.02

Kaliyadan, F., & Kulkarni, V. (2019). Types of Variables, Descriptive Statistics, and Sample Size. *Indian Dermatology Online Journal*, *10* (1), 82–86. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6362742/

Kiene, S. M., Dove, M., & Wanyenze, R. K. (2018). Depressive Symptoms, Disclosure, HIV-Related Stigma, and Coping Following HIV Testing Among Outpatients in Uganda: A Daily Process Analysis. *AIDS and Behavior*, *22* (5), 1639–1651. https://doi.org/10.1007/s10461-017-1953-9

Kirakoya-Samadoulougou, F., Jean, K., & Maheu-Giroux, M. (2017). Uptake of HIV testing in Burkina Faso: An assessment of individual and community-level determinants. *BMC Public Health*, *17* (1), 486. https://doi.org/10.1186/s12889-017-4417-2

Kolawole, O., Halid, O., Samuel, O., & A., A. (2019). An Assessment of HIV Counselling and Testing (HCT) Service Utilization in Nigeria: A Binary Logistic Regression Approach. *International Journal of HIV/AIDS Prevention, Education and Behavioural Science*, *5*, 26–36. https://doi.org/10.11648/j.ijhpebs.20190501.14

Lesko, C. R., Buchanan, A. L., Westreich, D., Edwards, J. K., Hudgens, M. G., & Cole, S. R. (2017). Generalizing study results: A potential outcomes perspective. *Epidemiology (Cambridge, Mass.)*, *28* (4), 553–561. https://doi.org/10.1097/EDE.0000000000000664

Meremo, A., Mboya, B., Ngilangwa, D., Dulle, R., Tarimo, E., Urassa, D., Michael, E., Gibore, N., Mpondo, B., Mchonde, G., Ernest, A., Noronha, R., & Ilako, F. (2016). Barriers to accessibility and utilization of HIV testing and counseling services in Tanzania: Experience from Angaza Zaidi programme. *The Pan African Medical Journal*, *23* (189). http://www.panafrican-med-journal.com/content/article/23/189/full/

Merga, H., Woldemichael, K., & Dube, L. (2016). Utilization of prevention of mother-to-child transmission of HIV services and associated factors among antenatal care attending mothers in Sebeta Town, Central Ethiopia. *Advances in Public Health*, *2016*. https://doi.org/10.1155/2016/6250898

Mirzaei, A., Carter, S. R., Patanwala, A. E., & Schneider, C. R. (2021). Missing data in surveys: Key concepts, approaches, and applications. *Research in Social and Administrative Pharmacy*. https://doi.org/10.1016/j.sapharm.2021.03.009

Mohlabane, N., Tutshana, B., Peltzer, K., & Mwisongo, A. (2016). Barriers and facilitators associated with HIV testing uptake in South African health facilities offering HIV Counselling and Testing. *Journal of Interdisciplinary Health Services*, *21* (1), 86–95. https://doi.org/10.1016/j.hsag.2015.11.001

Muhinda & Pazvakawambwa . (2017). HIV Testing among Women in Namibia: Patterns and Determinants. *Biomedical Journal of Scientific & Technical Research*, *1* (3), 571–578. https://ideas.repec.org/a/abf/journl/v1y2017i3p571-578.html

Mukhtar, M., Quansar, R., Bhat, S., & Khan, S. M. S. (2020). Knowledge, attitude and practice regarding mother-to-child transmission of HIV, its prevention, and associated factors among antenatal women attending a health care facility in district Srinagar, North India: A cross-sectional study. *International Journal Of Community Medicine And Public Health*, *7*, 2622. https://doi.org/10.18203/2394-6040.ijcmph20202987

Musarandega, R., Robinson, J., Sen, P. D., Hakobyan, A., Mushavi, A., Mahomva, A., & Woelk, G. (2020). Using the critical path method to rollout and optimize new PMTCT guidelines to eliminate mother-to-child transmission of HIV in Zimbabwe: A descriptive analysis. *BMC Health Services Research*, *20* (1), 1042. https://doi.org/10.1186/s12913-020-05900-4

Muyunda, B., Musonda, P., Mee, P., Todd, J., & Michelo, C. (2018) . Educational Attainment as a Predictor of HIV Testing Uptake Among Women of Child-Bearing Age: Analysis of 2014 Demographic and Health Survey in Zambia. *Frontiers in Public Health*, *6*. https://doi.org/10.3389/fpubh.2018.00192

National Population Commission (NPC) [Nigeria] & ICF International. (2014). *Nigeria Demographic and Health Survey 2013*. NPC and ICF International. https://dhsprogram.com/pubs/pdf/fr293/fr293.pdf

National Population Commission & ICF. (2019). *Nigeria Demographic and. Health Survey 2018*. https://dhsprogram.com/pubs/pdf/FR359/FR359.pdf

Ndege, S., Washington, S., Kaaria, A., Prudhomme-O'Meara, W., Were, E., Nyambura, M., Keter, A. K., Wachira, J., & Braitstein, P. (2016). HIV Prevalence and Antenatal Care Attendance among Pregnant Women in a Large Home-Based HIV Counseling and Testing Program in Western Kenya. *PLOS ONE, 11* (1), e0144618. https://doi.org/10.1371/journal.pone.0144618

Nissen, J., Donatello, R., & Van Dusen, B. (2019). Missing data and bias in physics education research: A case for using multiple imputation. *Physical Review Physics Education Research, 15*(2), 020106. https://doi.org/10.1103/PhysRevPhysEducRes.15.020106

Nubed, C. K., & Akoachere, J. F. T. K. (2016). Knowledge, attitudes and practices regarding HIV/AIDS among senior secondary school students in Fako Division, Southwest Region, Cameroon. *BMC Public Health, 16* (1). https://doi.org/10.1186/s12889-016-3516-9

Nyamukoho, E., Mangezi, W., Marimbe, B., Verhey, R., & Chibanda, D. (2019). Depression among HIV positive pregnant women in Zimbabwe: A primary health care based cross-sectional study. *BMC Pregnancy and Childbirth, 19* (1), 53. https://doi.org/10.1186/s12884-019-2193-y

O'Dwyer, M. C. T., Dune, T., Bidewell, J., & Liamputtong, P. (2019). Critiquing the Health Belief Model and Sexual Risk Behaviours among Adolescents: A Narrative Review of Familial and Peer Influence. *International Journal of Social Science Studies, 7* (6), 62. https://doi.org/10.11114/ijsss.v7i6.4518

Ofori, K. N. (2019). Application of the Health Belief Model to HIV Testing and Counselling Among Youth Living in Selected Rural Communities in Ghana. *International Journal of HIV/AIDS Prevention, Education and Behavioural Science, 5*, 11–18. https://doi.org/10.11648/j.ijhpebs.20190501.12

Ogbonna, P., Kotoye, C., Ingwu, J., Ohaeri, B., & Anyanwu, J. (2020). Barriers to Voluntary HIV Counselling and Testing among undergraduate students of the Faculty of Health Sciences and Technology, University of Nigeria Enugu Campus- Enugu State, Nigeria. *International Journal of Nursing Critical Care*. https://doi.org/10.37628/ijncc.v6i2.1565

Ojikutu, B. O., Pathak, S., Srithanaviboonchai, K., Limbada, M., Friedman, R., Li, S., Mimiaga, M. J., Mayer, K. H., Safren, S. A., & HIV Prevention Trials Network 063 Team. (2016). Community Cultural Norms, Stigma and Disclosure to Sexual Partners among Women Living with HIV in Thailand, Brazil and Zambia (HPTN 063). *PloS One, 11* (5), e0153600. https://doi.org/10.1371/journal.pone.0153600

Pederson, L. L., Vingilis, E., Wickens, C. M., Koval, J., Mann, R. E., Pederson, L. L., Vingilis, E., Wickens, C. M., Koval, J., & Mann, R. E. (2020). Use of secondary data analyses in research: Pros and Cons. *Journal of Addiction Medicine and Therapeutic Science, 6* (1), 058–060. https://www.peertechz.com/articles/JAMTS-

6-139.php

Peifer, C., Schönfeld, P., Wolters, G., Aust, F., & Margraf, J. (2020). Well Done! Effects of Positive Feedback on Perceived Self-Efficacy, Flow and Performance in a Mental Arithmetic Task. *Frontiers in Psychology*, *11*, 1008. https://doi.org/10.3389/fpsyg.2020.01008

Peltzer, K., Rodriguez, V. J., & Jones, D. (2016). Prevalence of prenatal depression and associated factors among HIV-positive women in primary care in Mpumalanga province, South Africa. *SAHARA-J: Journal of Social Aspects of HIV/AIDS*, *13*(1), 60–67. https://doi.org/10.1080/17290376.2016.1189847

Puukko, K., Hietajärvi, L., Maksniemi, E., Alho, K., & Salmela-Aro, K. (2020). Social Media Use and Depressive Symptoms-A Longitudinal Study from Early to Late Adolescence. *International Journal of Environmental Research and Public Health*, *17*(16), 5921. https://doi.org/10.3390/ijerph17165921

Rakhshanderou, S., Ghaffari, M., & Rafie, M. (2017). Application of health belief model to survey determinants of osteoporosis–related preventive behaviors among Iranian adolescents. *Annals of Tropical Medicine and Public Health*, *10*(4), 897. https://www.proquest.com/docview/1953810955

Ranganathan, P., Pramesh, C. S., & Aggarwal, R. (2017). Common pitfalls in statistical analysis: Logistic regression. *Perspectives in Clinical Research*, *8* (3), 148–151. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5543767/

Rosenstock, I. M. (1966). Why people use health services. *Milbank Memorial Fund Quarterly*, *44*, 94–127. https://doi.org/10.1111/j.1468-0009.2005.00425.x

Rosenstock, I. M., Strecher, V. J., & Becker, M. H. (1988). Social learning theory and the Health Belief Model. *Health Education Quarterly, 15* (2), 175–183. https://doi.org/10.1177/109019818801500203

Sas-Nowosielski, K., Hadzik, A., Górna, J., & Grabara, M. (2016). Applying the Health Belief Model in Explaining the Stages of Exercise Change in Older Adults. *Polish Journal of Sport and Tourism*, *23*, 221–225. https://doi.org/10.1515/pjst-2016-0029

Senaviratna, N. A. M. R., & A. Cooray, T. M. J. (2019). Diagnosing Multicollinearity of Logistic Regression Model. *Asian Journal of Probability and Statistics*, *5* (2), 1-9. https://doi.org/10.9734/ajpas/2019/v5i230132

Shehu, A. U., Joshua, I. A., & Umar, Z. (2016). Knowledge of contraception and contraceptive choices among human immunodeficiency virus-positive women attending antiretroviral clinics in Zaria, Nigeria. *Sub-Saharan African Journal of Medicine*, *3* (2), 84. http://www.ssajm.org/text.asp?2016/3/2/84/184355

Shodimu, M. A., Yusuf, O. B., Akinyemi, J. O., Fagbamigbe, A. F., Bamgboye, E. A., Ngige, E., Issa, K., Abatta, E., Ezire, O., & Amida, P. (2017). Determinants of perceived stigmatizing and discriminating attitudes towards people living with HIV/AIDS among women of reproductive age in Nigeria. *Journal of AIDS and HIV Research*, *9*, 139–151. https://doi.org/10.5897/JAHR2016.0391

Sia, D., Onadja, Y., Hajizadeh, M., Heymann, S. J., Brewer, T. F., & Nandi, A. (2016). What explains gender inequalities in HIV/AIDS prevalence in sub-Saharan Africa? Evidence from the demographic and health surveys. *BMC Public Health*,

16 (1), 1136. https://doi.org/10.1186/s12889-016-3783-5

Siuki, H. A., Peyman, N., Vahedian-Shahroodi, M., Gholian-Aval, M., & Tehrani, H. (2018). Health education intervention on HIV/AIDS prevention behaviors among health volunteers in healthcare centers: An applying the theory of planned behavior. *Journal of Social Service Research*, *45* (4), 582-588. https://doi.org/10.1080/01488376.2018.1481177

Stephen, R. S., & Senthamarai, K. K. (2017). Detection of Outliers in Regression Model for Medical Data. *International Journal of Medical Research & Health Sciences*, *6* (7),50-56. https://www.ijmrhs.com/medical-research/detection-of-outliers-in-regression-model-for-medical-data.pdf

Takarinda, K. C., Madyira, L. K., Mhangara, M., Makaza, V., Maphosa-Mutsaka, M., Rusakaniko, S., Kilmarx, P. H., Mutasa-Apollo, T., Ncube, G., & Harries, A. D. (2016). Factors associated with ever being HIV-tested in Zimbabwe: An extended analysis of the Zimbabwe Demographic and Health Survey (2010–2011). *PLoS ONE*, *11* (1). 10.1371/journal.pone.0147828

Teklehaimanot, H. D., Teklehaimanot, A., Yohannes, M., & Biratu, D. (2016). Factors influencing the uptake of voluntary HIV counseling and testing in rural Ethiopia: A cross-sectional study. *BMC Public Health*, *16* (1), 239. DOI: 10.1186/s12889-016-2918-z

Tesfaw, G., Ayano, G., Awoke, T., Assefa, D., Birhanu, Z., Miheretie, G., & Abebe, G. (2016). Prevalence and correlates of depression and anxiety among patients with HIV on-follow up at Alert Hospital, Addis Ababa, Ethiopia. *BMC Psychiatry*, *16*

(1), 368. https://doi.org/10.1186/s12888-016-1037-9

Teshome, R., Youjie, W., Habte, E., & Mohamedkassm, N. (2016). AIDS and clinical research 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. *Journal of AIDS & Clinical Research*, *7* (4), 4–11. 10.4172/2155-6113.1000559

The Global Fund. (2021). *The Global Fund invests US$4 billion a year to defeat HIV, TB and malaria and ensure a healthier, safer, equitable future for all*. https://www.theglobalfund.org/en/

Treves-Kagan, S., Ayadi, A. M. E., Pettifor, A., MacPhail, C., Twine, R., Maman, S., Peacock, D., Kahn, K., & Lippman, S. A. (2017). Gender, HIV testing and stigma: The association of HIV Testing behaviors and community-level and individual-level stigma in rural South Africa differ for men and women. *AIDS and Behavior*, *21* (9), 2579–2588. https://doi.org/10.1007/s10461-016-1671-8

U.S. Embassy and Consulate in Nigeria. (n.d.). *PEPFAR*. https://ng.usembassy.gov/embassy-consulate/abuja/sections-offices/pepfar/

Uchendu, O. C., Adeyera, O., & Owoaje, E. T. (2019). Awareness and utilization of female condoms among street youths in Ibadan, an urban setting in South-West Nigeria. *The Pan African Medical Journal*, *33*, 168. https://doi.org/10.11604/pamj.2019.33.168.12733

Udoh, E. E., & Ushie, B. A. (2020). Determinants of antenatal HIV testing in the opt-out approach in Nigeria: findings from the Nigerian Demographic and Health

Survey. *Journal of Biosocial Science*, *52* (4), 473-490. https://doi.org/10.1017/S0021932019000555

UNAIDS. (2005). *HIV-Related Stigma, Discrimination and Human Rights Violations: Case studies of successful programmes*. http://data.unaids.org/publications/irc-pub06/jc999-humrightsviol_en.pdf

UNAIDS. (2011, August 29). *Stigma and discrimination against people living with HIV remains widespread in Asia and the Pacific, report shows*. http://www.unaids.org/en/resources/presscentre/featurestories/2011/august/20110829stigmaindex

UNAIDS. (2014, p.4). *Women living with HIV speak out against violence: A collection of essays and reflections of women living with and affected by HIV*. https://www.unaids.org/sites/default/files/media_asset/womenlivingwithhivspeakout_en.pdf

UNAIDS. (2015a). 2015 progress report on the global plan: Towards the elimination of new HIV infections among children and keeping their mothers alive. https://www.unaids.org/sites/default/files/media_asset/JC2774_2015ProgressReport_GlobalPlan_en.pdf

UNAIDS. (2015b). UNAIDS *Terminology Guidelines—2015*. https://www.unaids.org/sites/default/files/media_asset/2015_terminology_guidelines_en.pdf

UNAIDS. (2017). *90-90-90: An ambitious treatment target to help end the AIDS epidemic*. http://www.unaids.org/en/resources/documents/2017/90-90-90

UNAIDS. (2020). *Global Factsheets (2020*): http://aidsinfo.unaids.org/

Vasileiou, K., Barnett, J., Thorpe, S., & Young, T. (2018). Characterizing and justifying sample size sufficiency in interview-based studies: Systematic analysis of qualitative health research over a 15-year period. *BMC Medical Research Methodology*, *18* (1), 148. https://doi.org/10.1186/s12874-018-0594-7

Villar, O. A., Montañez-Alvarado, P., Gutiérrez-Vega, M., Carrillo-Saucedo, I. C., Gurrola-Peña, G. M., Ruvalcaba-Romero, N. A., García-Sánchez, M. D., & Ochoa-Alcaraz, S. G. (2017). Factor structure and internal reliability of an exercise health belief model scale in a Mexican population. *BMC Public Health*, *17* (1), 229. https://doi.org/10.1186/s12889-017-4150-x

WHO, UNAIDS & UNICEF. (2011). *Global HIV/AIDS Response: Epidemic update and health sector progress towards Universal Access, Progress Report 2011. UNAIDS.* https://www.afro.who.int/publications/global-hivaids-response-epidemic-update-and-health-sector-progress-towards-universal

WHO, UNICEF & UNAIDS (Eds). (2011). *A guide on indicators for monitoring and reporting on the health sector response to HIV/AIDS*. https://www.who.int/hiv/data/UA2011_indicator_guide_en.pdf

WHO. (2016). *Consolidated guidelines on the use of antiretroviral drugs for treating and preventing HIV infection: Recommendations for a public health approach (*2nd ed.). https://apps.who.int/iris/handle/10665/208825

WHO. (2019). *Consolidated guidelines on HIV testing services*. https://www.who.int/publications/i/item/978-92-4-155058-1

WHO. (2021). *HIV/AIDS*. https://www.afro.who.int/health-topics/hivaids

Worku, M. G., Tesema, G. A., & Teshale, A. B. (2021). Prevalence and associated factors of HIV testing among reproductive-age women in eastern Africa: Multilevel analysis of demographic and health surveys. *BMC Public Health*, *21* (1), 1262. https://doi.org/10.1186/s12889-021-11292-9

Yaya, S., Oladimeji, O., Oladimeji, K. E., & Bishwajit, G. (2019) Determinants of prenatal care use and HIV testing during pregnancy: A population-based, cross-sectional study of 7080 women of reproductive age in Mozambique. *BMC Pregnancy and Childbirth, 19* (1), 354. https://doi.org/10.1186/s12884-019-2540-z

Yu, L., Liu, L., & Peace, K. E. (2020). Regression multiple imputations for missing data analysis. *Statistical Methods in Medical Research*, *29*(9), 2647-2664. https://doi.org/10.1177/0962280220908613

Zhang, C., Li, X., Liu, Y., Qiao, S., Zhang, L., Zhou, Y., Tang, Z., Shen, Z., & Chen, Y. (2016). Stigma against people living with HIV/AIDS in China: Does the route of infection matter? *PLoS ONE, 11*(3), e0151078. https://doi.org/10.1371/journal.pone.0151078

Appendix A: Permission to Access Nigeria Demographic Health Survey Data Set

Sep 27, 2021

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Federal ministry of health nigeria
Nigeria
Request Date: 09/27/2021

Dear CHARLES NZELU:

This is to confirm that you are approved to use the following Survey Datasets for your registered research paper titled: "The Effect of Stigma and Discrimination on HIV Testing by Pregnant Women in Nigeria":

Nigeria

To access the datasets, please login at: https://www.dhsprogram.com/data/dataset_admin/login_main.cfm. The user name is the registered email address, and the password is the one selected during registration.

The IRB-approved procedures for DHS public-use datasets do not in any way allow respondents, households, or sample communities to be identified. There are no names of individuals or household addresses in the data files. The geographic identifiers only go down to the regional level (where regions are typically very large geographical areas encompassing several states/provinces). Each enumeration area (Primary Sampling Unit) has a PSU number in the data file, but the PSU numbers do not have any labels to indicate their names or locations. In surveys that collect GIS coordinates in the field, the coordinates are only for the enumeration area (EA) as a whole, and not for individual households, and the measured coordinates are randomly displaced within a large geographic area so that specific enumeration areas cannot be identified.

The DHS Data may be used only for the purpose of statistical reporting and analysis, and only for your registered research. To use the data for another purpose, a new research project must be registered. All DHS data should be treated as confidential, and no effort should be made to identify any household or individual respondent interviewed in the survey. Also, be aware that re-distribution of any DHS micro-level data, either directly or within any tool/dashboard, is not permitted. Please reference the complete terms of use at: https://dhsprogram.com/Data/terms-of-use.cfm.

The data must not be passed on to other researchers without the written consent of DHS. However, if you have coresearchers registered in your account for this research paper, you are authorized to share the data with them. All data users are required to submit an electronic copy (pdf) of any reports/publications resulting from using the DHS data files to: references@dhsprogram.com.

Sincerely,

Bridgette Wellington

Bridgette Wellington
Data Archivist
The Demographic and Health Surveys (DHS) Program

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Appendix B: Survey Questions and the Level of Measurement of the Study Variables

Questions	Response	Level of measurement
Sociodemographic variables		
Age: How old were you at your last birthday?	Age in completed years Categorized into five years band	Ordinal
Level of education: What is the highest level of school you attended: primary, secondary, or higher?	Primary……1 Secondary….2 Higher……3	Ordinal
Religion: What is your religion?	Catholic……1 Other christian……. 2 Islam…….3 Traditionalist……97 Other…… 5	Nominal
Place of residence: Urban or Rural	Urban…….1 Rural……...2	Nominal
Marital Status: Are you currently married or living together with a man as if married?	Yes, currently married…….1 Yes, living with a man…….2 No, not in union . . . ……3	Nominal
Dependent variable		
I don't want to know the results, but were you tested for the AIDS virus as part of your antenatal care?	No = 0, Yes = 1	Nominal
Research Question 1: What is the relationship between pregnant women aged 15-49 years in Nigeria having stigmatizing attitudes		

Questions	Response	Level of measurement
towards persons living with HIV/AIDS and their self-report of testing for HIV when controlling for educational level, religion, and place of residence?		
Questions asked in the 2013 NDHS that addressed Stigmatizing attitudes and HIV Testing		
a. Would you buy fresh vegetables from a vendor who has the AIDS virus?	No = 0, Yes = 1	Nominal
b. If a member of your family got infected with the virus that causes AIDS, would you want it to remain a secret or not?	No = 0, Yes = 1	Nominal
c. 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?	No = 0, Yes = 1	Nominal
d. If a female teacher has the AIDS virus, should she be allowed to continue teaching in school?	No = 0, Yes = 1	Nominal
e. should children aged 12-14 be taught about using a condom to avoid AIDS?	No = 0, Yes = 1	Nominal

Questions	Response	Level of measurement
f. People with the AIDS virus should be ashamed of themselves?	No = 0, Yes = 1	Nominal
g. People with the AIDS virus should be blamed for bringing the disease into the community	No = 0, Yes = 1	Nominal
Research Question 2: What is the relationship between pregnant women aged 15-49 years in Nigeria knowledge of HIV/AIDS discriminatory practices towards persons living with HIV/AIDS and their testing for HIV?		
Questions asked in the 2013 NDHS that addressed Knowledge of HIV/AIDS Discriminatory Practices Towards persons living with HIV/AIDS		

Questions	Response	Level of measurement
a. Do you personally know someone who has been denied health services in the last twelve months because he or she has or is suspected to have the AIDS virus?	No = 0, Yes = 1	Nominal
b. Do you personally know someone who has been denied involvement in social events, religious services, or community events in the last twelve months because he or she has or is suspected to have the AIDS virus?	No = 0, Yes = 1	Nominal

Questions	Response	Level of measurement
c. Do you personally know someone who has been verbally abused or teased in the last twelve months because he or she has or is suspected to have the AIDS virus?	No = 0, Yes = 1	Nominal

Study Variable Types and Level of Measurement

Variable name	Type of variable	Level of measurement
HIV testing by pregnant women aged 15-49 years	Dependent	Nominal
Stigmatizing Attitudes towards persons living with HIV/AID	Independent	Nominal
Knowledge of discriminatory practices towards persons living with HIV	Independent	Nominal
Educational level	Covariate	Ordinal
Marital status	Covariate	Nominal
Age	Covariate	Ordinal
Place of residence	Covariate	Nominal
Religion	Covariate	Nominal

Appendix C: Factors Identified in Previous Research That Have an Impact on HIV Testing

Factors identified in previous research that affect HIV testing of pregnant wome	Research findings for the factors	Source
Educational level*	Higher educational level facilitated the HIV testing among pregnant women attending antenatal care.	Ndege et al. (2016 - Kenya) Ajayi et al. (2021- Nigeria) Teklehaimanot et al.(2016 - Ethiopia); Kolawole et al. (2019 - Nigeria) Muhinda & Pazvakawambwa, (2017 - Namibia) Takarinda et al., (2016 - Zimbabwe) Jooste et al. (2020 – South Africa); Alemu et al. (2017 - Ethiopia); Muyunda et al. (2018 – Zambia) Ejigu & Tadesse (2018 - Ethiopia); Worku et al. (2021 – East Africa).
Marital etatus*	Being married posed barrier to HIV testing.	Ndege et al. (2016 - Kenya).
	Being married facilitated HIV testing	Jooste et al. (2020 – South Africa) Worku et al. (2021 – East Africa); Diress et al. (2021 - Ethiopia); Teklehaimanot et al.(2016 - Ethiopia) Ajayi et al., 2021 – Nigeria
Place of residence*	Living in rural area facilitated testing for HIV.	Teklehaimanot et al. (2016 - Ethiopia), Kolawole et al. (2019 - Nigeria)
	Living in rural area Posed barrier to HIV testing.	Jooste et al. (2020 – South Africa), Worku et al. (2021 – East Africa); Gazimbi & Magadi (2017 – Zimbabwe).
	Living in urban area facilitated testing for HIV	Ajayi et al. (2021 - Nigeria)

Factors identified in previous research that affect HIV testing of pregnant wome	Research findings for the factors	Source
Religion*	Religion facilitated HIV testing	Takarinda et al. (2016 - Zimbabwe)
Age categories*	Being younger facilitated HIV testing.	Muhinda & Pazvakawambwa, (2017 - Namibia)
	Being older posed barrier to HIV Testing.	Jooste et al. (2020 – South Africa)
	Being older facilitated HIV testing.	Worku et al. (2021 – East Africa) Ndege et al. (2016 - Kenya) Muyunda et al. (2018 - Zambia); Teklehaimanot et al.(2016 - Ethiopia)
Discriminatory attitudes of individuals	Lower level of discriminatory attitudes facilitated HIV testing	Teklehaimanot et al. (2016 - Ethiopia)
Stigmatizing attitudes of individual	Lower levels of personal stigmatizing attitudes facilitated HIV testing.	Teklehaimanot et al.(2016- Ethiopia) Shodimu et al. (2017 - Nigeria); Takarinda et al. (2016 - Zimbabwe); Ajayi et al. (2021 - Nigeria)
	Higher levels of personal stigmatizing attitudes facilitated HIV testing.	Worku et al. (2021 – East Africa).
	Higher level of stigmatizing attitudes posed barrier to HIV testing	Gunn et al. (2016 - Congo, Mozambique, Nigeria & Uganda)
HIV/AIDS-related knowledge	comprehensive knowledge of HIV/AIDS facilitated HIV testing.	Teklehaimanot et al.(2016 - Ethiopia); Worku et al. (2021 – East Africa) Ankuda and Asiimwe (2017 - Uganda)

Factors identified in previous research that affect HIV testing of pregnant wome	Research findings for the factors	Source
Discriminatory attitudes by community, healthcare workers, etc.	Discriminatory attitudes posed barrier to HIV testing	Anígilájé et al. (2016 – Nigeria); Merga et al. (2016 – Ethiopia)
Stigmatizing attitudes by community, healthcare workers etc.	Stigma posed barrier to HIV testing.	Fuster-RuizdeApodaca et al.(2017 - Spain); Mohlabane et al. (2016 - South Africa); De Wet & Kagee (2016 – South Africa); Treves-Kagan et al. (2017 - South Africa); Anígilájé et al. (2016 – Nigeria); Merga et al. (2016 – Ethiopia)
Wealth index	Higher wealth index facilitated the likelihood of HIV testing.	Takarinda et al., (2016 - Zimbabwe); Muyunda et al. (2018 – Zambia)
	Lower wealth index facilitated the likelihood of HIV testing.	Muhinda & Pazvakawambwa, (2017 - Zambia)
	Higher wealth index posed barrier to HIV testing.	Worku et al. (2021 – East Africa)
Confidentiality	Lack of confidentiality or privacy of HIV test Result posed barrier to HIV testing.	Mohlabane et al. (2016 – South Africa); Jama et al. (2019 - Somalia)
Proximity of HIV test center	Closeness to VCT center facilitated uptake of HIV testing.	Meremo et al.(2016 - Tanzania), De Wet & Kagee (2016 – South Africa), Alemu et al. (2017 - Ethiopia); Teklehaimanot et al.(2016 - Ethiopia)
	Far location of VCT center posed barrier to HIV testing	Ogbonna et al. (2020 - Nigeria)
Self-Perceived risk of HIV	Perceiving self as having small risk of HIV infection facilitated HIV testing.	Fuster-RuizdeApodaca et al.(2017 - Spain)

Factors identified in previous research that affect HIV testing of pregnant wome	Research findings for the factors	Source
		Teklehaimanot et al.(2016 - Ethiopia)
	Higher perceived risk for HIV facilitated HIV testing.	
Self-perceived benefit	Perceived benefit facilitated HIV testing.	Fuster-RuizdeApodaca et al.(2017 - Spain)
Perceived severity of HIV	Perceived severity of HIV posed barrier to HIV testing.	Fuster-RuizdeApodaca et al.(2017 - Spain); Mohlabane et al. (2016 – South Africa)
Fear of positive result	Fear of positive result posed barrier to HIV testing.	Mohlabane et al. (2016 - South Africa); De Wet & Kagee (2016 – South Africa)
Employment	Being Employed facilitated HIV testing	Jooste et al. (2020 – South Africa)

*Indicates factors assessed in this study based on data availability in the primary NDHS study.

Appendix D: Coding Table

Variable	Coding
Pregnant women stigmatizing attitudes towards persons living with HIV/AIDS	This was coded by combining these questions below: (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 will be 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 attitudeswere classified as having negative attitudes, while those scoring equal or above the mean score were classified as having positive attitudes. A mean score of .56 (56%) ± .21 was taken as the cut-point.
Knowledge of discriminatory practices towards persons living with HIV/AIDS by pregnant women	Coded by combining the following question(1) Do you personally know someone who has been denied health services in the last twelve months because he or she has or is suspected to have the AIDS virus (2) Do you personally know someone who has been denied involvement in social events, religious services, or community events in the last twelve months because he or she has or is suspected to have the AIDS virus (3) do you personally know someone who has been verbally abused or teased in the last twelve months because he or she has or is suspected to have the AIDS virus. A yes answer by the respondents to any or all of these three questions on the knowledge of discriminating practices against persons living with HIV/AIDS is considered as knowledge of discriminating practices and coded as 1, while a no answer to all the questions is regarded as no knowledge and coded as 0

Variable	Coding
Age categories	Age categorized into age bands of five years interval from 15 to 49 years and numbered in ascending order. Education; No education = 0, primary = 1, secondary = 2, higher = 3
Educational level	Education coded as No education = 0, primary = 1, secondary = 2, higher
Place of residence	Place of Residence coded as Urban = 1and Rural = 2.
Religion	Religion coded as Catholic = 1, Other Christians = 2, Islam = 3, Traditionalist = 4, Others 97.
Marital status	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.
Self-reported HIV testing by pregnant women aged 15-49 years	Four questions were combined to create the dependent variable as follows: did the pregnant women tested for HIV as part of antenatal visits, tested for HIV between the time they went for delivery and before the baby was born, got results of HIV test as part of antenatal visits, and got results of HIV test when tested before the baby was born? The binary dependent variable "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 result and Yes= if the respondent tested and received result during antenatal visits or childbirth

Appendix E: Multicollinearity Diagnostic Table

Imputation Number	Model		Unstandardized Coefficients		Standardized Coefficients			95.0% Confidence Interval for B		Collinearity Statistics	
			B	Std. Error	Beta	t	Sig.	Lower Bound	Upper Bound	Tolerance	VIF
Original data	1	(Constant)	.574	.069		8.343	.000	.439	.708		
		Pregnant Women HIV/AIDS Stigmatizing Attitudes	.107	.010	.104	10.424	.000	.087	.127	.980	1.020
		Pregnant Women Knowledge of HIV Discriminatory Practices	-.003	.020	-.001	-.132	.895	-.042	.037	.980	1.021
		Age Categories of Pregnant Women	.010	.003	.029	2.935	.003	.003	.017	.968	1.033
		Educational Level of Pregnant Women	.129	.006	.255	21.736	.000	.117	.140	.708	1.413
		Religion of Pregnant women	-.060	.008	-.084	-7.465	.000	-.076	-.045	.780	1.282
		Place of Residence of Pregnant Women	-.162	.011	-.162	-15.284	.000	-.183	-.141	.866	1.155
		Pregnant Women Current Marital Status	-.001	.020	.000	-.041	.968	-.040	.038	.974	1.027
1	1	(Constant)	.453	.037		12.190	.000	.380	.526		
		Pregnant Women HIV/AIDS Stigmatizing Attitudes	.090	.005	.090	16.407	.000	.079	.100	.986	1.014
		Pregnant Women Knowledge of HIV Discriminatory Practices	.011	.011	.006	1.010	.312	-.010	.033	.980	1.020

Imputation Number	Model		Unstandardized Coefficients		Standardized Coefficients			95.0% Confidence Interval for B		Collinearity Statistics	
			B	Std. Error	Beta	t	Sig.	Lower Bound	Upper Bound	Tolerance	VIF
		Age Categories of Pregnant Women	.012	.002	.042	7.552	.000	.009	.015	.972	1.029
		Educational Level of Pregnant Women	.125	.003	.259	37.272	.000	.118	.131	.610	1.638
		Religion of Pregnant women	-.065	.005	-.088	-13.606	.000	-.074	-.056	.704	1.420
		Place of Residence of Pregnant Women	-.125	.006	-.124	-20.532	.000	-.137	-.113	.804	1.243
		Pregnant Women Current Marital Status	.016	.009	.010	1.717	.086	-.002	.035	.961	1.040
2	1	(Constant)	.406	.037		10.874	.000	.333	.479		
		Pregnant Women HIV/AIDS Stigmatizing Attitudes	.084	.005	.084	15.329	.000	.073	.094	.987	1.013
		Pregnant Women Knowledge of HIV Discriminatory Practices	.039	.011	.019	3.482	.000	.017	.060	.981	1.019
		Age Categories of Pregnant Women	.010	.002	.036	6.600	.000	.007	.013	.972	1.029
		Educational Level of Pregnant Women	.125	.003	.259	37.283	.000	.118	.132	.611	1.637
		Religion of Pregnant women	-.060	.005	-.081	-12.499	.000	-.069	-.050	.704	1.420
		Place of Residence of Pregnant Women	-.131	.006	-.130	-21.486	.000	-.143	-.119	.804	1.244

Imputation Number	Model		Unstandardized Coefficients		Standardized Coefficients			95.0% Confidence Interval for B		Collinearity Statistics	
			B	Std. Error	Beta	t	Sig.	Lower Bound	Upper Bound	Tolerance	VIF
		Pregnant Women Current Marital Status	.035	.010	.020	3.651	.000	.016	.053	.961	1.040
3	1	(Constant)	.397	.037		10.733	.000	.324	.469		
		Pregnant Women HIV/AIDS Stigmatizing Attitudes	.081	.005	.081	14.890	.000	.070	.092	.987	1.013
		Pregnant Women Knowledge of HIV Discriminatory Practices	.001	.011	.001	.122	.903	-.020	.023	.982	1.019
		Age Categories of Pregnant Women	.013	.002	.046	8.303	.000	.010	.016	.972	1.029
		Educational Level of Pregnant Women	.133	.003	.277	39.891	.000	.127	.140	.611	1.637
		Religion of Pregnant women	-.059	.005	-.080	-12.414	.000	-.069	-.050	.705	1.418
		Place of Residence of Pregnant Women	-.115	.006	-.115	-18.947	.000	-.127	-.103	.803	1.245
		Pregnant Women Current Marital Status	.023	.009	.013	2.403	.016	.004	.041	.961	1.040
4	1	(Constant)	.476	.037		12.856	.000	.404	.549		
		Pregnant Women HIV/AIDS Stigmatizing Attitudes	.087	.005	.087	15.970	.000	.076	.097	.988	1.012

Imputation Number	Model		Unstandardized Coefficients		Standardized Coefficients			95.0% Confidence Interval for B		Collinearity Statistics	
			B	Std. Error	Beta	t	Sig.	Lower Bound	Upper Bound	Tolerance	VIF
		Pregnant Women Knowledge of HIV Discriminatory Practices	.008	.011	.004	.778	.436	-.013	.030	.983	1.018
		Age Categories of Pregnant Women	.008	.002	.029	5.258	.000	.005	.011	.972	1.029
		Educational Level of Pregnant Women	.127	.003	.265	38.255	.000	.121	.134	.612	1.635
		Religion of Pregnant women	-.067	.005	-.091	-14.152	.000	-.077	-.058	.704	1.420
		Place of Residence of Pregnant Women	-.125	.006	-.125	-20.677	.000	-.137	-.113	.804	1.244
		Pregnant Women Current Marital Status	.017	.009	.010	1.793	.073	-.002	.035	.961	1.040
5	1	(Constant)	.607	.037		16.416	.000	.534	.679		
		Pregnant Women HIV/AIDS Stigmatizing Attitudes	.081	.005	.081	14.940	.000	.070	.092	.987	1.013
		Pregnant Women Knowledge of HIV Discriminatory Practices	.008	.011	.004	.730	.465	-.014	.030	.982	1.018
		Age Categories of Pregnant Women	.008	.002	.029	5.203	.000	.005	.011	.972	1.029
		Educational Level of Pregnant Women	.125	.003	.260	37.675	.000	.119	.132	.611	1.638

Imputation Number	Model		Unstandardized Coefficients		Standardized Coefficients			95.0% Confidence Interval for B		Collinearity Statistics	
			B	Std. Error	Beta	t	Sig.	Lower Bound	Upper Bound	Tolerance	VIF
		Religion of Pregnant women	-.068	.005	-.092	-14.298	.000	-.077	-.059	.704	1.421
		Place of Residence of Pregnant Women	-.134	.006	-.134	-22.191	.000	-.146	-.122	.804	1.244
		Pregnant Women Current Marital Status	-.030	.009	-.018	-3.194	.001	-.049	-.012	.961	1.040
Pooled	1	(Constant)	.468	.100		4.697	.004	.217	.718		
		Pregnant Women HIV/AIDS Stigmatizing Attitudes	.084	.007		12.464	.000	.071	.098		
		Pregnant Women Knowledge of HIV Discriminatory Practices	.014	.019		.701	.501	-.030	.057		
		Age Categories of Pregnant Women	.010	.003		3.617	.007	.004	.016		
		Educational Level of Pregnant Women	.127	.005		24.531	.000	.116	.139		
		Religion of Pregnant women	-.064	.007		-9.755	.000	-.078	-.050		
		Place of Residence of Pregnant Women	-.126	.010		-12.629	.000	-.148	-.104		
		Pregnant Women Current Marital Status	.012	.029		.422	.690	-.062	.086		