ISSN NO. 2320-5407

Journal homepage:http://www.journalijar.com
Journal DOI:10.21474/IJAR01

INTERNATIONAL JOURNAL OF ADVANCED RESEARCH

RESEARCH ARTICLE

Gender perspectiveof the demographic and biological profiles of southwestern Nigerians living with HIV infection at presentation (2004 – 2015).

***Ezechi OC, Musa ZA, Onwujekwe DI, Ezeobi PM, Gbajabiamila TA, Gab-Okafor CV, Odunukwe NN, Idigbe EI and Ujah IAO.**

Division of Clinical Sciences Division, Nigerian Institute of Medical Research, Yaba Lagos Nigeria.

Manuscript Info

Manuscript History:

Received: 12 May 2016
Final Accepted: 22 June 2016
Published Online: July 2016

Key words:
HIV, female gender, demographic, biological, late presentation

Corresponding Author

Ezechi OC.

Abstract

Background: Nigeria ranks second in total burden of HIV/AIDS globally and it is estimated that women constitute over half of the population of persons living with HIV/AIDS.Despite the high burden, the epidemiology of HIV in Nigeria, especially in women is not well understood. In this study the gender dimensions of the patients presenting at a large HIV treatment centre is reported.

Methods: Retrospective data analysis of clinical and laboratory information generated during routine patient care. Patients' data were captured with case record forms designed for the programme by clinicians and uploaded into the programme data base by data entry clerks. Study specific data were extracted from the data base, exported and analysed with SPSS for windows version 19.0

Results: A total of 23,734 adult HIV positive patients were seen over the 11 year study period. Yearly enrolment increased steadily from 625 in 2004 to a peak of 2327, with the proportion of women increasing over the years from 60.2% in 2004 to 68.6% in 2015. Trading was the most common occupational group (23.0%), although artisans were in the majority (25.3%) among the female enrollees. Majority were married (64.0%), acquired HIV infection through the heterosexual route (79.4%) and presented at late disease stage (55.3%). More males presented late, and with comorbidities compared to the females ($p < 0.05$). The mean CD4 cell count was 269.3 ± 173.7, with a higher mean baseline in females (290.8 ± 182.1) compared to (228.6 ± 153.1) in the male ($p=0.001$)

Conclusion: Majority of patients were females, traders and infected through heterosexual sex. Over 80% presented at CD_4 count < 500 cell/mm^3, with females presenting at a higher CD_4 count. Prevention programme should target females, traders and artisans, in addition to continue what is currently ongoing to control the epidemic.

Copy Right, IJAR, 2013,. All rights reserved.

Introduction

Human Immunodeficiency Virus infection has become the most important public health challenge in the last few decades, with over 36 million people reported in 2014 alone as living with the infection (1,2). The epidemic targets people in their most productive years, with disastrous economic, political and socio-demographic consequences. It is fatal without life-long treatment with highly active antiretroviral therapy. It's transmission mainly through the sexual routes makes its control difficult even with availability and increased access to antiretroviral drugs (2,3).

Although the new UNAIDS reports show levelling off of the HIV global prevalence as well as a decrease in the number of new infections, sub Saharan African still bears the biggest brunt of the epidemic (1). The burden of HIV/AIDS in sub Saharan Africa varies from country to country with most countries in Southern Africa having a HIV prevalence rate in double digits (3).

Nigeria, although with a low HIV prevalence is second to South Arica in terms of global HIV burden because of its population. The HIV/AIDS burden has continued to be a major threat to the health and socioeconomic live of the population (4). In response to the burden of ill health and deaths among Nigerians due to AIDS, and the unprecedented global efforts at improving care and treatment, the Federal Government of Nigeria started the antiretroviral drug access programme in 2002 (5). Since then HIV care, treatment and support services has expanded to cover virtually the entire country (6).

Nigeria is among the countries with the largest numbers of people on ART, and contributes approximately 6% of the global total (7). Yet, detailed literature search showed limited number of publications on the gender dimensions of individuals enrolled in Nigerian HIV programmes (3,7-9). The available reports are often challenged by methodological and contextual issues. Such information if available are essential for national planning and policy development.

In this study, we report the gender dimensions of the patients presenting at a large HIV treatment centre in Southwestern Nigerian city of Lagos over a period of 11 years.

Methods:-

Study setting:-

The study was conducted at the HIV treatment centre, Nigerian Institute of Medical Research, Lagos. The centre started operation in 2002 following the commencement of the Federal Government of Nigeria ARV access programme. It was among the 25 tertiary health facilities across the country, mainly to provide research back up to the national programme. In 2004 it became one of the centres supported by the Harvard School of Public Health (HSPH), Boston and AIDS Prevention Initiative Nigeria through the PEPFAR Fund. Patients are enrolled into the HIV treatment programme following a referral from the HIV Counselling and Testing Centre or other government of Nigeria HIV treatment centres.

Study population:-

HIV infected adults enrolled in the HIV programme between July 2004 and December 2015.

Study procedure:-

Following referral from the HCT clinic or transfer from other public facilities with evidence of HIV positive test results, the patients are enrolled into the programme after an informed consent. The HIV status of the patients were determined using the recommended Nigerian National HIV screening algorithm based on enzyme linked immunosorbent (ELISA) assays. At enrolment a structured pre-assessment visit form was used to collect patients' socio- demographic and clinical information, physical findings and anthropometric measurements. The baseline and periodic heamatologic, clinical chemistry, CD_4 count and viral loads were determined at the Human Virology Laboratory, while tuberculosis studies were conducted at tuberculosis reference laboratory of the Institute.

Data Management:-

Routinely in the programme, study specific case record forms are used to collect sociodemographic, previous medical and social history, physical examination findings and laboratory test results. The information collected are thereafter entered into the programme database by data entry clerks. Data managers cleaned and validated the data entered by the entry clerks. Eligible for this specific study are patients aged at least 15 years and signed an informed consent at enrolment for their data to be used for research. Data analysis was with SPSS for window version 19.

Results:-

A total of 23,734 patients were seen over the 11 year period. The distribution of the patient by year of enrolment and sex is shown in Table 1. The number of the yearly enrolment in the programme increased steadily from 625 in 2004 to a peak of 2327 in 2011, and decreased to 730 in 2015. However the proportion of women among the enrollees increased over the years from 60.2% in 2004 to 68.6% in 2015.

Sociodemographic profile of the participants:-

The socio-demographic characteristics of the study participants are shown in Table 2. Of the 23,734 adult enrollees during the period, the females were in the majority (15,609; 65.8%). The mean age of study participants was 35.6

years ± 7.2 years (range 15 -82), with the predominant age group being 30-39 years (43.6%). Over 90% of the HIV positive persons in the study were aged 20-49 years (90.3%). Compared to the males (39.7 ± 6.9 years), the females (33.4 ± 6.4 years) were on the average 6 years younger (P=0.029). While age group 20-39 years constitutes the majority (78.8%) in female, it was the age group 30-49 years that were in the majority among the males (76.8%). Sixty four percent of the participants were married; 64.4% and 63.3% respectively among the females and males. The proportion of widows among the female participants were ssignificantly more (4.2%) compared to 2.0% among the male participants (P=0.000). The majority of participants in this study had completed at least a secondary education (95.4%), however a higher proportion of females had less than primary education (5.5%) compared to 3.0% among the males (P=0.00). Most participants were either engaged in trading (23.0%) or artisanal work (21.1%). Employed participants accounted for 18.7% of all participants. While trading was the commonest occupationamong the male participants (41.5%), artisanal work was the commonest occupation among the female participants. Tailoring (5.4%), Hair dressing (4.7%) and Sales girls (4.7%) were the specific common occupational group among the females. A total of 924 (3.9%) participants have had previous antiretroviral drug experience before enrolment in our Centre. A slightly higher proportion of females (4.0%) compared to 3.8% of males have had previous antiretroviral drug experience, although non-significant (P=0.5). While majority of the participants identified heterosexual sex as their possible route of infection (8837; 79.4%), 11.0% reported their possible route of infection as unknown. Only 1.4% of the male participants reported anal sex as their possible route of infection.

Clinical profile of the participants:-

The clinical presentation of participants at enrolment into the HIV programme by sex is shown in Table 3. The majority of the patients presented at late clinical disease stage (54.3%; 10,849). Males (55.3%) were found to present at a more advanced stage of HIV disease than their female (53.8%) counterparts (p=0.029). One thousand four hundred and sixty seven participants were found to be wasted, with significantly more males (7.1%) than females (5.1%) found to be wasted (p=0.00002). The prevalence of pulmonary tuberculosis, HIV associated nephropathy and hypertension among the participants were 33.4%, 0.2% and 6.0% respectively. The burden of these diseases among the male participants were significantly higher than that in the females (P<0.05).

Laboratory profile of the participants:-

The baseline laboratory parameters of the patients are shown in Table 4. The CD_4 cell counts of the participants ranged from 3 – 1736 cells/mm3 with a mean of 256.9±164.5. Majority of the patients had CD_4 cells counts of less than 500 cells/mm^3 (86.3%). More females (14.6%) compared to males (11.8%) presented with CD_4 count of 500 and above (P=0.00). The viral load of the participants ranged from undetected to 16,640,372 copies per ml with a mean of 271,500.0±325,502.8. The mean baseline viral load of the male participants was significantly higher than the female counterparts (P=0.00). Haemoglobin concentration of the participants ranged from 1.5 to 17.6 g/dl with a mean of 10.4 ± 1.7. A significantly more women (69.1%) had haemoglobin less than 11g/dl compared to 30.9% among the males (p=0.00). The prevalence of hepatitis B and C coinfection among the participants were 4.8% and 1.9% respectively. While there were no difference in the burden of hepatitis C infection between male and female subjects (p=0.58), the males (6.1%) had significantly (p=0.00) higher prevalence of Hepatitis B infection compared to the females (4.1%).

Discussion:-

This study reports the demographic, clinical and laboratory characteristics of HIV positive adults seen at a large HIV treatment centre in southwestern Nigeria over a decade. It addresses the issue from gender perspective, which hitherto was not readily available.

The females were in the majority (65.8%) and the proportion increased over the years from 60.2% in 2004 to 68.6% in 2015. Over 90% of the HIV positive persons in the study were aged 20-49 years (90.3%), with females on the average six years younger than their male counterparts (P=0.029). Majority of the participants were married (64.0%), had at least a secondary education (74.4%), are either artisan or traders (44.1%) and contacted HIV through heterosexual intercourse (79.4%). Trading and Artisanal work was the commonest specific occupational groups among the males and females respectively. The majority of the patients presented with advanced diseases (54.3%), with higher proportion of males (55.3%) than females (53.8%) enrolled at the late stage of the disease (p=0.029). Comorbidities of pulmonary tuberculosis, HIV associated nephropathy and hypertension were common at 33.4%, 0.2% and 6.0% respectively, with male predominance (P<0.05). More males than females had Hepatitis B co infection. Majority of the patients presented with CD_4 cells counts of less than 500 cells/mm^3 (86.3%). More females (14.6%) compared to males (11.8%) presented with CD_4 count of 500 and above (P=0.00).

The observed female preponderance (65.8%) in this study is in keeping with findings of previous studies (1, 2). In this study we also observed an increasing trend of female preponderance over the years. Increasingly over the years it has been observed that the HIV epidemic that started among gay men in United States of America is now wearing a woman face globally and nationally (1-4). A number of studies especially in subSaharan Africa have noted this (5,3,6,7). Although high risk sexual behaviour is much more common among young men, females are disproportionately affected by HIV (3,8-11). In many countries including Nigeria, young women have been found to be five times more likely to be infected with HIV than their male counterparts (3,11-13). Women and girls often face discrimination in terms of access to education, employment and healthcare and as such cannot always practice safer sex even when they know the risks involved (14). Gender-based violence has been identified as a key driver of HIV transmission within African subregion (16). In Nigeria, a number of factors have been documented to account for higher prevalence of HIV infection among women. These include, practice of wife inheritance, early age of sexual debut, poverty, , labour migration, early age at first marriage, stigma and discrimination, low illiteracy level, practice of Female Genital Mutilation (FGM) and a number of other harmful cultural practices (3, 12). It is important to note that a number of studies from SouthEast Asia reported higher burden of HIV infection among males than females (2, 16-19). This phenomenon has been attributed to the migration of young men from rural area to the metropolitan cities in search of work. The long absence from their spouse put them at greater risk for HIV infection because of their engagement in transactional sex (2, 16,18). In addition, because of the existing social milieu in these setting, females do not seek medical care because of fear of ostracism,gender bias, social stigma and neglect attached with the disease (16-19).

Over 90% of the HIV positive persons in this study were aged 20-49 years, which is the sexually active and productive age group. The findings are similar to the findings of previous studies in sub-Saharan Africa and South-East Asia (2, 3, 16, 19). This segment of the population is more affected because they are economically productive hence with more disposable income and sexually more active (16,18). The females on the average were found to be younger than their male counterparts. The higher age of males in this study highlights the role men play in fueling the HIV/AIDS epidemic. The practice of older men having sexual intercourse with younger female partners is believed to be a significant contributor to the spread of HIV infection (19,20).

The high burden of infection among the married (64.0%) in this study is very worrisome as it has a significant implication for the transmission of HIV infection within the population. This puts a lie to the attitude of the people that HIV/AIDS is the product of premarital promiscuous sex life. The finding is however not an isolated case as in the last few years it has been reported that the greatest increase in new infection was among persons in stable relationship (1,3). The increased infection among married persons also has an implication for the prevention of mother to child transmission of HIV infection.

Heterosexual intercourse in this study like previous studies has remained the commonest route of transmission reported by the patients. In previous studies in our environment and other high burden countries of subSaharan Africa and South East Asia , heterosexual intercourse was reported to be main route of transmission (2,3,6,17-19). It is however important to state that although heterosexual contact appeared to be the predominant mode of HIV transmission in our environment, the exact pattern of HIV transmission in Nigeria is yet to be studied (21). According to the National Action Committee on AIDS, heterosexual transmission probably accounts for about 80% or more of cases of HIV infection in Nigeria (22). Surprising in this study is the number of males (112;1.4%) who reported anal sexual intercourse as their possible route of infection. It is similar to 1.2% previously reported in our environment (21). Information on men that have sex with men is limited in Nigeria, possibly due to under-reporting resulting from patients hiding their sexual orientation (21).After the signing of the Same-Sex Marriage (Prohibition) Act 2013 in Nigeria, there were media reports portraying widespread societal intolerance towards the lesbian, gay, and bisexual population (23). Human right advocates and health workers argued that the ban will drive the practice underground because of fear of stigmatization, discrimination and violence, resulting in increased HIV incidence among these at risk population (24). This finding is obviously not supporting the expressed fear. It may be argued that the finding is due to patients enrolled before the law was passed 2013, detailed analysis of the data showed that over 30% of the men that reported having sex with men were in patients enrolled after 2013. The increased reporting of anal sex as probably route of transmission in this study may be as a result of patients having confidence in the health worker's ability to protect their privacy, aware that the 2013 act did not prohibit provision of health services to MSM and natural instinct to sort for help which overcame the fear of stigma and discrimination.

In Nigeria, some key populations have been identified to be at risk of HIV infection and includes, sexworkers, long-distance truck drivers, MSM and members of the armed forces. This was not the case in our study, in which traders were found to be most commonly affected. This finding is similar to previous studies in our environment (3,21). According to Ojini and Coker (21), "many of these traders are poorly educated young men and women who have left their rural communities to come to Lagos to engage in buying and selling. Far from home and without the stabilizing influence and care of close friends and relatives, many of these young adults are tempted into high-risk sexual behaviour, such as early initiation of sex, premarital sex, multiple sexual partners and commercial sex". The behaviour of these traders are similar to the sexual behaviour of the gold miners of Southern Africa (25,26). A number of studies have shown that people who are mobile tend to be at higher risk for HIV and other sexually transmitted diseases(STDs) than people in more stable living arrangements (27-30). This may be the case in our environment. It is now time to classify Nigerian traders as another vulnerable group that merit targeted HIV-prevention programmes, especially as a number of studies in Nigeria outside our setting have also identified traders as a particularly high risk group (2,6,8,9,12,21). The traditional high risk group that include military men were found to be low. The Nigerian Military in the last few years established a non-stigmatizing and non-discriminating HIV programme in the barracks and cantonment. A number of these barracks are located around the clinic of study and military personnel may have preferred the clinic ran by military authorities.

More than half of the patients in this study presented at late clinical disease stage, with more males than females presenting in this late stage (p=0.029). The proportion of persons presenting late in this study of 54.3% is similar to range of 35–65 % reported previously in subSaharan Africa (31-35). This finding has major implication for treatment outcome and survival, as the health status of patients at the time of presentation and initiation of ART plays an important role in the success of treatment. Patients with late stage disease are less likely to respond to treatment, more likely to place financial strain on health services, and have a higher mortality rate compared to those who presented in stage 1 and II (31). Current efforts at encouraging HIV testing and early treatment should be intensified in other to reduce the economic burden and poor treatment outcome associated with late presentation.The late presentation of the patients in this study is typified by high prevalence of pulmonary tuberculosis and other medical conditions consequence on HIV direct insult on specific organs like the kidney. The burden of co-morbidities that was found to be higher among the males compared to females may be a reflection of similar trend in the general population.

Our study reported an overall mean CD_4 cell counts of 256.9±164, with a higher value among the females compared to males. This finding is comparable to studies in Nigeria and other subSaharan African countries (36-40). The higher CD_4 count in females may reflect more women presenting at earlier stage of HIV disease , a higher CD4 count levels in females observed in healthy HIV positive Nigerians (37, 41,42), or better health seeking behaviour among the females , which makes them to report earlier in the disease evolution. Female sex hormone effect is another possible explanation for the reported difference in CD_4 counts between males and females that has been suggested (39,43).

In 2014, the Nigerian National Guideline (44) changed its HAART initiation threshold from less than 350 to 500 cells/mm^3. Using this new threshold over eighty percent of our patients would have been eligible for HAART. The 2016 WHO Guideline of test and treat has generated so much controversy in Nigeria, with opponents suggesting that the country programme may not be able to manage a huge increase in the number of HIV infected persons eligible for ART as a result of the policy shift (45). However projecting from this study, it is obvious that only an additional 14.7% of the patients will be put on treatment. The advantages of test and treat which includes reduction in new infection, elimination of the epidemic and reduction in ART costs (46,47) obviously will in the long term out way the short term logistic and resources challenges(48).
This study although has attempted to narrow the gap in knowledge as it relates to demographic and biological characteristics of patients at enrolment is not without some limitations. It is a retrospective review of an existing data base, as such some data points were not available. The large number of participants in this study may have reduced the effect of such loss of data points.

Conclusion:-

Majority of patients in this study were females, traders and infected through heterosexual sex. Over 80% presented at CD_4 count of less than 500 cell/mm^3, with females presenting at a higher CD_4 count. In addition to what is

currently been done to control the epidemic, prevention programme should begin to target traders, artisans and men that have sex with men.

Table 1:-Distribution of patient in the study by year and sex (2004 – 2015)

Year of enrolment	All patient	Male	Female	Female as percentage all patient (%)
2004	625	249	376	60.2
2005	1910	720	1190	62.3
2006	2277	854	1423	62.5
2007	2868	987	1881	65.6
2008	2989	1040	1949	65.2
2009	2657	925	1732	65.2
2010	2318	749	1569	67.7
2011	2327	740	1587	68.2
2012	1644	520	1124	68.4
2013	2211	743	1468	66.4
2014	1178	369	809	68.7
2015	730	229	501	68.6
Total	23,734	8,125	15,609	65.8

Table 2:-Socio-demographic determinants of study participants (n = 23,734).

Characterisitics	Total (%)n=23,734	Males (%)n=8,125	Female (%)n=15,609
Age			
<20	308(1.3)	89(1.1)	219(1.4)
20 - 29	6046(25.5)	731(9.0)	5315(34.1)
30 - 39	10,355(43.6)	3372(41.5)	6983(44.7)
40 - 49	5022(21.2)	2868(35.3)	2154(13.8)
50 - 59	1540(6.5)	853(10.5)	687(4.4)
60 - 69	351(1.5)	179(2.2)	172(1.1)
70 - 82	49(0.2)	33(0.4)	16(0.1)
Marital Status			
Married	15193(64.0)	5147(63.3)	10046(64.4)
Single	5661(23.9)	2024(24.9)	3637(23.3)
Divorced/separated	2062(8.7)	792(9.7)	1270(8.1)
Widow	818(3.4)	162(2.0)	656(4.2)
Educational status			
Less than primary	1102(4.6)	244(3.0)	858(5.5)
Primary	4965(20.9)	1812(22.3)	3153(20.2)
Secondary	10529(44.4)	3599(44.3)	6930(44.4)
Tertiary	7129(30.0	2462(30.3)	4667(29.9)
Occupation			
Not working	4430(18.7)	712(8.8)	3718(23.8)
Unskilled	3045(12.8)	1096(13.5)	1949(12.5)
Artisan	5006(21.1)	1050(12.9)	3956(25.3)
Trading	5465(23.0)	3372(41.5)	2093(13.4)
Civil Servant	2629(11.1)	818(10.1)	1811(11.6)
Professionals/Business Executive	1774(7.5)	729(9.0)	1045(6.7)
Military/Paramilitary	299(1.3)	268(3.3)	31(0.2)
Religious person	86(0.4)	80(1.0)	6(0.04)
HIV Risk			
Heterosexual	18837(79.4)	6669(82.1)	12168(78.0)
Intravenous drug use	14(0.01)	5(0.1)	9(0.1)
Blood Transfusion	1057(4.5)	202(2.5)	855(5.5)
MSM	112(0.5)	112(1.4)	-(-)
PMTCT	46(0.2)	17(0.2)	29(0.2)

Not known	2607(11.0)	802(9.9)	1805(11.6)
Previous ARV experience	924(3.9)	306(3.8)	618(4.0)

Table 3:-Clinical characterisitics of the participants at presentation by sex

Clinical Features	**Total n = 23,734(%)**	**Male n = 8,125(%)**	**Female n = 15,609(%)**	**P value**
Wasting disease	2397(10.1)	918(11.3)	1479(9.5)	0.00001
Pulmonary TB	7927(33.4)	2917(35.9)	5010(32.1)	0.0000
HIVAN	38(0.2)	24(0.3)	14(0.09)	0.0003
Hypertension	1423(6.0)	658(8.1)	765(4.9)	0.0000
WHO disease stage				
I and II	10849(45.7)	3632(44.7)	7210 (46.2)	
III and IV	12885(54.3)	4493(55.3)	8339 (53.8)	0.029

HIVAN: HIV associated nephropathy

Table 4:-Laboratory characterisiticsof the participants at presentation by sex

Laboratory parameters	**Totaln = 23,734(%)**	**Male n = 8,125(%)**	**Femalen = 5,609(%)**	**P value**
CD_4 count				
Range	3 – 1896	3 – 1848	3 – 1896	
Mean	269.3 ± 173.7	228.6 ± 153.1	290.8 ± 182.1	0.001
< 200	11132(46.9)	4420(54.4)	6712(43.0)	
200 - 499	9351(39.4)	2744(33.8)	6606(42.4)	
≥500	3252(13.7)	956(11.8)	2291(14.6)	0.000
Viral load				
Range	20 – 16,640,372	200 – 16,162,080	20 – 16,640,372	
Mean	271,500.0±325,502.8	322,476.5±365,741.2	244,811.7±301,876.2	0.00
≤ 100,000	13,924(58.7)	4184(51.6)	9740(62.4)	
>100,000	9,810(41.3)	3941(48.5)	5869(37.6)	0.00
Haemoglobin				
Range	1.5 – 17.6	1.5 – 17.6	1.5 – 17.3	
Mean	10.4 ± 1.7	11.1 ± 2.0	10.0 ± 1.5	
< 11	13297(56.0)	2511(30.9)	10786(69.1)	0.00
≥ 11	10437(44.0)	5614(69.1)	4823(30.9)	
Hepatitis B Co-infection	1136(4.8)	496(6.1)	640(4.1)	0.000
Hepatitis C Co-infection	460(1.9)	163(2.0)	297(1.9)	0.58
Hepatitis B and C Co-infection	64(0.3)	32(0.4)	32(0.2)	0.008

References:-

1. UNAIDS. Global Statistics 2015. In: UNAIDS Facts sheet 2016. http://www.unaids.org/sites/default/files/media_asset/UNAIDS_FactSheet_en.pdf
2. Jha AK, Chadha S, Uppal B, Bhalla P, Jugal K, Dewan R. Socio-demographic and immunological profile of HIV patients attending ART clinic in a tertiary care hospital in North India. J HIV Clin Scientific Res 2014; 1(1): 007-010. DOI: 10.17352/2455-3786.000002
3. Laah JG, Ayiwulu E. Socio-demographic characteristics of patients diagnosed with HIV/AIDS in NasarawaEggon. Asian Journal of Medical Sciences. 2010;2(3):114-20.
4. Ezechi OC, David AN, Gab-Okafor CV, Ohwodo H, Oladele DA, Kalejaiye OO et al. Incidence of and socio-biologic risk factors for spontaneous preterm birth in HIV positive Nigerian women. BMC pregnancy and childbirth. 2012 Sep 9;12(1):1.
5. Ezechi OC, Gab-Okafor CV, Oladele DA, Kalejaiye OO, Oke BO, Ohwodo HO, et al. Pregnancy, obstetric and neonatal outcomes in HIV positive Nigerian women. African journal of reproductive health. 2013;17(3):160-8.
6. Idigbe, E.O., Adewole, T.A., Eisen, G., Kanki, P., Odunukwe, N.N., Onwujekwe, D.I. Management of HIV-1 infection with a combination of nevirapine, stavudine, and lamivudine: a preliminary report on the Nigerian antiretroviral program. *JAIDS* Journal of Acquired Immune Deficiency Syndromes, 2005; *40*(1), pp.65-69.
7. Word Health Organisation. Guideline on when to start antiretroviral therapy and on pre-exposure prophylaxis for HIV 2015. http://www.who.int/hiv/pub/guidelines/earlyrelease-arv/en/

8. Adejuyigbe EA, Fasubaa OB, Onayade AA. Sociodemographic characteristics of HIV-positive mother-child pairs in Ile-Ife, Nigeria. AIDS care. 2004;16(3):275-82.
9. Adebayo, S.B., J. Anyanti, O. Ladipo, A. Ankomah,B. Ekweremadu and I. Okekearu,.Understanding the relationship between HIV/AIDS,gender and marital status: evidence from a nationalpopulation-based HIV testing in Nigeria. Being aPaper presented at the 137th American Public healthAssociation Conference, 2009; 7-11 November,Philadelphia, Pennsylvania.
10. Ugwu, DS. Socio-economic impact of HIV/AIDSon farm women in Nigeria: Evidence from EnuguState. World Appl. Sci. J., 2009; 6(12): 1617-1624.
11. Bremner, J., C. Haub, M. Lee, M. Mather, E. Zuehlke. World population highlights: Key findingsfrom PRB's 2009 world population data sheet. Popul.Bull., 2009;64(3): 2-12.
12. Laah, J.G. The prevalence of HIV/AIDS in Zaria, Kaduna State. J. Popul. Assoc. Nigeria. 2003, 3(1): 95-101.
13. Mamman, M.. Gender HIV-infection and AIDS - Related deaths in sub-Saharan Africa. J. Popul. Assoc. Nigeria 2003; 3(1): 79-94.
14. Ezechi OC, Gbajabiamilla TA, Gab-Okafor CV, Oladele DA, Ezeobi PM, Ujah IA. Contraceptive behavior, practices and associated factors among Nigerian women living with human immunodeficiency virus infection. Journal of HIV and Human Reproduction. 2013;1(1):30.
15. Ezechi OC, Gab-Okafor C, Onwujekwe DI, Adu RA, Amadi E, Herbertson E. Intimate partner violence and correlates in pregnant HIV positive Nigerians. Archives of gynecology and obstetrics. 2009;280(5):745-52.
16. UmeshSJ ,Deepali SD , Rajesh NL, Sonali GC, Vilas RM , Harshada HU. Sociodemographic and clinical profile of HIV/AIDS patients visiting to ART Centre at a rural tertiary care hospital in Maharashtra state of India.Int J Biol Med Res. 2012; 3(2): 1568-1572
17. Sonani HP, Undhad AM, Savani GT. Clinical and socio-demographic profile of patients registered at ART centre, SMIMER, Surat. National Journal of Community Medicine 2011; 21: 130-132.
18. Khan MA. Socio-demographic and clinical profile of people living with HIV/Aids. Asian Journal of Medical Sciences (E-ISSN 2091-0576; P-ISSN 2467-9100). 2014;3(2):1-0.
19. Vickers IE, Alveranga H, Smikle MF. Clinical and epidemiological characteristics of adult and adolescent patients newly diagnosed with the human immunodeficiency virus at a Jamaican clinic for sexually transmitted infections. West indian medical journal. 2005;54(6):360-3.
20. UNICEF/UNAIDS/WHO. Young people and HIV/AIDS: opportunitiesin crisis. United Nations Children Fund, Joint United Nations Programmeon HIV/AIDS and World Health Organization. 2002: 11–22.
21. Ojini FI, Coker A. Socio-demographic and clinical features of HIV-positive outpatients at a clinic in south-west Nigeria. African Journal of AIDS Research. 2007;6(2):139-45.
22. National Action Committee on AIDS (NACA) (2004) National HIV &AIDS Behaviour Change Communication 5-year Strategy (2004–2008). Available at: www.naca.gov.ng/publications (Accessed 09 October 2009).
23. Sekoni AO, Jolly K, Gale NK, Ifaniyi OA, Somefun EO, Agaba EI et al. Provision of Healthcare Services to Men Who Have Sex with Men in Nigeria: Students' Attitudes Following the Passage of the Same-Sex Marriage Prohibition Law. LGBT health. 2016 Apr 19.
24. Schwartz, S.R., Nowak, R.G., Orazulike, I., Keshinro, B., Ake, J., Kennedy, S. et al . The immediate effect of the Same-Sex Marriage Prohibition Act on stigma, discrimination, and engagement on HIV prevention and treatment services in men who have sex with men in Nigeria: analysis of prospective data from the TRUST cohort. The Lancet HIV 2015;2(7): 299-306.
25. Meekers D. Going underground and going after women: trends in sexual risk behaviour among gold miners in South Africa. International journal of STD & AIDS. 2000 ;11(1):21-6.
26. Lurie MN, Williams BG, Zuma K, Mkaya-Mwamburi D, Garnett GP, Sturm AW. The impact of migration on HIV-1 transmission in South Africa: a study of migrant and nonmigrant men and their partners. Sexually transmitted diseases. 2003;30(2):149-56.
27. Pison G, Le Guenno B, Lagarde E, Enel C, Seck G. Seasonal migration: a risk factor for HIV in rural Senegal. J AIDS 1993; 6:196– 200.
28. Legarde E, Pison G, Enel C. A study of sexual behaviour change in rural Senegal. J AIDS 1996; 11:282 – 287.
29. Mbizvo MT, Machekano R, McFarland W, et al. HIV seroincidence and correlates of seroconversion in a cohort of male factory workers in Harare, Zimbabwe. AIDS 1996; 10:895 – 901.
30. Brewer TH, Hasbun J, Ryan CA, et al. Migration, ethnicity and environment: HIV risk factors for women on the sugar cane plantations of the Dominican Republic. AIDS 1998; 12:1879 - 1887.
31. Kigozi IM, Dobkin LM, Martin JN, Geng EH, Muyindike W, Emenyonu NI, Bangsberg DR, Hahn JA. Late disease stage at presentation to an HIV clinic in the era of free antiretroviral therapy in sub-Saharan Africa. Journal of acquired immune deficiency syndromes. 2009;52(2):280.
32. Abaynew Y, Deribew A, Deribe K. Factors associated with late presentation to HIV/AIDS care in South WolloZoneEthiopia: a case-control study. AIDS research and therapy. 2011;28;8(1):1.

33. Geng EH, Hunt PW, DieroLO, Kimaiyo S, Somi GR, Okong P. Trends in the clinical characteristics of HIV-infected patients initiating antiretroviral therapy in Kenya, Uganda and Tanzania between 2002 and 2009. Journal of the International AIDS Society. 2011;28;14(1):1.
34. Mulissa Z, Jerene D, Lindtjørn B. Patients present earlier and survival has improved, but pre-ART attrition is high in a six-year HIV cohort data from Ethiopia. PloS one. 2010;5(10):e13268.
35. Lahuerta M, Lima J, Nuwagaba-Biribonwoha H, Okamura M, Alvim MF, Fernandes R, Assan A, Hoos D, Elul B, El-Sadr WM, Nash D. Factors associated with late antiretroviral therapy initiation among adults in Mozambique. PLoS One. 2012;7(5):e37125.
36. Omoti CE, Udezi WA, Edoise RE. Haematological aspects of antiretroviral naïve HIV patients in a Nigerian tertiary hospital: laboratory and clinical considerations. International Journal of Biological and Chemical Sciences. 2007;1(2):176-80.
37. Glynn JR, Caraël M, Auvert B, Kahindo M, Chege J, Musonda R, Kaona F, Buvé A, Study Group on the Heterogeneity of HIV Epidemics in African Cities. Why do young women have a much higher prevalence of HIV than young men? A study in Kisumu, Kenya and Ndola, Zambia. Aids. 2001;15:S51-60.
38. Akinbami A, Oshinaike O, Adeyemo T, Adediran A, Dosunmu O, Dada M, Durojaiye I, Adebola A, Vincent O. Hematologic abnormalities in treatment-naive HIV patients. Infectious Diseases: Research and Treatment. 2011;3:45.
39. Akinbami A, Dosunmu A, Adediran A, Ajibola S, Oshinaike O, Wright K, Arogundade O. CD4 count pattern and demographic distribution of treatment-naive HIV patients in Lagos, Nigeria. AIDS Research and Treatment. 2012.
40. Tugume SB, Piwowar EM, Lutalo T, Mugyenyi PN, Grant RM, Mangeni FW, Pattishall K, Katongole-Mbidde E. Hematological reference ranges among healthy Ugandans. Clinical and diagnostic laboratory immunology. 1995;2(2):233-5.
41. Oladepo DK, Idigbe EO, Audu RA, Inyang US, Imade GE, Philip AO, Okafor GO, Olaleye D, Mohammed SB, Odunukwe NN, Harry TO. Establishment of reference values of CD4 and CD8 lymphocyte subsets in healthy Nigerian adults. Clinical and Vaccine Immunology. 2009 ;16(9):1374-7.
42. Aina O, Dadik J, Charurat M, Amangaman P, Gurumdi S, Mang E, Guyit R, Lar N, Datong P, Daniyam C, Kanki P. Reference values of CD4 T lymphocytes in human immunodeficiency virus-negative adult Nigerians. Clinical and diagnostic laboratory immunology. 2005;12(4):525-30.
43. Prins M, Robertson JR, Brettle RP, Aguado IH, Broers B, Boufassa F, Goldberg DJ, Zangerle R, Coutinho RA, van den Hoek A. Do gender differences in CD4 cell counts matter?. Aids. 1999;13(17):2361-4.
44. Federal Ministry of Health. Integrated National Guidelines forHIV Prevention, Treatment and Care, Federal Ministry of health Abuja, Nigeria, (2014).
45. World Health Organisation. Consolidated guidelines on the use of antiretroviral drugs for treating and preventing HIV infection. WHO Geneva 2016. http://www.who.int/hiv/pub/arv/arv-2016/en/
46. Granich RM, Gilks CF, Dye C, De Cock KM, Williams BG. Universal voluntary HIV testing with immediate antiretroviral therapy as a strategy for elimination of HIV transmission: a mathematical model. The Lancet. 2009;373(9657):48-57.
47. Walensky RP, Paltiel AD, Losina E, Morris BL, Scott CA, Rhode ER, Seage GR, Freedberg KA, CEPAC Investigators. Test and treat DC: forecasting the impact of a comprehensive HIV strategy in Washington DC. Clinical Infectious Diseases. 2010;51(4):392-400.
48. Kulkarni SP, Shah KR, Sarma KV, Mahajan AP. Clinical uncertainties, health service challenges, and ethical complexities of HIV “test-and-treat”: a systematic review. American journal of public health. 2013;103(6):e14-23.