ESTIMATION OF *HIV* PREVALENCE USING FERTILITY EXPERIENCE OF WOMEN OF REPRODUCTIVE AGE IN NIGERIA

BY

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CERTIFICATION

I certify that this project titled 'Estimation of HIV prevalence using fertility experience of women of reproductive age in Nigeria' was carried out under my supervision by **Mr. I.P. Omoniyi** in the Department of Epidemiology, Medical Statistics and Environmental Health (EMSEH), College of Medicine, University of Ibadan. This project was duly supervised and is therefore approved for the contribution to knowledge.

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LIST OF ABBREVIATIONS AND ACRONYMS

ANC: Antenatal clinic

UNAIDS: United Nation Programme on *HIV/AIDS*

HIV: Human Immune deficiency Virus

WHO: World Health Organization

RIR: Relative Inclusion Ratio

AIDS: Acquired Immune Deficiency Syndrome

MDG: Millennium Development Goals

NARHS: National HIV/AIDS and Reproductive Health Survey

ASFR: Age Specific Fertility Rate

DEDICATION

This dissertation is dedicated to the Almighty God and my mentor, Mr. Ayodele omoniyi.

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I give all glory to God Almighty, the merciful and gracious king of my life for His enduring favour on my life and in my journey so far especially for the beginning and the completion of this dissertation.

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ABSTRACT

Use of sentinel site to obtain *HIV/AIDS* data on pregnant women attending antenatal clinic in Nigeria shows that the prevalence rate of *HIV* has steadily been on the increase with recent decline to 5.0 % in 2003 and 4.4% in 2005 and 4.1. Also the results of a population based survey conducted in 2007 by Federal Ministry of Health estimated overall adult prevalence of HIV/AIDS at 3.6 %. It is however unclear if this represents a true decrease in the prevalence considering the differences in the methods employed by ANC sentinel survey and NARHS. Due to the fertility variability among women especially among those of child bearing age who present at the ANC, there is always need for their fertility adjustment. One of such adjustment is the relative age-specific fertility rates of women who are *HIV*-positive compared with those of their *HIV*-negative peers. This study therefore compared the fertility of *HIV* positive and *HIV* negative women of reproductive age to know if the ANC HIV – estimate underestimate, overestimate or approximately estimate the *HIV* burden of the general population.

This was a comparative cross sectional, population based study that Used data from 5360 women of reproductive age who participated in 2007 National HIV/AIDS and Reproductive Health Survey in Nigeria. Data were analyzed using bivariate and logistic regression.

Of the total number, 170 (4.1%) were HIV positive. The mean age for all HIV positive women was 29.65 (± 8.476) compared to 27.88 (± 9.4) years for HIV negative women. Of all the women who visited ANC, 4.8% of them were HIV positive and 2.8% of those who were HIV positive have not visited any ANC. On the other hand, of all the women who had had ANC visit, 95.2% of them were HIV negative while 97.2% of those who are negative have not had any ANC visit (p =0.024). The fertility rate for HIV positive (365.7 births per 1000 women years of exposure, 95% CI 293 to 438) was higher than that of HIV negative women (360.15 births per 1000 women years of exposure, 95% CI 354 to 375). The overall RIR was 1.015 (95% CI 1.00 to 1.018). This finding was consistent with studies in West African countries. This study conclusively found that ANC HIV prevalence estimate over estimated HIV prevalence in Nigeria. Formally married women and never married women were high risk groups because marital status was found to be an influencing factor contributing to HIV status determination. This study therefore strongly recommends that

continuous monitoring of the fertility rates in HIV positive and HIV negative women of reproductive age should be an adjunct to HIV serosurveillance because fertility rates are not static, but change over time. Attention must be given to women who were formally married or never married by sensitizing them on the need to know their HIV status and programmes that target this group of people regarding HIV prevention and its management should be strengthened.

Key words: HIV, Relative Inclusion Ratio, Fertility rates, Nigeria, Antenatal clinic

CHAPTER ONE

INTRODUCTION

1.0 Background

The first case of *H*uman *I*mmune deficiency *V*irus (*HIV*) was described globally in the early eighties. According to UNAIDS/WHO (2009) as at December 2008, 33.4 million people comprising of 15.7 million women and 2.1 million children aged below 15 years were living with the disease. Of these 33.4 million people, two million people comprising 1.7 million adults and 280,000 children less than 15 years; have died due to the pandemic.

In Nigeria, 1.3 million people were living with HIV virus in 2010 (FMOH,2011) making her the second largest with number of people living with HIV/AIDS in sub Saharan Africa and first in west Africa sub region. The impact of the epidemic has included: increased morbidity rates, higher infant, childhood and adult mortality, a large number of orphans and widows, deterioration of the health sector, poorer households, reduced agricultural output, disrupted business activities, adverse effects on education and fertility change.

Antenatal clinic (ANC) attendees are a readily accessible group for surveillance purposes. Most countries have set up *HIV* surveillance system. In countries with generalized epidemics, annual *HIV* serosurveillance in pregnant women attending antenatal clinics is the prime source of data on the spread of *HIV* (UNAIDS/WHO, 2000). The primary purpose of antenatal clinic-based surveillance is the assessment of trends in *HIV* prevalence. The proportion of Women presenting at this ANC clinics however differ depending on the location, level of education and religion (Awusi *et. al.* 2009)

Nigeria has experienced high fertility levels over the last two decades, despite attempt to control population growth with the introduction of a National Policy on population in 1988. The policy advocated each woman has 4 children and recommended eighteen years for the commencement of childbearing. The 2008 NDHS results also indicate that the total fertility rate (TFR) is 5.7 births per woman. This means that, on average, a Nigerian woman will give birth to six children by the end of her childbearing years. However, the impact of *HIV/AIDS* on the lives of women is one of the most critical reproductive health concerns of our times. Numerous studies have shown that *HIV* infection reduces fertility (Zeba *et. al.*, 1998; Chin, 1998 and Stover, 2004). In previous UNAIDS estimates, the fertility ratio among HIV-positive women compared with women without *HIV* was assumed to be 0.7 for women older than 20 years. For women aged 15–19, the status of

HIV infection was an indication that a woman was sexually active and thus had a higher probability of being pregnant than HIV-negative women of the same age.

National *HIV/AIDS* and Reproductive Health Survey (NARHS) 2007 is a survey that was conducted as part of efforts to generate reliable data for effective programming. The Federal Ministry of Health (FMOH) in collaboration with the National Agency for the Control of AIDS (NACA), the Society for Family Health (SFH), other development partners and key stakeholders conducted Nigeria's first National *HIV /AIDS* and Reproductive Health Survey (NARHS) in 2003 and the second in 2005. The 2007 survey is the third in the series. The 2007 survey includes a biological marker component (*HIV* testing) and is called NARHS Plus. NARHS plus provides the much needed information on *HIV* infection in the various categories of the population which is essential to guide policy makers and programme managers as they plan and implement interventions to address the *HIV/AIDS* epidemic.

1.1 Problem statement

Use of sentinel site to obtain *HIV/AIDS* data on pregnant women attending antenatal clinic in Nigeria shows that the prevalence rate of *HIV* has steadily been on the increase. The prevalence increased from 1.8 % in 1992 to 3.8 % in 1994; to 4.5% in 1996; to 5.4 % in 1999; 5.8 % in 2001 (FMOH, 2001) with recent decline to 5.0 % in 2003 and 4.4% in 2005 (FMOH, 2006), 4.6% in 2008 (FMOH, 2009) and 4.1(FMOH, 2011). Also the results of a population based survey conducted in 2007 by Federal Ministry of Health estimated overall adult prevalence of HIV/AIDS at 3.6 %(NARHS, 2007). It is however unclear if this represents a true decrease in the prevalence considering the differences in the methods employed by ANC sentinel survey and NARHS. Also, some researches comparing ANC estimates of *HIV* prevalence with *HIV* prevalence from population-based studies had shown that ANC figures closely estimate the actual population prevalence (Carpenter *et al.*, 1997 and Glynn *et al.*, 2000) However, the findings have not been consistent across African region (Lewis *et. al.*, 2004). Changalucha *et al* (2002) in Tanzania and Zambia reported that the prevalence of *HIV* from ANC underestimated community *HIV* prevalence. On the other hand, Studies in Kenya and Rwanda have also found out that prevalence from ANC over-estimated community prevalence (Changalucha *et al.*, 2002).

1.2 Justification

With the inconsistencies in the ability of using ANC data to estimate *HIV* general population prevalence as obtained in studies conducted in other African countries and coupled with the fact that most population based surveys are costly and time consuming, the Federal Ministry of Health (FMOH) and its partners are seeking ways to enhance *HIV* estimation using antenatal clinics as sentinel sites.

Due to the fertility variability among women especially among those of child bearing age who present at the ANC, there is always need adjustment. One of such adjustment is the relative age-specific fertility rates of women who are *HIV*-positive compared with those of their *HIV*-negative peers (Stover, 2004) so as to determine the relative likelihood of including these two groups of women in a seroprevalence survey in antenatal clinics in Nigeria.

This study would provide information on how to strengthen HIV estimate coming out of Antenatal sentinel sites across Nigeria. This would enhance the representativeness of such estimate. Such information is invaluable to the execution of various HIV preventive programmes in Nigeria and other countries who share certain attributes with Nigeria as it concern HIV/AIDS. With the availability of information on how to make HIV estimate from ANC sentinel site more representative, stakeholders' involved in HIV preventive programmes would be able to set their priorities right.

This study compares fertility between *HIV* positive and *HIV* negative women of reproductive age. Similar work or studies has been done across sub Saharan Africa countries to know if the ANC-estimate underestimate, overestimate or approximately estimate the *HIV* burden of the general population.

1.3 General objective

To compare the fertility rate of women of reproductive age who are living with *HIV* with those of uninfected women and determine how closely ANC HIV-estimate estimate the *HIV* burden of the general population.

Specific objectives are:

To

1. Determine proportion of women of reproductive age who are HIV positive
2. Determine relationship between ANC attendance and HIV status.

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2. Determine relationship between ANC attendance and HIV status.

3. Determine fertility ratio for HIV positive and HIV negative women of reproductive age.
4. Identify factors contributing to *HIV* status determination.

CHAPTER TWO

LITERATURE REVIEW

2.1 Epidemiology of *HIV/AIDS*

HIV/AIDS has developed into a massive global pandemic. Sub Saharan Africa is the severely affected region with prevalence rates among adults in some community of the order of 20 – 30 % (Lucas and Gilles, 2003). AIDS, the acquired Immunodeficiency Syndrome (sometimes called "slime disease") is a fatal illness caused by retrovirus known as Human Immuno deficiency Virus (HIV) which breaks down the body immune system, leaving the victims vulnerable to a host of life threatening opportunistic infections , neurological disorders , or unusual malignancies (W.H.O. 1986).

A total of 39.5 million (34.1 million – 47.1 million estimated) people were living with HIV in 2006, about 2.6 million more than in 2004 (UNAIDS/ WHO, 2006). The figure includes the estimated 4.3 million (3.6 million – 6.6 million) adults and children who were then newly infected with HIV in 2006 (UNAIDS AND WHO, 2006). Estimated number of deaths due to AIDS in 2007 was 2.1 million worldwide, of which 76% occurred in sub-Saharan Africa (UNAIDS, 2007). According to UNAIDS/WHO (2009), the number decreased to 33.4 million people in 2008; comprising of 15.7 million women and 2.1 million children aged below 15 years living with the virus. Of these 33.4 million people, two million people comprising 1.7 million adults and 280,000 children less than 15 years; have died due to the pandemic.

Nigeria, the most populous African nation with a population of over 140 million people (Nigeria 2006 Census), has witnessed rise and fall in the figures with regard to the number of people living with *HIV/AIDS*. Nigeria has the third highest population of people living with *HIV* after South Africa and India (UNAIDS 2007). The disease has maintained an inconsistent upsurge in the last two decades. The prevalence rate has continually been on the increase from 1.8 % in 1992; 3.8% in 1994; 4.5 % in 1996; 5.4% in 1999; 5.8 % in 2001 (FMOH, 2001), with recent decline to 5.0 percent in 2003 and 4.4 % in 2005, 4.6% in 2008 and 4.1% in 2010 (FMOH, 2011) respectively. Even with this relatively low prevalence rate, only India and South Africa have more people infected with HIV than Nigeria, where an estimated 2.9 million (1.7 million–4.2 million) people were living with the virus in 2005 (UNAID, 2006). Since the first cases of AIDS were reported in Nigeria in 1986 (Chikwem *et al.*, 1990; Sagay *et al.*, 1999), estimating *HIV* has been an issue. As

at the end of 2010, 3.5 million people were estimated to be living with *HIV* making Nigeria with the largest number of *HIV/AIDS* cases in West Africa (FMOH, 2011)

2.2 Reservoir, Sources of Infection and Transmission

The reservoir of infection is in human beings. Although there are related viruses in animals, there is no evidence of naturally occurring zoonotic infection. The virus has been found in greatest concentration in blood, semen and cerebrospinal fluid (Park, 2007). Lower concentration have been detected and excreted in other various body fluids such as tears, saliva, breast milk, urine and cervical and vaginal secretion (Lucas and Gilles, 2003; Park, 2007). The best epidemiological evidence confirmed that infection is not transmitted through casual contact (Lucas and Gilles, 2003). Transmission occurs through the transfer of body fluid by four main routes (Lucas and Gilles, 2003; Parks, 2007)

Sexual: The disease was initially associated with male homosexual in USA (Lucas and Gilles, 2003; Park, 2007). Homosexual or bisexual men remain the predominantly high risk group in Western Europe and North America where cases shows a male / female ratio 10 to 1. In Africa and in many other developing countries, however, heterosexual transmission is common and the infection occur with equal frequency in men and women (Lucas and Gilles, 2003)

Perinatal infection: Children born to infected women acquire infection and progress to clinical disease. This mother to child transmission account for most of the cases in children less than 15 years.

Blood transfusion and tissue transplantation: HIV/AIDS is transmitted by contaminated blood transfusion of whole blood cells, platelets etc. There is no evidence that transmission ever occur through blood products such as albumin, immunoglobulin or hepatitis vaccine that meet WHO requirement (WHO, 1994).

2.3 Pattern of Spread

There are two main epidemiological pattern of spread;

Pattern I: In Western Europe, North America, Australia, New Zealand and most areas of South America, occurrence is mainly in homosexual or bisexual men and intravenous drug abusers. Limited heterosexual transmission occurs mainly in the contact of drug abusers. Transmission through blood transfusion has been eliminated in developed countries by excluding high risk donors and screening blood.

Pattern II: This is found in part of Asia and South America. Transmission is mainly heterosexual. Both sexes are equally affected and perinatal transmission to the infants is a significant problem. Homosexual transmission is not a major factor but transmission of contaminated blood remains Public Health problem.

2.4 Laboratory Diagnosis

Antibody – antigen detection

Serological test are widely used to detect antibodies; they are simple to perform, sensitive and specific at most stages of the infection, and relatively inexpensive. The presence of the specific antibody to HIV 1 or HIV 2 is a confirmation of exposure to the infection. ELISA tests are commonly used for screening sera and more specific tests (e.g. Western blot technique) for confirmation. Some rapid screening test including home collection kits have been developed but these require confirmation by formal laboratory tests. The antibody tests are negative in the early stages of the infection but infection can be diagnosed by detecting HIV RNA in blood samples. The HIV RNA test is used to measure the vital load, usually stated as the number of HIV RNA copies in 1ml of plasma. The viral load is also used to measure the response of the patients to antiretroviral therapy.

Virus Isolation

A test for the virus itself would eliminate the painful uncertainty of AIDS infection. HIV can be recovered from cultured lymphocyte (Jawetz, 1987).

Blood cell count

As infection progresses, there is a fall in the blood count of the CD4 lymphocyte from the normal level of about /mm^3, the patient become vulnerable to tuberculosis and variety of opportunistic infection such as *Pneumocystis carinii*, *Cryptococcus neoformans*, *Histoplasma neoformans*, *Coccidioides immitis* and *Aspergillus spp.*

Delayed hypersensitivity reaction: Detection in the delay hypersensitivity reaction occurs in the later stages of the disease.

Associated disorder: Laboratory tests are used to identify opportunistic infections which affect these patients, to diagnose Kaposi's sarcoma and to evaluate the neurological damage.

2.5 Control of *HIV/AIDS*

The most logical approach to the control of infection is to reduce transmission while providing humane care for patients (Lucas and Gilles, 2003). The most important tool of control is modification of human behaviour through education directed at each of the four modes of transmission:

Sexual behaviour: Avoidance of exposure: sexual activities should be confined to persons who are in prominent monogamous relationships – one man, one wife, for life.

Reducing the risk of infection: whenever sexual activity does not conform to the ideal, measures should be taken to reduce the risk of infection, for example by the use of male or female condoms. Such measures do not assure absolute protection.

Perinatal infection: Infected women of child bearing age should be counselled on avoidance of pregnancy through the use of contraceptives. There is a clear indication for using antiretroviral therapy, either the protocols based on triple therapy or the more affordable treatment based on nevirapine (Lucas and Gilles, 2003). One difficult issue is the feeding of the baby. Breastfeeding significantly increases the risk of mother to child transmission.

Blood transfusion: Donors who belong to high groups and their sexual partners should be excluded. Donated blood should be screened to avoid transfusing infected specimens.

Contaminated needles and other equipments

Great care should be exercised in handling blood and other human specimens which are potentially infected. Instruments should be carefully disinfected and whenever feasible disposable needles and syringes should be used. Intensive education should be given to drug abusers to avoid the sharing of contaminated needles. If economically possible, free needles should be provided.

2.6 Antenatal Care

This is the care giving to women during pregnancy (Park, 2007). It is a major component of maternal health services (Lucas and Gilles, 2003). The primary aim of antenatal care is to achieve at the end of a pregnancy a healthy mother and a healthy baby (Park, 2007). Antenatal visit should begin soon after conception and continue throughout pregnancy.

Ideally, the mother should attend the antenatal clinic once in a month during the first 7 month; twice a month, during the next month; and thereafter once a week; if everything is normal (Park, 2007).

Functions of antenatal care

Antenatal care functions are many. These include: preparing the pregnant women and her family for delivery, educating the pregnant women, her family and the entire community, assessing and monitoring the health status of the women and the progress of the pregnancy, providing appropriate preventive measures – nutritional supplement (iron, folic acid), tetanus immunization, malaria prophylaxis/ treatment as indicated, and diagnosis and treatment of complication (Lucas and Gilles, 2003)

2.7 Antenatal Care Surveillance system

In 1989, WHO recommended the establishment of *HIV* sentinel surveillance systems for *HIV* detection (Chin & Mann, 1989). Antenatal clinic attendees were proposed as target population because of their accessibility for surveillance purposes. Most countries have set up *HIV* surveillance systems and, in countries with generalized epidemics, annual *HIV* serosurveillance in pregnant women attending antenatal clinics is the prime source of data on the spread of *HIV* (UNAIDS/WHO, 2000). The primary purpose of antenatal clinic-based surveillance is the assessment of trends in *HIV* prevalence. Therefore, consistency of methods and tools employed and especially the continuing participation of the same clinics is an essential feature of good surveillance systems (Bloom *et. al.*, 2002). Voluntary counseling and testing for all women of childbearing age, including pregnant women have also been proposed in the current national Prevention of Mother to Child Transmission (PMTCT) guidelines (FMOH, 2005)

However, reporting from more than one or two sentinel sites per year did not begin until 1992. By 1994, 10 major urban sentinel sites reported *HIV* cases among antenatal clinic women, though it remained low for many years. But from 1988 to 1990, 1% of antenatal women in the major urban areas tested positive for *HIV*; by 1993 to 94, a median of nearly 4% in major urban areas tested positive. In 1999, nearly 5% also tested positive. It is in urban areas that a large numbers of women using private antenatal clinics might make an important difference. For example, in South Africa where a significant proportion of women who are well off do use private clinics (Bloom *et al*, 1999). *HIV* prevalence varies

between urban and rural areas; therefore the geographic location of the antenatal clinics is important. National surveillance systems are usually based on a convenience sample of clinics. The country is stratified into administrative or other type of regions and urban and rural clinics are selected from the different strata for the national surveillance system. Such a system cannot be considered as representative for the whole antenatal population.

Furthermore, in the 10 urban sentinel sites in 1999, *HIV* prevalence ranged from 3% to 8% among antenatal women tested (UNAIDS and World Bank, 2000). Pregnant women who choose to attend public health facilities may have characteristics different from all pregnant women.

A substantial proportion of pregnant women, may not attend antenatal clinics for various reasons. However, if large proportions of pregnant women do not attend antenatal clinics, caution should be made before generalizing the findings of the surveillance system to all pregnant women. However, there are several factors that can affect the extent to which pregnant women attending antenatal clinics in the surveillance system are representative of all pregnant women in the country. These include non-attendance at antenatal clinics, use of private clinics, and the location of participating clinics. Educational attainment of both the women and their husbands had been established to be a positive influence on the utilization of ANC services in any population (Kabir *et al.*, 2005). *HIV* prevalence among non-attending women is likely to be lower than among those attending, but the situation may vary from country to country (Bloom *et al*, 1999). Women are more affected in the defining feature of the epidemic with policy implications for prevention of mother to child transmissions (Adeyi *et. al.*, 2006; USAID, 2010).

The 2010 prevalence rate of 4.1% was derived from national sentinel surveillance of antenatal attendees aged 15-49 years drawn from rural and urban communities throughout the country (FMOH, 2011). Nigeria *HIV* prevalence was estimated at 3.6% in a population based survey (NARHS, 2007). Prevalence was higher among females (4.0%) than males (3.2%); slightly higher in the urban area (3.8%) compared with the rural area (3.5%). It was highest in the North Central zone (5.7%) and lowest in the South East (2.6%). It was highest among respondents with primary education (4.6%) and lowest among respondents that had no education (2.7%). *HIV* prevalence was highest among the 30-39 years age group (5.4%) and lowest among the 15-19 years age group (1.7%).

Strengths of Antenatal Sentinel Surveillance

Antenatal clinics provide ready and easy access to a cross-section of sexually active women from the general population who are not using contraception. Blood is drawn for routine testing for syphilis, and a portion can be used for anonymous testing of HIV. In generalized epidemics, HIV testing among pregnant women is considered a good proxy for prevalence in the general population.

Annual antenatal clinic survey data can be used to assess trends in the HIV epidemic over time. Data for pregnant women will reflect the prevalence in groups that may be of higher risk of infection because of their living arrangements (such as workers who live in Guidelines for measuring national HIV prevalence in population-based surveys hostels or army barracks) if they have regular unprotected sexual contact with women in the general population.

In countries with low levels of HIV prevalence, strategicaliy placed sentinel sites can provide an early warning for the start of an epidemic. In recent years, many countries have expanded the geographical coverage (the number and sample sizes of sites) of sentinel surveillance, especially in rural areas, to improve the representativeness of the samples.

Weaknesses

As important as antenatal sentinel surveillance system is, some lapses are still evident. These include:

Sentinel surveillance systems have limited geographical coverage, especially in Smaller and more remote rural areas. Women attending antenatal clinics may not be representative of all pregnant women because many women may not attend antenatal clinics or may attend private clinics. The rate of contraceptive use in a country may affect the number of pregnant women. The implementation of antenatal clinic-based surveillance varies considerably between countries (Garcia-Calleja et al., 2004). The quality of the surveys may vary over time depending on available resources. Antenatal clinic surveillance does not provide information about HIV prevalence in men. Because these surveys are conducted among pregnant women, estimates for men are based on assumptions about the ratio of male-to-female prevalence that are derived from community-based studies in the region. However, this ratio varies between countries and over time

2.8 Contraceptive Use

Many developing economies are characterized by rapid population growth that is partly attributed to high fertility rate, high birth rates accompanied by steady declines in death rates, low contraceptive prevalence rate and high but declining mortality rate (Oyedokun, 2007). In Sub-Saharan Africa (SSA), the rate of population growth is one of the highest in the world, (2.8 %) compared to the rest of the world (USAID/HPI, 2007). This is likely to be an impediment towards the realization of the reduction of child mortality, improvement of maternal health, achievement of universal primary education, environmental sustainability and combating HIV/AIDS, malaria and other diseases as part of the Millennium Development Goals (MDGs) (Health Policy Initiative, 2007).

There is evidence that HIV/AIDS has increased the use of contraception. Glynn *et. al.*, (2000) found that HIV infected women who had given birth once were more likely to have used contraceptives than HIV negative women. The proportion of HIV positive women using modern contraceptives were 34.5% compared to 17.5% among HIV negative women in Yaoundé, Cameroon and 20.3% compared to 14.8% respectively in Ndola, Zambia in 1998. Also Ryder et al. (1991) comparing 238 HIV positive and 315 sero negative women in Kinshasa, Democratic Republic of Congo found that 26.4% of the HIV infected were using modern contraceptives significantly higher than 16.3% of the uninfected ($p < 0.05$).

Condom use both for family planning and for disease prevention is often thought to increase as contraceptive practice becomes more widespread. In the late 1990s, 4.9% of the world's married couples used predominantly the male latex condom (UN, 2001). By far, the highest prevalence rate (42%) is found in Japan, the only country in the world where condom is the most commonly used family planning method (Engender Health, 2002). Researchers conducted in many developing countries have demonstrated similar disparities between high levels of knowledge of HIV/AIDS and awareness of condom on the one hand and lower use of condoms as a method of disease and pregnancy prevention on the other (Maharaj, 2001; Meekers and Klein, 2001). Recent surveys, especially those focused on *HIV/AIDS* prevention; suggest that condom use has risen in many countries, reflecting an increased awareness of the potential risk of unprotected sexual activity (Andrzej, 2004). Because of this attitude to procreation in Nigeria, condoms are rarely used for long in most marriage.

In 2004 contraceptive prevalence rate in Nigeria stood at 8%, while results from the Integrated Baseline Health Survey (IBHS) indicate that contraceptive prevalence rate is still

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Many developing economies are characterized by rapid population growth that is partly attributed to high fertility rate, high birth rates accompanied by steady declines in death rates, low contraceptive prevalence rate and high but declining mortality rate (Oyedokun. 2007). In Sub-Saharan Africa (SSA), the rate of population growth is one of the highest in the world, (2.8 %) compared to the rest of the world (USAID/HPI, 2007). This is likely to be an impediment towards the realization of the reduction of child mortality, improvement of maternal health, achievement of universal primary education, environmental sustainability and combating HIV/AIDS, malaria and other diseases as part of the Millennium Development Goals (MDGs) (Health Policy Initiative, 2007).

There is evidence that HIV/AIDS has increased the use of contraception. Glynn *et. al.*, (2000) found that HIV infected women who had given birth once were more likely to have used contraceptives than HIV negative women. The proportion of HIV positive women using modern contraceptives were 34.5% compared to 17.5% among HIV negative women in Yaoundé, Cameroon and 20.3% compared to 14.8% respectively in Ndola, Zambia in 1998. Also Ryder et al. (1991) comparing 238 HIV positive and 315 sero negative women in Kinshasa, Democratic Republic of Congo found that 26.4% of the HIV infected were using modern contraceptives significantly higher than 16.3% of the uninfected ($p < 0.05$).

Condom use both for family planning and for disease prevention is often thought to increase as contraceptive practice becomes more widespread. In the late 1990s, 4.9% of the world's married couples used predominantly the male latex condom (UN, 2001). By far, the highest prevalence rate (42%) is found in Japan, the only country in the world where condom is the most commonly used family planning method (Engender Health, 2002). Researchers conducted in many developing countries have demonstrated similar disparities between high levels of knowledge of HIV/AIDS and awareness of condom on the one hand and lower use of condoms as a method of disease and pregnancy prevention on the other (Maharaj, 2001; Meekers and Klein, 2001). Recent surveys, especially those focused on *HIV/AIDS* prevention; suggest that condom use has risen in many countries, reflecting an increased awareness of the potential risk of unprotected sexual activity (Andrzej, 2004). Because of this attitude to procreation in Nigeria, condoms are rarely used for long in most marriage.

In 2004 contraceptive prevalence rate in Nigeria stood at 8%, while results from the Integrated Baseline Health Survey (IBHS) indicate that contraeeptive prevalence rate is still

low in Nigeria and it varies by demographic and socio-economic characteristics (NPC and ORC Macro 2004). This was supported by a Study conducted by Omo Aghoja et al in 2009 where contraceptive prevalence rate (current use) was 29%, and 71% of respondents among those that were not using any method of contraception. The use of contraceptive in Nigeria varies within marital, pre-marital, and extra-marital relationships (Iyaji *et. al.* 2011). The level of contraception among sexually active young women is particularly low, with a reported prevalence of 7.3 %. (Oye-Adeniran *et al.*, 2005). This contributes to the high level of unwanted pregnancy, unsafe abortions and maternal mortality. One foremost reason why contraceptive is used in Nigeria either in marital, extra marital and pre-marital relationship is for the prevention of pregnancy (Iyaji *et. al.*, 2011)

2.9 Fertility Trends in Nigeria

Age-specific fertility rate (ASFR) was defined as the total number of births in the 36 months preceding the survey divided by the sum of woman-years at child-bearing age during the same period multiplied by 1000 for every 5-year age bracket(ORC macro, 2010). The age-specific fertility rate is the value of fertility rate for seven five-year groups (15–19, 20- 24, 25–29, 30–34, 35– 39, 40-44 and 45–49 years). Woman-years of exposure is the sum of the number of months exposed in the five-year age bracket during the time period divided by 12

Nigeria has experienced high fertility levels over the last two decades, despite the introduction of a National Policy on population in 1988 which advocated four children per woman, and eighteen years for the commencement of childbearing. According to the 1991 Nigeria Demographic and Health Survey (NDHS), Nigerian women will have an average of 6 children by the end of their reproductive years. The total fertility rate (TFR) may actually be higher than 6.0 due to under estimation of births. In 1981/82 Nigeria Fertility Survey, the TFR was 5.9 children per woman. However, the proportional contribution of adolescents fertility (among women aged 15 –19) to the overall fertility rate among women aged 15 – 49) has been increasing over time.

The major factor determining fertility is the early age at marriage and child bearing in Nigeria. Ihejiamaizu, Okoro and Obafemi (1998) found that 26.9% of urban females and 27.4% of the rural females in Akwa Ibom State in southern Nigeria married before attaining the age of 17. Similarly in Cross River State, 26.9% of urban females and 34.8 %

of their rural counterparts also married before age 17. They also found median age at first pregnancy to be 20 years for rural and urban Cross River women and 21.1 and 20.2 years for urban and rural Akwa Ibom respectively. Gbenga et al (1998: 20) found in Abuja Federal Capital territory that 42.8 % of 1131 adolescents in the study had married between ages 15 – 20.

The incidence of pre-marital sexuality and pregnancy is on the increase in Nigeria. Literature reveals that about one-half of unmarried adolescents in Nigeria have been pregnant (Nichols et al; 1986). The genesis of that free and open approach to sex among Nigerian adolescents is linked with the period during and immediately after the civil war (1967 – 1970) when the oil boom and corresponding Udoji salary award to parents ushered in a changed social condition that prodded in increased curiosity among adolescents for sex.

The 2008 NDHS results indicate that the TFR is 5.7 births per woman. This means that, on average, a Nigerian woman will give birth to six children by the end of her childbearing years. The current TFR of 5.7 is the same as that reported from the 2003 NDHS. Fertility outcomes also correlated with a man's social rank, status increased the number of sexual partners or wives. The positive association between status level and sexual access to women has been identified for several pre-demographic transition societies, including Celts, German tribes, Macedonians, Persians, Egyptians, African tribes, Mongolians, Chinese and Indians (Betzig,1986; Scheidel, 2000).

2.9.1 HIV Infection and Fertility.

The impact of HIV and AIDS on the lives of women is one of the most critical reproductive health concerns of our times. In sub-Saharan Africa, where the epidemic has spread to the general population (mainly through sexual contact), women make up 59 percent of adults living with HIV. Young women ages 15 to 24 years in that region are between two and six times as likely to be infected as young men their age (UNAIDS, 2006). Women are especially at risk of contracting HIV because of the interplay of biological, economic, and cultural factors. Physical differences make it more likely that a woman will contract the virus from a man than vice versa. Perhaps more important, powerlessness, dependence, and poverty tend to diminish women's ability to protect themselves from unsafe sex. A woman's choices are often limited by her inability to

negotiate when or with whom to have sex or whether to use a condom; by society's acceptance of men having sex before or outside marriage; and by the need for economic support from men (UNAIDS, 2006). Numerous studies have shown that HIV infection reduces fertility (Zeba *et. al.*, 1998, Chin, 1998 and Stover, 2004).

In a study conducted from 1998 to 1993 in Paris and south east of France, De Vincenzi et al (1997) found that the incidence of pregnancy decreased significantly from 20.4 per 100 person years before HIV diagnosis to less than half, 7.9 per 100 person years after HIV diagnosis. The study also showed that the proportion of pregnancies voluntarily interrupted more than doubled from 29 to 63 per cent between before and after HIV diagnosis. The percentage of spontaneous abortions and ectopic pregnancies increased significantly from 8.3 to 25.4 of those conceived before and after HIV diagnosis, respectively.

In a study conducted by Carpenter et. al., 1997, a relationship was established between HIV and fertility. In the study, it was found that for all reproductive age groups, the proportions of women infected with HIV were much lower for those who gave birth than those who did not give births. The odds ratios ranged from 0.30 to 0.54 and were significant for ages 20-34. The exception was the age group 13-19 years where the odds ratio was 1.43. This is the age group when women are first HIV infected and the disease has perhaps not progressed enough to lower fertility. The overall prevalence for those who gave birth was 9.5% significantly lower than 12.3% for those who did not give birth (odds ratio = 0.56 and $p < 0.001$).

Furthermore, in 2007 UNAIDS estimates, the fertility ratio among HIV-positive women compared with women without HIV was assumed to be 0.7 for women older than 20 years. For women aged 15–19, the status of HIV infection was an indication that a woman was sexually active and thus had a higher probability of being pregnant than HIV-negative women of the same age. As a result, the fertility adjustment was set at 1.5, that is, fertility was assumed to be 50% higher among HIV-positive compared with HIV-negative women (Stover, 2004 and Lewis *et. al.*, 2004). Similarly, in a study conducted in Cameroon by Engene J.K. and Charles S.W. in 2008, showed that fertility was low in HIV positive women compared to the HIV negative women both rural and urban Cameroon . In the same study, overall fertility ratio (Relative inclusion Ratio) was less than unity (one).

2.9.2 Relative Inclusion Ratio or Fertility Ratio

The relative inclusion ratio (RIR) is the ratio of the fertility rate in HIV positive women of reproductive age to the fertility rate of HIV negative women of reproductive age (15– 49 years). Nicoll et al in 1998 used this ratio to compare the relative fertility in HIV infected and uninfected women, so as to determine the relative likelihood of including these two groups of women in a seroprevalence survey in antenatal clinics (Nicoll *et al*., 1998.). A ratio of 1.00 suggests a good estimation; a ratio of less than 1.00 indicates an underestimation and a ratio of more than 1.00 is an over-estimation of the HIV prevalence in the general population. ANC-based HIV prevalence can be adjusted for the effect of differential fertility rates by using the formula "Adjusted HIV Prevalence = {Unadjusted HIV Prevalence}/ {RIR}". For example if the Unadjusted ANC-HIV Prevalence is 4.5% and RIR is 0.75, then the Adjusted HIV Prevalence is 4.5/0.75 or 6.4%.

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CHAPTER THREE

METHODOLOGY

3.1 Study Design

This was a comparative cross sectional, population based study. It was a secondary data analysis of data from 2007 National HIV/AIDS and Reproductive Health Survey (NARHS).

3.2 Study Location

The primary survey was a national one involving the thirty six states and its Federal Capital Territory, Abuja, Nigeria. Nigeria is located in West Africa and shares land borders with the Republic of Benin in the west, Chad and Cameroon in the east, and Niger in the north. Its coast in the south lies on the Gulf of Guinea on the Atlantic Ocean. The three largest and most influential ethnic groups in Nigeria are the Hausa, Igbo and Yoruba. In terms of religion Nigeria is roughly split half and half between Muslims and Christians with a very small minority who practice traditional religion. Nigeria is the most populous country in Africa, with annual growth rate of 2.8%. It is the eighth most populous country in the world with a population of about 140 million. It is the most populous country in the world in which the majority of the population is black. It is listed among the "Next Eleven" economies. The economy of Nigeria is one of the fastest growing in the world, with the International Monetary Fund projecting a growth of 9% in 2008 and 8.3% in 2009. International Monetary Fund (IMF) has also announced that Nigeria is the third fastest growing economy in the world after China and India, as a result of the growth of the nation's economy from 6.9 per cent in 2009 to 7.4 per cent this year. It is the third largest economy in Africa. It is also the largest exporter of oil in Africa and is a regional power that is also the hegemony in West Africa. It has a total fertility rate of 5.7 (NDHS, 2008) and HIV prevalence of 4.1% (FMOH, 2011)

3.3 Study population:

All Nigerian women population within reproductive age (15-49) who participated in the survey.

Inclusion criteria:

- Must fall within reproductive age bracket (15-49 years)
- Must know her *HIV* status
- Must have given birth atleast once

Exclusion criteria:

1. Any adult female who does not fall within reproductive age bracket shall be excluded.
2. All women who do not know their *HIV* status
3. All women who fall within the reproductive age but declined to be tested

3.4 Ethical Clearance

Ethical clearance was obtained from the Institutional Review Board (IRB) of the National Institute of Medical Research (Nigeria) prior to the commencement of the primary survey. Oral and written informed consent was sought from each respondent before a questionnaire was administered, and each serotest conducted. Pre and Post Test counselling were provided to all respondents who agreed to be tested. Where a respondent chose not to participate, the questionnaire was returned as refusal. Respondents who were sero positive were referred to a HCT/ART site for follow up. In order to protect the anonymity of the results during the processing phase, the master survey data file was kept at Federal Ministry of Health (FMOH); all hard copies and files were stored in locked cabinets. The data file was kept on a separate network and protected with a password) so that only authorized survey staff had access to the data during the processing phase. No questionnaire or file including information from the survey was either copied or taken out of FMOH. After the tabulation phase has been completed and it was determined that no additional reconciliation of the interview results was necessary, all the sections of the NARHS Plus questionnaires relating to the surveyed individuals' personal identification (ID), such as the name, the household number, the cluster number, the number of the administrative subdivisions, and the part of the questionnaire containing the identification codes of the blood samples were destroyed. A new data file was created in which all of the personal identification of the persons surveyed (household number, cluster number, etc.) was replaced by randomly generated codes. This

process maintained the integrity of the cluster and the household, while making impossible all identification of the individuals, households, and clusters surveyed. A series of checks were carried out on this file in order to ensure that the results were not affected by these changes. After it had been verified that this new file was completed, all the data files containing the original cluster numbers and household numbers were destroyed.

3.5 Sampling procedure

The primary survey used probability sampling technique. The sampling procedure (four levels) was a multistage cluster sampling aimed at selecting eligible persons with known probability.

Stage 1: This involved the selection of rural and urban localities;

Stage 2: This involved the selection of Enumeration Area (EA) within the selected rural and urban localities;

Stage 3: selection of eligible individuals within households was done

Stage 4: Selection of actual respondents for interview and testing was conducted

Stage 1

All localities in a state were stratified into urban and rural localities with settlements less than 20,000 inhabitants classified as rural. The sampling frame of all rural localities in a state (i.e. villages, small towns, hamlets and other settlements with a population of less than 20,000 inhabitants) was arranged in their geographic order, and grouped into one stratum with their weights attached (weight being the number of inhabitants). Using the population as a measure of size (MOS), a cumulative (total) population of the rural dwellers within the state was obtained. A sampling interval was obtained and by using the Table of random numbers, a random start within the sampling interval was chosen. A rural settlement corresponding to a cumulative measure of size was chosen. The urban settlements were stratified into 'major towns' and 'medium towns. One major' town and one 'medium' town were selected with probability proportional to the size (population) of the town. The cumulative population of urban centres in the state would be obtained for each stratum, and using the table of random numbers, a random number between 1 and the cumulative population of the urban dwellers will be picked. One 'major' town and one

'medium' town corresponding to the random number picked in each stratum were chosen for the formation of clusters and subsequent interview.

Stage 2

For each of the three chosen rural localities the lists of the Enumeration Areas (EA) that make up the locality were arranged in a geographic order. One of the EAs was chosen at random and from which the number of allocated clusters was formed by listing three times the number of eligible persons to be interviewed using the EA as a starting point. The number of allocated urban respondents per state was distributed proportional to size of the 'major' to 'medium' towns of the state. For the 'major' town chosen, different locations were selected using the EAs making up the town. The EAs that composed the town were arranged in their geographic order and the number of allocated clusters were chosen systematically and used as a reference starting point to form each cluster.

Stage 3

The number of eligible persons required (allocated) for the localities were equally divided among the clusters.

Stage 4

A cluster is a location with a maximum of 60 eligible respondents listed within neighbouring households of which a third were sampled for interview.

3.6 Data collection method

Study instrument

Primary data were collected by personal interview method using structured and semi structured questionnaire which included socio demographic characteristics, knowledge and perception of HIV/AIDS, attitude and use of family planning, knowledge about family planning among others. Two questionnaires was used for the primary data collection: an individual questionnaire for each respondent and a one page questionnaire for the biomarker component. These instruments were based on the questionnaires developed by the NARHS national programme which was adapted from International standard questionnaires such as the DHS and adapted to Nigeria's specific data needs. The questionnaires as well as all survey procedures including those relating to the HIV was translated and piloted prior to implementation of the main survey.

Training

Training of survey personnel was at two levels: central training and state level training. A comprehensive training manual was developed and finalized for the 218 purposes of both central and state level trainings. Given the large number of expected participants, the central level training will be in two batches (north and south). The two-day central training involved National population commission staff, SAPCs, RHCs state laboratory scientist, one state counsellor, research agency supervisors and quality controllers as well as Technical committee members. Experience from previous surveys showed that bringing all related personnel together for a comprehensive training on all aspects of the fieldwork. The training was based on sample selection (including household listing and selection) and all aspects of fieldwork. In view of its complexity and sensitivity, considerable amount of time was devoted to the review and role play with the questionnaire. Coordination, logistics, standardization, and shared understanding of the survey procedures will be the key objectives of the central training, but this will not prevent the discussion of local problems. State level training will be undertaken by the centrally trained supervisors, SAPCs, RHCs, NPC officer and a member of the survey technical group as an additional quality control measure. This, among others, will minimize state-to-state variability in training procedures. All field enumerators in the state will undergo training in all aspects of the fieldwork.

In addition to the review and 'trial' field interviews, translation of selected words and phrases, blood collection and sero-testing demonstration. Furthermore, discussion on the selection of EAs and sampling procedure was also done. State level training lasted for three days. There was also a one-day training for 'listers' (four per state) that was responsible for the listing of all appropriate household and household members. This was undertaken mainly by staff of the State NPC who participated in the central training.

Two types of Training manual was developed: General Guidelines for Interviewers and Supervisors. It provided details, among others, related to general principles of interviewing and supervising with the roles of different members of the field team. Training Manual for Interviewers and Supervisors. Provided specific instructions on how to ask and record responses for each of the survey questionnaire items.

Pilot

A pilot study was conducted in two states (Nasarawa and Lagos by visiting one urban and one rural cluster in each state to test the instruments and other aspects of the survey

including fieldwork and data entry. This was conducted with the state coordinators, independent research agency's supervisors as well as NPC staff. The pilot was able to determined any problems that could have arisen during the survey, and discovered problems in the questionnaire and other elements of the survey and address them accordingly

Laboratory method

HIV testing was done using national guidelines for rapid-test as outlined in the UNAIDS/WHO guidelines (WHO, 2005). Therefore, for ethical reasons pre and post test counseling we re conducted using Determine and Statpak or Determine and Bundi for parallel testing. Individuals who test positive or whose tests were indeterminate were referred to the nearest HIV treatment facility for confirmatory testing and follow up. A unique random identification number (bar code) was assigned to each dried blood spot (DBS) and labels containing that code affixed to the filter paper card, the questionnaire, and a field tracking form at the time of the collection of the sample.

After fieldwork was completed in a sampled cluster, the questionnaires, dried blood spot and sample transmittal forms were sent to the central office of the technical Management committee for logging and checking prior to data entry. DBS samples were checked against the transmittal form and then forwarded to designated testing laboratories. No identifier other than the unique identification label affixed at the time of the collection of the samples accompanied the specimen to the laboratory.

3.7 Data Management

The primary data was imported i nto SPSS and the sampling weights applied in the analysis. The weighting in the analysis was based on the sampling fractions derived from sample size and the population of the states. For most variables, the analysis was done at the national and zonal levels and state level analysis was carried out for selected variables.

For this study however, secondary data was managed using SPSS version 16.0 for windows and analyzed using descriptive, bivariate statistics and multivariate analytic tool. The result was presented using tables. Descriptive statistics (mean, median, range) were used to analyze few socio- demographic variables such as age, age at first intercourse of these women and average number of children born by the women. Chi Square was used to establish relationship between ANC attendance, Contraceptive use, *HIV* status, and other

socio-demographic variable. A multivariate Analytic tool such as logistic regression was used to evaluate other factors that might contribute to determining HIV status using antenatal clinic.

Independent variable

Independent variables included: age, marital status, religion, education, number of children, contraceptive use, antenatal clinic attendance, age at first intercourse.

Dependent variable

The main dependent variable in this analysis was HIV status.

3.8 Definitions of Terms

1. Age-specific fertility rate (ASFR) : is the total number of births in the 36 months preceding the survey divided by the sum of woman-years at child-bearing age during the same period multiplied by 1000 for every 5-year age bracket(ORC macro. 2010).
2. The relative inclusion ratio (RIR): is the ratio of the fertility rate (ASFR) in HIV positive women of reproductive age to the fertility rate(ASFR) of HIV negative women of reproductive age (15– 49 years). A ratio of 1.00 suggests a good estimation; a ratio of less than 1.00 indicates an underestimation and a ratio of more than 1.00 is an over-estimation of the HIV prevalence in the general population. ANC-based HIV prevalence can be adjusted for the effect of differential fertility rates by using the formula "Adjusted HIV Prevalence {Unadjusted HIV Prevalence}/ {RIR}". For example if the Unadjusted ANC-HIV Prevalence is 4.5% and RIR is 0.75, then the Adjusted HIV Prevalence is 4.5/0.75 or 6.4%.
3. Contraceptive use: this is the number condom use among the total respondents. This was used as a proxy for contraceptive use because other types of contraceptive were not significant during the analysis
4. Antenatal Clinic visit: this is the visit of pregnant women for the first antenatal care. A variable such as "did you seek any antenatal for you last pregnancy" was used as a proxy for those coming for the antenatal for the first time(first pregnancy)

CHAPTER FOUR

RESULTS

4.1 Socio demographic characteristics of women according to their and HIV status

Overall, a total of 5360 women of reproductive age were involved in the analysis. Of this total number, 170 (4.1%) were HIV positive. The mean age for all HIV positive women was 29.65 (± 8.476) as to 27.88 (± 9.4) years for HIV negative women. Table 1 shows the relationship between sociodemographic characteristics and HIV status of the women. The prevalence of HIV infection was higher among the formally married women (10.6%) and those in 30 – 34 age groups (7.6%) ($P < 0.001$). The higher proportion (4.7%) of those with HIV infection resided in the rural environment of Nigeria. This was however not significant. A higher proportion (6.3%) of those with HIV infection also lived in the North central zone of Nigeria ($p < 0.001$). The prevalence of HIV also varied according to the women's religion; it was higher (5.3%) among those who practiced Christianity ($p < 0.001$)

Table 1: Relationship between sociodemographic characteristics and HIV status

Characteristics	HIV positive N=170 %	HIV negative N=4025 %	P value
Age group			<0.001
15-19	13 (1.4)	902 (98.6)	
20-24	38 (4.5)	812 (95.5)	
25-29	35 (4.8)	698 (95.2)	
30-34	44 (7.6)	535(92.4)	
35 and above	40 (3.6)	1078 (96.4)	
Location			0.142
Urban	67 (4.7)	1367 (95.3)	
Rural	103 (3.7)	2658 (96.3)	
Zone			0.003
North West	20 (2.3)	857 (97.7)	
North east	28 (4.6)	578 (95.4)	
North central	47 (6.3)	698 (93.7)	
South west	32 (4.0)	760 (96.0)	
South East	19 (3.8)	482 (96.2)	
South South	24 (3.6)	650 (96.4)	
Marital status			<0.001
Currently married	110 (4.0)	2658 (96.0)	
Never married	34 (2.9)	1152 (97.1)	
Formally married	25 (10.6)	211 (89.4)	
Education			0.877
Quranic/ Primary	54 (4.7)	1101 (95.3)	
Secondary	68 (4.5)	1456 (95.5)	
Higher	17 (5.1)	317 (94.9)	
Religion			0.000
Islam	52 (2.6)	1914 (97.4)	
Christianity	116 (5.3)	2085 (94.7)	
Other	1 (4.2)	23 (95.8)	

HIV = Human Immunodeficiency Syndrome.

4.2 Sexual history of HIV positive and HIV negative women of reproductive age

Age at first intercourse was significantly associated with HIV status of the women (p=0.017) as shown in table 2. The mean age at first intercourse for HIV positive was 25.82 ± 22.22 and 33.46 ± 29.88 for HIV negative women. However, the number of children was not significant with HIV status

Table2: Sexual history of HIV positive and HIV negative women of reproductive age

Characteristics	HIV positive N=170	HIV negative N =4025	P value
Age at first Intercourse			0.017
Mean (S.D)	25.82 ± 22.22	33.46 ± 29.88	
Median (range)	18 (12 – 88)	18 (8 – 99)	
Mode	15	87	
Number of children			0.054
Mean	5.03 ± 3.36	6.18 ± 3.31	
Median	4.0 (1-13)	6.0 (0-16)	
mode	4	6.0	

S.D = Standard deviation; HIV = Human Immunodeficiency Syndrome

4.3 Contraceptive use and HIV status of the women

Table 3 shows the relationship between contraceptive use and HIV status. Out of the 170 *HIV* positive respondents, 25.3 % of them reported to have used contraceptives. On the other hand, out of the 4025 HIV negative respondents, 22.1% of them reported to have used contraceptive. This was significant (p=0.002)

Table 3: Relationship between contraceptive use and HIV status

Variable	HIV positive N = 170	HIV negative N= 4025	P value
Contraceptives use			0.002
Yes	43 (33.9)	559(22.1)	
No	84 (66.1)	1967(77.9)	

HIV = Human Immunodeficiency Syndrome

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HIV = Human Immunodeficiency Syndrome

4.4 Contraceptive use and antenatal clinic attendance

Table 4 shows the relationship between contraceptive use and Antenatal clinic attendance among women of reproductive age in Nigeria. Of all the women studied, 86.9 % of them had used one type of contraceptives or the other and the same time had antenatal clinic visit for their last pregnancy while 76.1 % of those who have not used any type of contraceptive had antenatal clinic visit for their last pregnancy. On the other hand, of all the women who had used one type of contraceptivee, 13.1% of them did not visit any antenatal clinic for their last pregnancy while of those who have not used any type of contraceptives, 23.9 % of them never visited any antenatal clinic for their last pregnancy. This finding was however significant (p=0.000).

Table 4: Relationship between contraceptive use and Antenatal clinic attendance

Characteristics	ANC visit N = 4175 %		P value
	Yes	No	
Contraceptive use			0.000
Yes	333 (86.9)	46 (13.1)	
No	934 (76.1)	823(23.9)	

ANC = Antenatal clinics

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	Yes	No	
Contraceptive use			0.000
Yes	333 (86.9)	46 (13.1)	
No	934 (76.1)	823(23.9)	

ANC = Antenatal clinics

4.5 Antenatal clinic attendance and HIV status

Table 5 shows the relationship between ever had Antenatal clinic visit and *HIV* status. Of all the women who visited ANC, 4.8% of them are HIV positive. On the other hand, of all the women who have had ANC visit, 95.2% of them were HIV negative. This was significant (p= 0.024).

Table 5: Relationship between antenatal attendance and HIV status

Characteristics	HIV positive N =170	HIV negative N = 4025	P value
Ever had ANC visit			0.024
Yes	65(4.8)	1297 (95.2)	
No	21(2.8)	740 (97.2)	

ANC = Antenatal Clinic; HIV = Human Immunodeficiency Syndrome

4.5 Antenatal clinic attendance and HIV status

Table 5 shows the relationship between ever had Antenatal clinic visit and *HIV* status. Of all the women who visited ANC, 4.8% of them are HIV positive. On the other hand, of all the women who have had ANC visit, 95.2% of them were HIV negative. This was significant (p= 0.024).

Table 5: Relationship between antenatal attendance and HIV status

Characteristics	HIV positive N =170	HIV negative N = 4025	P value
Ever had ANC visit			0.024
Yes	65(4.8)	1297 (95.2)	
No	21(2.8)	740 (97.2)	

ANC = Antenatal Clinic; HIV = Human Immunodeficiency Syndrome

4.6 Fertility rates for HIV positive and HIV negative in urban Nigeria

Tables 6 shows the age specific fertility rates for HIV positive and negative in urban area. In the urban area, the fertility rates increased from 15 – 19 years to a maximum at 20 – 24 years and then decreased monotonically till the 35 – 49 years for HIV positive women while it increased from 15 – 19 years through 35 – 49 years for HIV negative women. However, fertility rates were higher among HIV positive women in age group 20 – 24, 25 – 29 compared to their HIV negative counterpart. Overall fertility rate was 347.6 births per 1000 women years of exposure (95% CI 203 to 426) in HIV infected women compared to 272.3 births per 1000 women years of exposure (95% CI 249 to 296) in HIV negative women population.

In the urban area, all the RIRs were higher than unity (one) except for that of the age group 35 to 49 (0.58 , 95% CI 0.53 to 0.63) , and the overall RIR for urban was 1.155 (95% CI 1.130 to 1.180).

Table 6: Fertility rates and Relative Inclusion Ratios for HIV positive and HIV negative women of reproductive age for urban in Nigeria

HIV POSITIVE				HIV NEGATIVE			
Age group (years)	Number of Birth (X_1)	Women Years of Exposure (Y_1)	Fertility rate $Z_1=(X_1/Y_1)$ *1000 (95% C I)	Number of Birth (X_2)	Women Years of Exposure (Y_2)	Fertility $Z_2=(X_2/Y_2)$ *1000 (95% C I)	RIR Z_1/Z_2 (95% C I)
15 – 19	0	40.3	0 (0-0)	12	1038.5	11 6 (0 4– 23 5)	0 (0 – 0)
20 – 24	12	50.3	238.6 (46-430)	50	888 7	56 3 (29 – 84)	4 20 (3 78-4 62)
25 – 25	14	42 6	328.6 (23- 636)	108	800 6	134 9 (93–177)	2 4 (3 97-4 43)
30 – 34	15	18.3	819 7 (642-997)	217	548 9	395 3 (325-466)	2 07 (1 87-2 28)
≥35	21	45 6	460 5 (216-705)	772	979 4	788 2 (746-831)	0 58 (0 53-0 63)
TOTAL	62	197 1	314 6 (203-426)	1159	4256 1	272 3 (249-296)	1 16 (1 13-1 18)

CI = Confidence interval; HIV = Human Immunodeficiency Syndrome; RIR = Relative Inclusion Ratio

4.7 Fertility rates for HIV positive and HIV negative women for rural Nigeria

Table 7 present the age specific fertility rates of HIV positive and HIV negative women for rural area in Nigeria. In the rural area, fertility rates increased steadily both among the HIV positive and HIV negative women to the climax (35 – 49) respectively although, the peak of fertility for urban HIV positive women was attained at earlier age group (30 – 34) compared to that of rural area counterpart whose peak was attained at later age group (35 – 49). Unlike in urban area, the overall fertility rate of HIV positive women in rural area was lower (395 births per 1000 women years of exposure, 95% CI 301 to 489) than that of HIV negative women (406 births per 1000 women years of exposure, 95% CI 387 to 425).

In the rural, almost all RIRs were lower than unity except for the age group 35 – 49 (1.35 95% CI 1.29 to 1.39). However, overall RIR for rural was observed to be 0.97 (95% CI 0.96 to 0.98).

Table 7: Fertility rates and Relative Inclusion Ratios for HIV positive and HIV negative women of reproductive age of rural Nigeria.

HIV POSITIVE				HIV NEGATIVE			
Age group (years)	Number of Birth (X_1)	Women Years of Exposure (Y_1)	Fertility rate $Z_1=(X_1/Y_1)$ *1000 (95% C I)	Number of Birth (X_2)	Women Years of Exposure (Y_2)	Fertility $Z_2=(X_2/Y_2)$ *1000 (95% C I)	RIR Z_1/Z_2 (95% C I)
15 – 19	0	37 5	0 (0-0)	67	2005 5	33 4 (19-48)	0 (0-0)
20 – 24	5	72 6	68 (45-181)	200	1693 6	118 1 (91-145)	0 58 (0 54-0 62)
25 – 25	10	85 3	177(30- 324)	426	1463 9	291 (249-333)	0 61 (0 56-0 65)
30 – 34	16	66 0	240 (75-404)	600	948 8	632 4 (244-338)	0 38 (0 33-0 43)
≥35	103	77 5	1338 (759 1-3435 1)	2009	2018 7	995 2(990-1000)	1 35 (1 29-1 39)
TOTAL	134	338 9	395 (301-489)	3302	8130 5	406 (387-425)	0 97 (0 96-0 98)

CI = Confidence Interval; HIV = Human Immunodeficiency Syndrome; RIR = Relative Inclusion Ratio

4.8 Fertility rates for HIV positive and HIV negative women for Nigeria

Table 8 shows the fertility rate for HIV positive and HIV negative women in Nigeria irrespective of where they lived or resided. The trend of fertility observed here was similar to that which was observed in both urban and rural areas. However, unlike in urban and rural, the peak of the fertility was observed at the same age group (35 – 49) for the two groups although fertility rate for the HIV positive women (1007.7 births per 1000 women yeas of exposure, 95% CI 839.2 to 1175.4) at this age group was higher than that of the HIV negative women (927.59 births per 1000 women years of exposure, 95% CI 912 to 943). The overall fertility rate observed for all women irrespective of where they resided was similar to that which was observed for urban women population in that; the fertility rate for HIV positive (365.7 births per 1000 women years of exposure, 95% CI 293 to 438) was higher than that of HIV negative women (360.15 births per 1000 women years of exposure, 95% CI 354 to 375).

RIR was higher than unity (one) for the age groups 20 – 24 and 35 – 49 (1.429 95% CI 1.380 to 1.480 and 1.080 95% CI 1.070 to 1.100) and lower in other age groups. The overall RIR was 1.015 (95% CI 1.00 to 1.018).

Table 8: Fertility rates and Relative Inclusion Ratios for HIV positive and HIV negative women of reproductive age of Nigeria.

HIV POSITIVE				HIV NEGATIVE			
Age group (years)	Number of Birth (X_1)	Women Years of Exposure (Y_1)	Fertility rate $Z_1=(X_1/Y_1)$ *1000 (95% C.I)	Number of Birth (X_2)	Women Years of Exposure (Y_2)	Fertility $Z_2=(X_2/Y_2)$ *1000 (95% C.I)	RIR Z_1/Z_2 (95% C.I)
15 – 19	0	77.8	0 (0-0)	79	3044	25.95(16-36)	0 (0-0)
20 – 24	17	122.9	138.3(29-248)	250	2582.3	96.80 (76-117)	1.429 (1.38-1.48)
25 – 25	24	127.9	187.7(58-317)	534	2264.5	235.80(204-267)	0.796 (0.77-0.83)
30 – 34	31	84.3	367.7(225-510)	817	1497.7	545.50(503-588)	0.674 (0.64-0.71)
≥35	124	123.1	1007.3(839.2-1175.4)	2781	2998.1	927.59(912-943)	1.086 (1.07-1.10)
TOTAL	196	536	365.7(293-438)	4461	12386.6	360.15(345-375)	1.015 (1.00-1.02)

CI = Confidence interval; HIV = Human Immunodeficiency Syndrome

4.9 Factors contributing to determining HIV status of women in Nigeria

Table 9 shows that respondents who fall within age group 20 to 24 were 1.1 times more likely to know their HIV status than their counterpart in age group 15 to 19. Respondent in age group 25 to 29 were 1.7 more likely to know their HIV status than those in age group in 15 to 19. This was not significant. In the same vein, respondent in age group 30 to 34 were 1.7 more likely to know their HIV status than those in the age group 15 to 19. Respondents in age group 35 and above were 1.7 more likely to know their HIV status than those in the age group 15 to 19, this was not however significant.

Respondents who lived in the North East were 1.3 less likely to know their HIV status than those in the North West. This was not significant. Respondents in the North Central were 2.6 more likely to know their HIV status than those who resided in the North West. Respondents who lived in the South west were 1.7 more likely to know their HIV status than those who resided in the North West. This was significant. Respondents who resided in the South East are 1.1 more likely to know their HIV status than those who lived in the North West. Respondents who lived in the South South were 1.2 more likely to know their HIV status than those who lived in the North West, this was not significant.

Respondents who are never married were 3.5 less likely to know their HIV status than those that were currently married. This was significant. Respondents who were formally married 17 less likely to know their HIV status, this was not however significant.

Respondents who never attended antenatal clinic were 1.0 more likely to know their HIV status than those who ever attended. This was not significant. Respondents who never used contraceptive were 1.5 more likely to know their HIV status than those who used contraceptive.

However, marital status became more significant haven adjusted for other confounding factors. Women who were never married were 2.9 times less likely to know their HIV status than women who were currently married. Women who were formally married were 4.0 times less likely to know their HIV status than women who were currently married.

Table 9: Logistic regression analysis of socio demographic factors influencing *HIV* status determination

CHARACTERISTICS	ODD RATIO	95%CONFIDENCE INTERVAL
Age group		
15-19(ref)		
20-24	1.115	0.271– 4.585
25-29	1.742	0.753 – 4.030
30-34	1.731	0.772 – 3.878
35 and above	1.730	0.755 – 3.961
Zone		
North West(ref)		
North east	0.749	0.209– 2.691
North central	2.557	0.967 – 6.760
South west	1.653	0.697– 3.921
South East	1.086	0.463 – 2.545
South South	1.223	0.476 – 3.143
Marital status		
Currently married (ref)		
Never married	0.285	0.113 – 0.721*
Formally married	0.593	0.152 – 2.311
Antenatal clinic attendance		
Yes (ref)		
No	1.016	0.515 – 2.002
Contraceptive Use		
Yes (ref)		
No	1.461	0.818 – 2.610

* = Significant; HIV = Human Immunodeficiency Syndrome

Table 10: Logistic regression analysis for the influence of marital status on *HIV* haven adjusted for other factors

Characteristics	Adjusted odds ratio	95% Confidence interval
Marital status		
Currently married(ref)		
Never married	0.349	0.221 – 0.551*
Formally married	0.249	0.146 – 0.426*

*= Significant; HIV = Human Immunodeficiency Syndrome

CHAPTER FIVE

DISCUSSION

5.1 Sociodemographic characteristics

Finding from this study showed that mean (SD) age for HIV positive and HIV negative women were relatively the same (Table 2). This was comparable to that found in a study, *association between fertility and HIV status in* Cameroon (Engene and Charles, 2008). This might be due to the fact that both studies used population based data. Median (range) age at first intercourse found for HIV positive women and for HIV negative women were thesame. This finding might be attributed to social and moral values of these respondents. This was similar to that reported by Engene and Charles, 2008. Median number of children for HIV women was lower than that of HIV negative women (Table2). This was relatively different from that reported by the authors (Engene and Charles, 2008). The difference in the median number of children between HIV positive and HIV negative women may due to their of level of contracetive use

5.2 Prevalence of HIV among women of reproductive in Nigeria

The prevalence found in this study was similar to that reported in the original survey of National HIV/AIDS and Reproductive Health Survey for female population (NAHRS, 2007). The prevalence of HIV was higher among the formally married. This also followed the same trend though lower; with that reported by Engene and Charles (2008). This might be attributed to their previous risky sexual behaviour. The prevalence of HIV was also higher among age group 30 to 34 which corroborated the reported prevalence by NARHS (2007). Though one would have expected prevalence to be higher in the lower age group because of sexual activity of these lower age groups however no explanation could put forward for this deviation.

5.3 Relationship between antenatal (ANC) attendance and determination of HIV status among women of reproductive age in Nigeria

Antenatal clinics were proposed by WHO in 1989 as sentinel sites for the collection of HIV data. This study found that large proportion of the whole respondents had been ANC attendee at one time or the other. A lower proportion of HIV positive women had ANC visit compared to an overwhelming proportion of HIV negative women had also had ANC visit (Table 5). Overall, this study found a great number of respondents attending ANC. This finding however justified the reason why ANC was proposed in the first place for HIV

data collection. However, difference in utilization of this antenatal care services by HIV positive and HIV negative women could actually introduce bias to ANC - base HIV prevalence estimate. Educational attainment of both the women and their husbands had been established to be a positive influence on the utilization of ANC services in any population (Kabir *et al.*, 2005). Another factor that is important is contraceptive use. In this study, a high proportion of HIV positive women had used contraceptive compared to their HIV negative counterpart. This finding of contraceptive use was similar to the report from a study conducted in Kinshasa, Democratic Republic of Congo where contracetive use among HIV positive and HIV negative women; 26.4% of the HIV infected were using modern contraceptives significantly higher than 16.3% of the uninfected ($p < 0.05$) (Ryder et al., 1991). From this finding, contraceptive use could affect the influx of women into antenatal clinic which in turn might affect the representativeness of HIV prevalence estimate coming out of such sentinel site. This actually talks about the fact that, contraceptive use could reduce risk of pregnancy. Since women could not be pregnant by the reduced risk of pregnancy, the chance of utilizing ANC service by these women could then be low

5.4 Fertility rates of HIV positive women and HIV negative women of reproductive age in Nigeria

First of all, this study used fertility rates (number of births per 1000 woman years of exposure over 36 months) instead of live birth rates (number of live births per 100 woman years of exposure) as reported by Nicoll et al., (1998) because it was consider that all pregnant women are equally likely to be tested for HIV infection irrespective of the birth outcome (dead or live births). Finding of high fertility among HIV positive women in urban area (Table 6) of Nigeria in this study was consistent with report from other authors (Zaba et al., 1998; Gray et al., 1998). This study found high fertility rates among HIV positive women of all age group except for the group ≥ 35 where fertility for HIV positive was lower than their HIV negative counterpart. Higher fertility in urban could be attributed to differences in sexual and reproductive attitude and practices.

Finding of low fertility among HIV positive in rural Nigeria was consistent with report from previous studies (Zaba et al., 1998; Gray et. al 1998; Eugene and Charles, 2008) except for age group ≥ 35 where fertility was higher than their HIV negative women. Studies have shown that HIV positive women who had given birth once were more likely to have used contraceptive than HIV negative (Glynn et al., 2000). The use of contraceptive therefore might be a contributing factor to the low fertility among the HIV positive women in the

rural area of Nigeria. Above all, overall fertility rates observed for all women irrespective of where they resided were similar to that which was observed for urban women population in that; the fertility rate for HIV positive was higher than that of HIV negative women. Monitoring of HIV epidemic through antenatal sentinel surveillance require adjustment for various factors such as the variability in the distribution of HIV across different age group and different sub population. Another factor is the adjustment for the differences in the fertility rates between HIV positive and HIV negative women (petruckevitch et al., 1997). Adjustment for fertility rate is an important factor because modest changes in fertility can have profound effect on the validity of estimate from pregnant women (Boisson et al., 1996). Adjusting for the differences in fertility rates was sufficient in countries with over whelming epidemics where the infection was transmitted through one source (heterosexual route) and many people are unaware of their HIV status (Nicoll et al., 1998).

This study found summary Relative Inclusion Ratios (RIR) or fertility ratio for urban and rural areas of Nigeria respectively. The urban RIR was higher than unity (one) (Table 7). This was higher than the one reported by Engene and Charles (2008) for Cameroon. The rural summary RIR of Nigeria was lower than unity (one). This followed the same trend but was slightly higher than summary RIR reported by Desgrées du Loû et al. (1999) for rural area of Ivory Coast and Engene and Charles (2008) for rural area of Cameroon. Similarly, RIR was higher than unity (one) in Nigeria generally (Table 8). Engene and Charles (2008) reported the Relative Inclusion Ratio (RIR) because it might be useful in wide geographical area such as sub Saharan Africa. However, since the fertility rates are self-weighted for age and rural-urban differences following the fact that the sample represented all women of reproductive age in Nigeria, this study therefore reports the summary RIRs for Nigeria. These RIRs are important following consideration of fertility rates by United Nations Programme on HIVAIDS (UNAIDS) when estimating and projecting HIV prevalence (Stover et al., 2006).

5.5 Factors contributing to HIV status determination in Nigeria

HIV prevalence among female as reported by National HIV/AIDS and Reproductive Health Survey (NAHRS) in 2007 was still very high. This study also supported this fact haven found similar prevalence as shown in Table 1. This study went further to know clearly factors that could contribute to people knowing their HIV status apart from fertility issue which was a core objective of this study. Prominently, marital status influenced their HIV status determination. Respondents who were never and formally married were less likely to

know their HIV status than those who were currently married (Table 9). This study therefore found this groups as high risk groups as far as HIV infection is concerned considering the fact that if these groups do not take time to know their HIV status; the chance of transmitting the virus to their potential sexual partners is very high and even if they decide to get pregnant subsequently, the risk of their unborn baby getting infected increases thereby increasing the burden of HIV in the general population.

5.6 Strength and limitation of the study

The strengths of this study include the availability of large sample size, with national data gotten from with the aid of well trained manpower, and a good laboratory sampling. However, variables such as the one which asks to know those who visited ANC for their first pregnancy as proposed by World Health Organization (WHO) in 1989 to know the trend of spread of HIV infection in a given population was not available in the data set. This was why another variable such 'did you receive any antenatal care for your last pregnancy?' was used as a proxy to measure this. Also since primary data was collected through survey, recall bias could not be out ruled out.

CONCLUSION

In conclusion, fertility rates were higher in HIV positive women compared to HIV negative women of reproductive age in area urban of Nigerian and of course the Relative Inclusion Ratio showed that ANC prevalence estimate overestimated HIV prevalence in urban area of Nigeria. Also, fertility rates were lower in HIV positive women compared to HIV negative women in rural Nigeria. The RIR showed that overall, fertility rate were higher in HIV positive women compared to HIV negative women of reproductive age in Nigeria irrespective of rural – urban differences. The key findings of the study therefore support the use of summary Relative Inclusion Ratio (RIR) or fertility ratio for the adjustment of HIV prevalence (among adult female population) obtained from sentinel surveillance in antenatal clinic.

Prevalence of HIV infection was higher among women who were formally married and those who were never married. There was a strong relationship between marital status and knowing ones HIV status among these women. This however made these women high risk groups. This study found that marital status could also introduce bias into ANC HIV prevalence estimate like fertility could do therefore this study suggest that further studies should be carried out on what influence could marital status pose on the outcome of ANC HIV estimation using antenatal clinic in Nigeria.

RECOMMENDATIONS

With the evidences on ANC utilization and fertility among HIV positive and HIV negative of reproductive age in Nigeria, this study suggests the following recommendations.

1) Continuous monitoring of the fertility rates in HIV positive and HIV negative women of reproductive age should be an adjunct to HIV serosurveillance because fertility rates are not static, but change over time. This could involve collection of additional information about their birth history, contraceptive use, and occurrences of pregnancies if any since fertility recognizes any form of conception either live or death, abortion or delivery.
2) Pregnant women need to be educated on the need and importance of antenatal clinic visit. The key stakeholders (Federal Ministry of Health) and other partners in the health sector can do this by using audio and visual media such as radio and television houses. Print medium could also be an option for the literate section of the public.
3) Health workers and nurses in antenatal clinic should be retrained on antenatal care practices. The could be achieved by organizing short courses for midwives on how to attend to patient because some patient have complained on the bad attitude of some health care providers.
4) More antenatal clinics should be constructed and those on ground should be renovated to make it more accessible for pregnant women to use.
5) Use of Relative Inclusion Ratio is strongly recommended especially when preventive programme is to be implemented on the basis of rural – urban differences. For example if an HIV programme is to be implemented in rural community in Nigeria using ANC HIV- estimate , what the organization carrying out such programme need to do is use the Relative Inclusion Ratio derived for rural community in Nigeria from a population based such as this to adjust the ANC HIV estimate. Doing that will make ANC HIV estimate more representative. Such organization will be working with more accurate estimate thereby saving it from various logistic problems and a good impact will be made at end of such programme.
6) Attention must be given to women who were never and formally married by sensitizing them on the need to know their HIV status and programmes that target

this group of people regarding HIV prevention and its management should be strengthened.

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APPENDIX A

2007 NATIONAL HIV AND AIDS AND REPRODUCTIVE HEALTH SURVEY (NARHS PLUS)

NIGERIA

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Paste

INDIVIDUAL INTERVIEW SCHEDULE FOR WOMEN AGED 15-49 YEARS AND MEN AGED 15-64 YEARS

STATE ☐☐ CLUSTER ☐☐☐ QUEST. ID ☐☐☐☐☐

000 STATE _____

001 ZONE _____ CODE ☐

002 LOCAL GOVT. AREA _____ ☐☐☐

003 LOCALITY _____ ☐☐☐

004 LOCATION (URBAN=1 OR RURAL=2) ☐

005 HOUSEHOLD NUMBER ☐☐☐☐☐

Introduction: My name is..... ..... I am working for the Federal Ministry of Health. We are interviewing people here in **[NAME OF CITY, TOWN OR SITE]** in order to find out about certain behaviors that affect people's health in this environment.

APPENDIX A

2007 NATIONAL HIV AND AIDS AND REPRODUCTIVE HEALTH SURVEY (NARHS PLUS)

NIGERIA

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005 HOUSEHOLD NUMBER ☐☐☐☐☐

Introduction: My name is..... ..... I am working for the Federal Ministry of Health. We are interviewing people here in [**NAME OF CITY, TOWN OR SITE**] in order to find out about certain behaviors that affect people's health in this environment.

Confidentiality and consent: I am going to ask you questions some of which may be very personal. Your answers are completely confidential. Your name will not be written on this form, and will never be used in connection with any of the information you tell me. You may need to know that this exercise is taking place all over the country. Your honest answers to these questions will help us better understand what people think, say and do about certain kinds of behaviours. The information collected from you and people like you will help the government to find solution to some health problems affecting people in this environment. We would greatly appreciate your help in responding to this survey. My supervisor may come back later to verify this information.

(Signature of interviewer certifying that informed consent has been given verbally by respondent)

Interviewer visit

	Visit 1	Visit 2	Visit 3
Date			
Result			
Interviewer			

Result codes: 1...Completed; 2...Respondent not available; 3...Refused; 4...Partially completed; 5... Others (Specify).

006 INTERVIEWERS: Code |__|__| Name_____ Signature_____

007 DATE OF INTERVIEW:__\ ___ \ ____ TIME INTERVIEW STARTED_____

DD MM YYYY

CHECKED BY SUPERVISOR _____ CODE |__| __| Date _____

Name of Coder_____|___|___| Signature_____
Date_____

Section 1: Background characteristics

No.	Questions and filters	Coding categories	Skip to
Q1 01	[RECORD SEX OF THE RESPONDENT]	Male.....1 Female.....2	

Confidentiality and consent: I am going to ask you questions some of which may be very personal. Your answers are completely confidential. Your name will not be written on this form, and will never be used in connection with any of the information you tell me. You may need to know that this exercise is taking place all over the country. Your honest answers to these questions will help us better understand what people think, say and do about certain kinds of behaviours. The information collected from you and people like you will help the government to find solution to some health problems affecting people in this environment. We would greatly appreciate your help in responding to this survey. My supervisor may come back later to verify this information.

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Result codes: 1...Completed; 2...Respondent not available; 3...Refused; 4...Partially completed; 5... Others (Specify).

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Signature_____

007 DATE OF INTERVIEW:__\ ___ \ ____ **TIME INTERVIEW STARTED**_____

DD MM YYYY

CHECKED BY SUPERVISOR _____ **CODE** |__| __| **Date** _____

Name of Coder_____|___|___| Signature_____
Date_____**Section 1: Background characteristics**

No.	Questions and filters	Coding categories	Skip to
Q1 01	[RECORD SEX OF THE RESPONDENT]	Male.....1 Female.....2	

Q1 02	In what month and year were you born?	Month [__|__] Don't know month .....88 Year [__|__[__|__] Don't know year 8888	
Q1 03	How old were you as at your **last** birthday? **[COMPARE WITH Q102 IF NEEDED AND CORRECT Q103]**	Age in completed years [__|__]	
Q1 04	What is your **occupation** i.e. what kind of work do you mainly do?	Director/upper management.....1 Other management.....2 Sales manager/representative/Insurance Broker..3 Professional/Specialist.....4 Self employed/Own small business.....5 Self employed (informal sector /hawkers/vendors etc.).....6 Blue collar skilled & semi skilled.....7 Unskilled.....8 Clerk/clerical.....9 Civil Servant.....10 Farmer/Forestry/Fishing/Mining.....11 Housewife.....	

Q1 11	What is your religion?	Islam..... 1 Protestant..... 2 Catholic..... 3 Traditional..... 4 No religion ..... 5 Others specify.[ ]...6 No Response.....9	
		.....12 Pensioner/Retired..... .....13 Unemployed..... .....14 Student..... .....15 Others specify[ ]...16	
Q1 05	Have you ever attended school?	Yes..... 1 No..... 2	→Go to Q107
Q1 06	What is the highest level of school you attended: Quranic only, primary, secondary or higher?	Quranic only.....1 Primary ....2 Secondary ..... 3 Higher 4	

No.	Questions and filters	Coding categories	Skip to
Q201	**[ASK WOMEN ONLY IF MALE GO TO Q233]** I would like to ask you about all the births you have had during your life. Have you ever given birth?	Yes .....1 No .....2 No Response.....9	→Go to Q233
Q201A	How old were you when you gave birth for the very first time?	Years..... [ ] [ ] Don't know.....88 No response.....99	
Q202	Do you have any sons or daughters to whom you have given birth who are now living with you?	Yes.....1 No.....2 No Response.....9	→Go to Q204
Q203	How many sons are alive and live with you? How many daughters are alive and live with you? **[IF NONE RECORD "00"]**	Sons at home Daughters at home No Response.....99	
Q204	Do you have any sons and daughters to whom you have given birth who are alive but do not live with you?	Yes.....1 [ ] No.....2 [ ] No Response.....9	→Go to Q206
No.	**Questions and filters** How many sons are alive but do not live with you?	**Coding categories**	**Skip**

		Sons elsewhere	to
Q2 15d	How many daughters are alive but do not live with you? Where did you get the Fansidar/3 tablets from? [IF NONE RECORD "00"] [PROBE FOR WHICH TYPE OF FACILITY THE MEDICINE WAS PROVIDED FROM]	Government hospital/ health center/post.....1 Daughters elsewhere health center.....2 Private Hospital.....3 No Community Health Worker.....4 Response..... 99 NGOs clinic.....5 Chemist/ PMS.....6 Pharmacy store.....7 Place of work.....8 Church/Mosque.....9 Community Based Distributor.....10 Traditional Birth Attendants.....11 Others Specify[ ].....12	
Q2 15e	Was it given to you during an **antenatal** visit, another visit to a health facility, or some other time or source?	Antenatal visit.....1 Another facilty visit.....2 Other source.....3 Cant remember.....8	
Q2 16	Did you see any one or receive any antenatal care in YOUR **last** pregnancy?	Yes.....1 No.....2	→Go to Q 219

Q2 17	Which of the following did you see? [READ OUT, MULTIPLE RESPONSE POSSIBLE]		Yes	No	
		☐ Doctor	1	2	
		Nurse/Midwife	1	2	
		☐ Auxillary nurse	1	2	

		Community health extension workers	1	2	
		Traditional birth attendant	1	2	
Q218	How many times did you receive/go for antenatal care during the pregnancy?	No of times.....[___][___] Not sure.....88			
Q219	Who assisted in the birth of the child? **[MULTIPLE CODES POSSIBLE]**		Yes	No	
		Doctor	1	2	
		Nurse/Midwife	1	2	
		Auxillary nurse	1	2	
		Community health extension workers	1	2	
		Traditional birth attendant	1	2	
		Relatives	1	2	
		Friend	1	2	
		Self assisted	1	2	
		Others Specify[ ] ..1			
Q220	Did you go for postnatal care after the delivery?	Yes.....1 No.....2			→Go to Q221

Q2 03			
Q2 06	Have you given birth to a boy or girl who was born alive but later died? [IF NO, PROBE] Any baby who cried or showed signs of life but died after a few hours or days?	Yes ..... 1 No ..... 2 No Response 9	→Go to Q208
Q2 07	How many boys have died? No of boys dead How many girls have died? No of Girls dead [IF NONE RECORD "00"] No Response 99		
Q2 08	[SUM ANSWERS FOR QUES 203,205,207 . IF NONE ENTER "00"] Total		

Section 2: Childbirth, breastfeeding, antenatal and postnatal care

Q2 36	Which of these best describes your marital status? Are you.... **[READ OUT]**	Currently married.....1 Living with a sexual partner.....2 Never married.....3 Separated.....4 Divorced.....5 Widowed.....6 No Response.....9	→Go to Q301
Q3 08	Have you ever used male condoms **[OR IF FEMALE]** Has your partner ever used a male condom with you?	Yes ..... 1 No ..... 2 No Response.....9	→Go to →Q3 15
Q3 08 AA	Has a condom ever broken or gotten torn while you were using it during sex?	Yes.....1 No.....2 Cant remember/Don't know....8	→Go to →Q3 08A
Q3 08 AB	How long ago was the last time a condom broke while you were using it? **[RECORD ANSWER IN MONTHS]**	Months Number [__|__]__] Cant Remember.....888 No Response.....999	
Q3 08 A	Are you currently using male condoms? **[IF FEMALE ASK]** Is your partner currently using male condoms with you?	Yes.....1 No.....2	

Q2 36	Which of these best describes your marital status? Are you.... **[READ OUT]**	Currently married.....1 Living with a sexual partner.....2 Never married..... .....3 Separated.....4 Divorced.....5 Widowed.....6 No Response.....9	→Go to Q301
Q3 08	Have you ever used male condoms **[OR IF FEMALE]** Has your partner ever used a male condom with you?	Yes ..... 1 No .... 2 No Response.....9	→Go to →Q3 15
Q3 08 AA	Has a condom ever broken or gotten torn while you were using it during sex?	Yes.....1 No.....2 Cant remember/Don't know....8	→Go to →Q3 08A
Q3 08 AB	How long ago was the last time a condom broke while you were using it? **[RECORD ANSWER IN MONTHS]**	Months Number [__|__]__] Cant Remember.....888 No Response.....999	
Q3 08 A	Are you currently using male condoms? **[IF FEMALE ASK]** Is your partner currently using male condoms with you?	Yes.....1 No.....2	

	Questions and filters	Coding categories	Skip to
	[TELL THE RESPONDENT] **I need to ask you some personal questions about sexual activity in order to gain a better understanding of some family life issues.**		
Q401	At what age did you first have sexual intercourse, if ever?	Age in years [___|___] Never.....87 Can't remember..... 88 No Response.....99	→Go to Q901
Q401A	Have you ever had sex in exchange for money/ favours or gifts?	Yes..... ..... 1 No ..... 2 No response.....9	
Q402	Surveys reveal that many people have had more than one sexual partner at the same time. Would you say this has ever happened to you?	Yes ..... 1 No 2	
Q403	Have you had sexual intercourse in the last 12 months?	Yes ..... 1 No ..... 2 No Response.....9	→Go to Q501

	Questions and filters	Coding categories	Skip to
	[TELL THE RESPONDENT] **I need to ask you some personal questions about sexual activity in order to gain a better understanding of some family life issues.**		
Q40 1	At what age did you first have sexual intercourse, if ever?	Age in years [___|___] Never.....87 Can't remember..... 88 No Response.....99	→Go to Q901
Q40 1A	Have you ever had sex in exchange for money/ favours or gifts?	Yes..... ..... 1 No ..... 2 No response.....9	
Q40 2	Surveys reveal that many people have had more than one sexual partner at the same time. Would you say this has ever happened to you?	Yes ..... 1 No 2	
Q40 3	Have you had sexual intercourse in the last 12 months?	Yes ..... 1 No ..... 2 No Response.....9	→Go to Q501

APPENDIX B

DHS Statistics > Fertility

CurrentFertilityRates

Age Specific Fertility Rate

Statistic(s)

Age-Specific Fertility Rate (ASFR). Also Known As Age-Period Fertility Rate in the Three Years That Precede the Date of the Survey, Presented as an Annual Rate

Definition

A. Coverage: All women age 15-49 years in seven five-year age groups (15-19, 20-24, 45-49 years).

B. Numerator: Number of births that occurred in the 1–36 months before the survey to women in the age group at the time of the birth.

C. Denominator: Number of women-years of exposure in the 1–36 months before the survey of women in the age group.

D. Rate is the quotient of the numerator divided by the denominator.

Calculation

A. Numerator: Births are tabulated according to period of birth and the age of mother at the time of the birth.

1. Period of birth: The period of birth is calculated as the difference in months between the date of interview and the date of birth, both in century-month code format (CMC). Births are included in the tabulation if they occur 1–36 months before the survey.

2. Age of mother at the time of the birth: The difference in months between the date of birth of the child and the date of birth of the mother both in CMC. The difference is then divided by 60 and truncated to whole numbers to form the age groups. Births are tabulated by age group.

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2. Age of mother at the time of the birth: The difference in months between the date of birth of the child and the date of birth of the mother both in CMC. The difference is then divided by 60 and truncated to whole numbers to form the age groups. Births are tabulated by age group.

B. Denominator: Women-years of exposure are calculated as the sum of the number of months exposed in the five-year age group during the time period divided by 12. A woman can contribute exposure to just two five-year age groups during the 36-month period.

1. Higher age group: A woman's age at the end of the period determines the higher age group. The high age group is calculated by subtracting the women's date of birth from the date of interview minus one (in CMC), dividing the difference by 60 and truncating to a whole number. The number of months spent in the higher age group is the difference in months between her age at the end of the period of exposure (date of interview less one month) and the lower age limit of the age group plus one month. If the number of months in the age group is less than the duration of the time period (36 months), then the woman contributes exposure to both the higher age group and the next lower age group.

2. Lower age group: The contribution to the lower age group is 36 less the number of months in the higher age group. If the number of months in the higher age group is greater than or equal to the duration of the time period (i.e., ³ 36 months), then the exposure in the higher group is the duration and the exposure in the lower age group is zero.

a) Tabulation: Each woman is tabulated twice, once according to her higher age group accumulating the exposure she contributes to that group and once in the lower age group accumulating lower age group exposure. (In ISSA, the same table is used, effectively summing the accumulations within each age group.) For ever-married samples, the exposure is adjusted to represent all women by multiplying by the woman's "all-woman factor" (AWFACTOR), which is derived from the proportion of ever-married women from the household data file. See section on all women factors for details in their calculation.

3. Examples

a) Example 1: A woman interviewed in December 2001, born in May 1970. Her CMC date of interview is 12*(2001 – 1900) + 12 = 1224. The date of the end of the period of exposure is 1224 – 1 = 1223. Her CMC date of birth is 12*(1970 – 1900) + 5 = 845. Her age in months at the end of the period is 1223 – 845 = 378. The age group at the end of the period is 378/60 = 6.3, truncated to 6. This represents age group 30–34 years (30 =

6*5 years interval). The number of months in this age group is 378 – 6*60 + 1 = 19 months. Since this is less than the total number of months during the period (36 months), she contributed 19 months to age group 30–34 during the period and 36 – 19 = 17 months to the age group 25–29 during the period.

b) Example 2: A woman interviewed in December 2001, born in March 1967. Her CMC date of interview is 12*(2001 – 1900) + 12 = 1224. The date of the end of the period of exposure is 1224 – 1 = 1223. Her CMC date of birth is 12*(1967 – 1900) + 3 = 807. Her age in months at the end of the period is 1223 – 807 = 416. The age group at the end of the period is 416/60 = 6.93, truncated to 6. This represents age group 30–34 years (30 = 6*5 years interval). The number of months in this age group is 416 – 6*60 = 56 months. Since the number of months in this age group is greater than 36 months, she contributed 36 months of exposure to age group 30–34 during the period and no exposure to the next lower age group during the period.

c) ASFR: The age-specific fertility rate is calculated as the quotient of the numerator divided by the denominator for each age group, multiplied by 1000. The result is an average rate over the 36-month period, expressed as an annual rate.

Handling of Missing Values

The total number of children to which a woman has given birth is recorded obligatorily by the interviewer; no unknown numbers children are allowed. There are three values involved in the calculation of ASFR, interview date, birth date of woman and birth dates of children. The interview date is always known from fieldwork dates. If missing or unknown, the birth dates of interviewed women and her children are imputed before formation of the standard recode file. See Croft, 1991 on date imputation.

Notes

Births to women at ages less than 15 years or more than 49 years at the time of the birth are not generally included. In a few specific countries, births to girls 10–14 are included.

Births in the month of interview are excluded. This exclusion is because this month does not represent a full month but is censored by the date of interview.

A three-year (36 month) time period is taken for calculating current AFSR. This period is a compromise between the need for recency and reduction of sampling variation.

This time period was selected during the World Fertility Survey, when sample sizes were on usually about 5,000 women. For comparability over time and across surveys, this period has been maintained by DHS.

No adjustment is made for truncation by age. (Women who are at most 49 years at the time of interview were 48 years the year before and 47 years two years before.) The reason no adjustment is made is that the tiny probability of giving birth by women 48 and 49 years of age outweighs the complication of doing the adjustment by single years of age.

In line with general DHS policy, no adjustment is made for possible omission or date misreporting of the dates of birth of children or misreporting of the date of birth of the woman.

For ever-married samples, it is assumed that never-married women have not had any births. Only the denominator of the rates is adjusted to estimate the number of all women.

References

Croft, T. 1991. Date Editing and Imputation. Demographic and Health Surveys World Conference Proceedings, II: 1337–1356. Columbia, Maryland: IRD/ORC Macro.