FACTORS ASSOCIATED WITH HIV INFECTION AMONG CLIENTS ACCESSING HIV COUNSELING AND TESTING SERVICES IN A SECONDARY REFERRAL HOSPITAL IN LAGOS, NIGERIA

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**Abstract**

**Background:** HIV counselling and testing (HCT) provides an opportunity for people to learn more about the human immune deficiency virus (HIV). This study assessed the knowledge of, and factors associated with, HIV infections among clients assessing HCT services referral hospital in Lagos, Nigeria.

**Materials and Methods:** Retrospective review of records of clients who assessed HCT services at Mainland Hospital Lagos, Nigeria, between July 1, 2016, and December 31, 2017, was done. Multivariate analysis was done to identify the factors associated with HIV infection and knowledge of HIV.

**Results:** A total of 4273 clients were screened for HIV within the study period. The mean age of clients was 38.5±14.4. Male:Female ratio was 1.087. The prevalence of HIV infection was 19%. Factors associated with HIV infection were: age above 24 years, being female (AOR 1.6 95% CI 1.4–2.0, p<0.001), previous marriage (divorced, widowed, separated) (AOR 2.3 95% CI 1.7–3.3, p<0.001) and poor knowledge of HIV (AOR 2.9 95% CI 2.2–3.6, p<0.001). Males were 15 times more likely to have good knowledge of HIV than females (AOR 14.5 95% CI 10.5–20.0, p<0.001). In addition, the clients who were single (AOR 3.6 95% CI 2.4–5.4, p<0.001) and married (AOR 3.9 95% CI 2.9–5.3, p<0.001) were four times more likely to have good knowledge of HIV than clients who were previously married.

**Conclusion:** More proactive measures are required to educate the public, especially women who were previously married, on HIV transmission and prevention.

**Key Words:** Clients, HIV, HIV counselling and testing, Knowledge of HIV, Lagos, Nigeria.

**List of abbreviations:** AIDS – Acquired Immune deficiency syndrome, AOR – Adjusted odds ratio, ARV – Anti-retroviral drugs, CI – Confidence interval, COR – Crude odds ratio, FHI 360 – Family Health International, HCT – HIV counselling and testing, HIV – Human immune deficiency virus, MDR-TB- Multi-drug resistant Tuberculosis, MSM – Men sleeping with men, p – p value, PLWHA- People living with HIV/AIDS, SPSS – Statistical Package for Social Sciences, STI – Sexually transmitted infection, TB – Tuberculosis, FMOH- Federal Ministry of Health, NACA - Nigeria National Agency for the Control of AIDS UNICEF- United Nations Children’s Fund, NPC - Nigeria Population Commission, UNAIDS- The Joint United Nations Programme on HIV and AIDS

**Introduction**

HIV Counselling and Testing (HCT) is the first step to HIV management and other support services. It allows clients the opportunity to know their HIV status and get to know more about the human immune deficiency virus (HIV). It enhances and provides
the needed change in behaviour, psychological and emotional support to people living with HIV/AIDS (PLWHA). HCT also foster social integration and reduces the stigma associated with HIV in the community (FMOH, 2011).

The Nigerian government aimed to provide HIV counselling for at least 80% (about 80 million) of the sexually active population by 2015 through the provision of physical access to HIV related services. However, the demand for HCT in the country was very low despite the adoption of the client and the provider-initiated counselling and testing approaches (FMOH, 2011; UNAIDS, 2016). The inadequate availability of HIV testing kits, wrong perception of the end-users about HCT centers, and the inadequate number of facilities providing HCT services are reasons for low uptake of HCT in Nigeria (NACA, 2010a).

The Nigeria National Agency for the Control of AIDS reported that the number of HCT sites was low (34%) compared to the number required to provide effective coverage in the country (NACA, 2010b).

HIV remains a public health issue in Nigeria, despite the reduction in its prevalence in the last decade. Although the prevalence of HIV among adult is low (3.4%), but in actual numbers, the country has the second-largest HIV epidemic globally after South Africa, based on the population (UNAIDS, 2016). Heterosexual intercourse accounts for 80% of HIV infection in the country but transmission through intravenous drug use and same-sex intercourse are increasing in Nigeria and could contribute to 40% of new infections (NACA, 2015). There is, therefore, a need to create more awareness and intensify efforts aimed at increasing the knowledge of Nigerians of HIV. Age, gender, educational status, marital status and knowledge of HIV have been associated with HIV infection among HCT clients (Zheng et al, 2010; Peltzer, 2012).

A survey reported that the general awareness of HIV in Nigeria is high (FMOH, 2013), however, the comprehensive knowledge of HIV prevention is poor (34% and 24% among men and women, respectively) which is lower than the West and Central Africa rate (UNICEF, 2011). The comprehensive knowledge of HIV prevention was associated with educational and socio-economic status (UNICEF, 2011). To the best of the authors’ knowledge, few studies have assessed the knowledge of clients accessing HCT services in Nigeria. This study assessed the knowledge and factors associated with HIV infection among clients undertaking HCT services in a secondary referral hospital in Lagos, Nigeria.

Materials and Methods

Study design

A cross-sectional study was conducted by reviewing records of clients who assessed HCT services at Mainland Hospital Lagos, Nigeria, between July 1, 2016, and December 31, 2017, was conducted.

Study background HIV counselling and testing in Lagos, Nigeria

The study location was Mainland Hospital Lagos, Nigeria, a secondary referral hospital for treatment of infectious diseases like tuberculosis (TB), HIV/AIDS, multi-drug resistant TB MDR-TB), Cholera, Ebola virus disease and Lassa fever in Lagos state Nigeria. HIV treatment in the hospital commenced in 2000, supported by Family Health International (FHI 360). HIV test, laboratory test (CD 4 count and viral load) and antiretroviral drugs (ARVs) were at no cost to the patients. About 12,000 clients had been enrolled for ARVs in the hospital as at the end of 2017.

HCT was integrated into the services offered at Mainland hospital and as such, it was offered to all patients assessing services at the hospital by trained counsellors according to the National guidelines for HIV counselling and testing (FMOH, 2011). HCT involves pre-test counselling in which basic facts of HIV/AIDS are provided, HIV rapid test and the meaning of the results were explained. Also, HIV risk behaviours, risk reduction strategies and available support systems were explored. Issues relating to disclosure and informed consent before conducting HIV test were also discussed (FMOH, 2011). Post-test counselling (offered to all clients regardless of the HIV test outcome) involves: discussion of HIV results and highlighting the window period for HIV negative clients, risk reduction plan review, discussion on positive living for HIV positive clients, disclosure of status to spouse and counsel for a partner to do HIV test.

Adherence counselling was offered to all HIV positive clients before anti-retroviral drugs initiation. They were also referred for other supportive services such as treatment of opportunistic infections, sexually transmitted infections (STIs) and TB management, prevention of mother-to-child transmission, family planning, nutrition and psychological support as the case may be (FMOH, 2011). Findings from the pre- and post-test counselling in addition to the clients’ details were entered into the HCT client intake form. The HCT client intake form is a harmonized tool designed by the Federal Government of Nigeria in partnership by implementing partners to capture details of pre- and post-test counselling findings of clients seeking HCT services.

HIV was diagnosed using HIV rapid test kits. No further test was carried out if the result was negative, however, in a positive test, confirmation was done with Uni-Gold rapid kit. A concordance result was regarded as positive, otherwise, STAT-PAK® was used as a tie-breaker.

Inclusion and exclusion criteria: All available records of patients that accessed HCT services during the period under review were included for analysis. Others were excluded.
Evaluation of knowledge of HIV infection

Clients’ knowledge of HIV infection was assessed based on 6 sets of questions relating to knowledge of clients about HIV transmission routes, risk factors for HIV transmission, prevention of HIV transmission methods, the possible outcome of HIV test and previous HIV test on the client intake form. A correct answer was scored one mark while a wrong answer was scored zero. The mean score of the study population was used as the cutoff. Clients with scores above the average score were classified as having good knowledge of HIV, while clients with scores below the sample average score of the population were classified as having poor knowledge of HIV.

Data analysis

Data analysis was conducted using the Statistical Package for Social Sciences (SPSS) IBM version 22. Numerical variables were represented by percentages, mean and standard deviation. Knowledge of HIV and HIV status were the outcome variables. Categorical variables were compared using the chi-squared test. Multivariate analysis was done to identify the correlates of HIV infection and knowledge of HIV. For all statistical tests p<0.05 was considered statistically significant.

Ethical considerations

The Health Research and Ethical Committee of the Lagos State University Teaching Hospital granted the ethical approval (Reg. No. NHREC04/04/2008, approved on 31/07/2018) for the study. Also, written permission to use data was obtained from the Management of Mainland Hospital, Lagos. Clients’ confidentiality was maintained by de-identifying the data before data entry and analysis.

Results

A total of 4,273 clients were screened for HIV within the study period. Of these, 38.1% and 61.9% were screened in 2016 and 2017, respectively. The mean age of clients was 38.5±14.4. Males were more than females except for the clients below 25 years. About 33%, 59% and 8% of the clients were single, married and previously married, respectively, as shown in Table 1. The association between knowledge of HIV and HIV infection is shown in Table 2. The HIV prevalence within the study period was 19%. HIV prevalence was higher among clients who were not previously tested (22.5%) and they had 2-fold chance of being HIV positive, compared to clients who had HIV test previously (18.3%) (AOR 2.1, 95% CI 1.7–2.6, p<0.001). There was 30% chance of clients not informed of HIV transmission routes to be HIV positive compared with clients informed of HIV transmission routes (AOR 1.3, 95% CI 1.0–1.7, p=0.040). Clients not informed about HIV transmission methods had 7-fold chance of having HIV infection than clients who knew about the methods of preventing HIV transmission (AOR 6.8, 95% CI 1.5–30.8, p=0.013).

The socio-demographic factors associated with HIV infection is shown in Table 3. The odds of having HIV infection was 3-fold higher (AOR 3.1 95% CI 2.1–4.5, p <0.001) among clients 25–34 years, 5-fold higher (AOR 5.3 85% CI 3.6–7.9, p<0.001) among clients 35–44 years, 5- fold more (AOR 4.9 95% CI 3.2–7.4, P<0.001) among clients 45–54 years and 2-fold higher (AOR 2.0 95% CI 1.2–3.3, p=0.006) among clients 55–64 years than clients less than 25 years. Females had a 60% chance of having HIV than males (AOR 1.6 95% CI 1.4–2.0, p<0.001). Clients who were previously married (divorced, widowed, separated) had 130% chance of having HIV than clients who were single (AOR 2.3 95% CI 1.7–3.3, p<0.001). The likelihood of HIV infection was about 3-fold more among clients who had poor knowledge of HIV than clients who had good knowledge of HIV (AOR 2.9 95% CI 2.2–3.6, p<0.001)

Males are about 15 times more likely to have good knowledge of HIV than females (AOR 14.5 95% CI 10.5–20.0, p<0.001). Also, clients who were single (AOR 3.6 95% CI 2.4–5.4, p<0.001) and married (AOR 3.9 95% CI 2.9–5.3, p<0.001) were four times more likely to have good knowledge of HIV than clients who were previously married as shown in Table 4.
Table 1: Socio demographic distribution by age-group.

| Variables                  | < 25 | 25 – 34 | 35 – 44 | 45 – 54 | 55 – 64 | >64 | Total |
|----------------------------|------|---------|---------|---------|---------|-----|-------|
| n=673 (%)                  | n=1148 (%) | n=1110 (%) | n=730 (%) | n=373 (%) | n=239 (%) | n=4273 (%) |
| Gender                     |      |         |         |         |         |     |       |
| Male                       | 312 (46.4) | 593 (51.7) | 597 (53.8) | 430 (58.9) | 210 (56.3) | 134 (65.1) | 2276 (53.3) |
| Female                     | 361 (53.6) | 555 (48.3) | 513 (46.2) | 300 (41.1) | 163 (43.7) | 105 (43.9) | 1997 (46.7) |
| Marital Status             |      |         |         |         |         |     |       |
| Single                     | 640 (95.1) | 566 (49.3) | 173 (15.6) | 27 (3.7) | 7 (1.9) | 3 (1.3) | 1416 (33.1) |
| Married                    | 33 (4.9) | 555 (48.3) | 799 (72.0) | 615 (84.2) | 324 (86.9) | 205 (85.8) | 2531 (59.2) |
| Previously married #       | 0 (0.0) | 27 (2.4) | 138 (12.4) | 88 (12.1) | 42 (11.3) | 31 (13.0) | 326 (7.6) |
| Year                       |      |         |         |         |         |     |       |
| 2016                       | 252 (37.4) | 458 (39.9) | 406 (36.6) | 282 (38.6) | 129 (34.6) | 99 (41.4) | 1626 (38.1) |
| 2017                       | 421 (62.6) | 690 (60.1) | 704 (63.4) | 448 (61.4) | 244 (65.4) | 140 (58.6) | 2647 (61.9) |

NB: # = Widow, widower, divorced, separated

Table 2: Association between knowledge of clients attending HCT and HIV test outcome

| Variables                              | HIV Positive n = 811 (%) | HIV Negative n = 3462 (%) | COR (95%CI), p | AOR (95%CI), p |
|----------------------------------------|--------------------------|----------------------------|----------------|----------------|
| Previous testing                       |                          |                            |                |                |
| Yes                                    | 652 (18.3)               | 2914 (81.7)                |                |                |
| No                                     | 159 (22.5)               | 548 (77.5)                 | 1.3 (1.1 – 1.6), 0.009 | 2.1 (1.7 – 2.6), <0.001 |
| Has knowledge of HIV Routes of transmission |                          |                            |                |                |
| Yes                                    | 611 (75.3)               | 3160 (91.3)                |                |                |
| No                                     | 200 (24.7)               | 302 (8.7)                  | 3.4 (2.8 – 4.2), <0.001 | 1.3 (1.0 – 1.7), 0.040 |
| Informed about risk factors of HIV transmission |                          |                            |                |                |
| Yes                                    | 455 (56.1)               | 2857 (82.5)                |                |                |
| No                                     | 356 (43.9)               | 605 (17.5)                 | 3.7 (3.1 – 4.4), <0.001 | 0.6 (0.1 – 2.6), 0.57 |
| Informed about preventing HIV transmission methods |                          |                            |                |                |
| Yes                                    | 452 (13.7)               | 2858 (86.3)                |                |                |
| No                                     | 359 (37.3)               | 604 (67.2)                 | 3.8 (3.2 - 4.4), <0.001 | 6.8 (1.5 – 30.8), 0.013 |

NB: COR = crude Odds ratio, AOR = Adjusted odds ratio, CI = Confidence interval, p = p value, HCT = HIV counselling and testing
Table 3: Socio demographic factors associated with HIV infection

| Variables          | HIV positive | HIV negative | COR (95%CI), p | AOR (95%CI), p |
|--------------------|--------------|--------------|----------------|----------------|
| n = 811 (%)        | n = 3462 (%) | n = 3462 (%) |                |                |
| **Age group (years)** |              |              |                |                |
| < 25               | 42 (6.2)     | 631 (93.8)   | 1              | 1              |
| 25 – 34            | 200 (17.4)   | 948 (82.6)   | 3.2 (2.2 – 4.6), <0.001 | 3.1 (2.1–4.5), <0.001 |
| 35 – 44            | 311 (28.0)   | 799 (72.0)   | 5.9 (4.1 – 8.3), <0.001 | 5.3 (3.6 – 7.9), <0.001 |
| 45 – 54            | 191 (26.2)   | 539 (73.8)   | 5.3 (3.7 – 7.7), <0.001 | 4.9 (3.2 – 7.4), <0.001 |
| 55 – 64            | 50 (13.4)    | 323 (86.6)   | 2.3 (1.5 – 3.7), <0.001 | 2.0 (1.2 – 3.3), 0.006 |
| ≥ 65               | 17 (7.1)     | 222 (92.9)   | 1.2 (0.6 – 2.3), 0.6376 | 0.9 (0.5 – 1.7), 0.904 |
| **Gender**         |              |              |                |                |
| Male               | 323 (14.2)   | 1953 (85.8)  | 1              | 1              |
| Female             | 88 (24.4)    | 1509 (75.6)  | 2.0 (1.7 – 2.3), <0.001 | 1.6 (1.4 – 2.0), <0.001 |
| **Marital Status** |              |              |                |                |
| Single             | 170 (12.0)   | 2146 (88.0)  | 1              | 1              |
| Currently Married  | 513 (20.3)   | 2018 (79.7)  | 3.2 (2.7 – 3.9), <0.001 | 1.1 (0.9 – 1.4), 0.306 |
| Previously Married | 128 (39.3)   | 198 (60.7)   | 8.2 (6.2 – 10.8), <0.001 | 2.3 (1.7 – 3.3), <0.001 |
| **Knowledge of HIV** |            |              |                |                |
| Good               | 612 (16.2)   | 3173 (83.8)  | 1              | 1              |
| Poor               | 199 (40.8)   | 289 (59.2)   | 3.6 (2.9 – 4.4), <0.001 | 2.9 (2.2 – 3.6), <0.001 |

NB: COR = crude Odds ratio, AOR = Adjusted odds ratio, CI = Confidence interval, p = p value.

Table 4: Characteristics of clients with good knowledge of HIV

| Variables          | Knowledge of HIV | Good | Poor | COR (95%CI), p | AOR (95%CI), p |
|--------------------|------------------|------|------|----------------|----------------|
| n = 3785 (%)       | n = 488 (%)      |      |      |                |                |
| **Age group (years)** |                  |      |      |                |                |
| < 25               | 594 (88.3)       | 79 (11.7) | 1     |                |                |
| 25 – 34            | 1013 (88.2)      | 135 (11.8) | 1.0 (0.7 – 1.3), 0.9892 | 0.9 (0.6 – 1.3), 0.553 |
| 35 – 44            | 988 (89.0)       | 122 (11.0) | 1.1 (0.8 – 1.5), 0.6285 | 1.1 (0.7 – 1.7), 0.607 |
| 45 – 54            | 647 (88.6)       | 83 (11.4) | 1.0 (0.7 – 1.4), 0.8291 | 0.9 (0.6 – 1.5), 0.766 |
| 55 – 64            | 333 (89.3)       | 40 (10.7) | 1.1 (0.7 – 1.7), 0.6205 | 1.1 (0.6 – 1.8), 0.843 |
| >65                | 210 (87.9)       | 29 (12.1) | 1.5 (0.9 – 2.3), 0.1085 | 1.0 (0.5 – 1.7), 0.906 |
| **Gender**         |                  |      |      |                |                |
| Female             | 1554 (77.8)      | 443 (22.2) | 1     |                |                |
| Male               | 2231 (98.0)      | 45 (2.0) | 14.1 (10.3 – 19.3), <0.001 | 14.5 (10.5 – 20.0), <0.001 |
| **Marital Status** |                  |      |      |                |                |
| Single             | 1273 (89.9)      | 143 (10.1) | 3.4 (2.5 – 4.6), <0.001 | 3.6 (2.4 – 5.4), <0.001 |
| Married            | 2276 (89.9)      | 255 (10.1) | 3.4 (2.6 – 4.5), <0.001 | 3.9 (2.9 – 5.3), <0.001 |
| Ever Married       | 236 (72.4)       | 90 (27.6) | 1     |                |                |

NB: COR = crude Odds ratio, AOR = Adjusted odds ratio, CI = Confidence interval, p = p value.
Discussion

HCT provides a unique opportunity for early detection and prompt initiation of treatment of HIV patients, regardless of their CD4 count (FMOH, 2016). In this study, 19% of clients that assessed the HCT services within the study period had HIV infection. This prevalence is higher than the 3.4% obtained from national surveys (NACA, 2015; FMOH, 2013). Although an earlier study conducted at the hospital estimated the TB/HIV co-infection rate to be 21.6% (Adejumo et al, 2017). The study site being, a referral hospital for HIV, TB and MDR-TB in Lagos State, may explain the high prevalence of HIV obtained in our study.

The odds of having HIV infection in this study was higher among the older age groups compared with clients less than 24 years. Clients aged 35–44 years had the highest prevalence of HIV in this study. This is similar to the finding of the national HIV survey in Nigeria, in which the highest prevalence of HIV was among the age group 35–39 years (FMOH, 2013). Studies from South Africa and China reported similar findings (Peltzer, 2012; Zheng et al, 2010).

Similar to the findings from Nigeria and South Africa, the prevalence of HIV was higher in females than in males, and females had 60% chance of having HIV compare with males in this study (NACA 2010b; FMOH 2013; Awofala et al, 2018; Rehle et al, 2010; UNAIDS, 2014). Heterogeneous sex remains the major route of HIV transmission in Nigeria, accounting for 80% of infection (NACA 2010b; NACA, 2015). There is an increase in the prevalence of HIV among men sleeping with men (MSM) in Nigeria, female sex workers and intravenous drug users (FMOH 2010 a,b). Studies from South Africa and Kenya showed that the odds of having HIV was three times higher among MSM than men who had sex with women only, and significantly higher proportion of females are HIV infected than males of the same age group. (Dunkle et al, 2013; Sanders et al, 2013). They also acquire the infection 5-7 years earlier than their male peers (Ayesha and Quarraisha, 2016). Poverty, earlier sexual debut among females, child marriage, transactional sex, multiple partners, gender-based violence, low condom use and sexually transmitted infections contribute to women vulnerabilities to HIV (NACA, 2014; Zuma et al, 2010; Peltzer, 2010; Halperin et al, 2011).

Compare to single clients, previously married clients (widow, separated or divorced) had over two-fold chance to have HIV in this study. A similar observation has been reported in a national survey in Nigeria (FHOM, 2013). They may be infected by their spouses who later died or the discovery of the status of their spouses led to either separation or divorce. Recent large population surveys in sub-Saharan Africa have documented that widows and divorced women are likely to engage in high-risk behaviours for sustenance (Patel et al, 2018; Tenkorang, 2014).

Our study showed that a majority (88.6%) had good knowledge of HIV transmission and prevention, similar to what was obtained in the 2013 National demographic Health survey (NPC, 2013). On the contrary, other studies from Nigeria, Congo, Ethiopia, Bolivia and India showed knowledge of HIV to be poor (UNICEF, 2011; NPC, 2013; Gebremedhin et al, 2017; Oljira et al, 2013; Teran et al, 2015). HCT provides an opportunity for people to learn more about HIV (FMOH, 2011). In this study, the prevalence of clients who had no previous HIV test were twice likely to have HIV infection, compared with clients who were tested previously. The knowledge of HIV transmission acquired during previous HCT session may be responsible for this finding. People who had undergone HCT have been found to have greater knowledge scores than those who have not had HCT (Mall et al, 2013). The association between knowledge of HIV and HIV infection has been found to be inconsistent from several reports in different parts of the world. While some authors have documented having good knowledge of HIV does not translate to positive behavioural change and low HIV prevalence (Fagbamigbe et al, 2017; Gobopamang, 2011), others documented that poor knowledge of HIV transmission routes to be a risk factor for HIV infection (Hong et al, 2012). In the present study, the odds of HIV infection was higher among clients not informed of the routes of HIV transmission, prevention of HIV transmission and clients with poor knowledge of HIV. Knowledge of HIV was not associated with age. However, males had better knowledge than females in this study, as documented in many other studies from Nigeria and South Africa (Peltzer, 2012; UNICEF, 2011; NPC, 2013).

Conclusion

The prevalence of HIV in this study was higher than the national figures. Age, gender, marital status, previous HCT and knowledge of HIV were factors associated with HIV infection in this study. Although the prevalence of HIV is reducing in Nigeria, “there is need to sustain efforts at reducing the prevalence of HIV among women, especially widows.”

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Declaration on Conflict of Interest

The authors declare that there is no conflict of interest associated with this study.

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