An Assessment of HIV Counselling and Testing (HCT) Service Utilization in Nigeria: A Binary Logistic Regression Approach

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Abstract: HIV infection remains the most challenging health and development crisis in the last two decades as it continues to create health and socio-economic challenges in many parts of Nigeria and the world at large. HIV counselling and testing (HCT) can identify infection in early stages as it involves analysis of body fluids for the presence of antigens or antibodies produced in response to HIV and these are key to controlling the HIV epidemics. As a result, certain factors are considered in this study as deterrents to HCT service utilization in Nigeria applying the k-order binary logistic regression model using a structured questionnaire developed by the research team in some selected states in South-West of Nigeria. The socio-demographic details of respondents reveals that out of 788 people (out of 800 administered questionnaires) that were interviewed, 452 (57.4%) have had HCT while 336 (42.6%) never had HCT. Age 15-19 (the adolescent) with 68.1% are the groups with the highest respondents with HCT uptake. The chi-square test of independence also reveals that age, gender, religion, and marital status are not related with HCT uptake while ethnic, educational status, place of residence are associated with decision on HCT uptake. The binary logistic regression of HCT uptake on the investigated socio-demographic details of respondents reveals the age group (50 and above) has the highest odds of up-taking HCT while those in the group 25-29 years has the least. Male respondents have a slightly higher odds compared to female and the Yoruba ethnic group are the most likely to utilize HCT. Results also revealed that traditionalist are the most likely to utilize HCT (1.635) with the Christianity (with 1.000) being the least. Those who are single/never married has a non-significant highest odds (1.092) among the marital status considered while those who are separated/divorced has the least (0.712). The odds of utilizing HCT is least among those with no formal education. People with Primary education are about three times more likely to take HCT compared to those with no formal education. Rural settlers are about three times (2.818) more likely to uptake HCT in comparison with those who reside in urban centres. Finally, employment status of respondents is insignificant to HCT uptake, although the odds in favour of those that are schooling is highest (1.175), followed by those that are self-employed (1.013).

Keywords: HIV, Counselling, Testing, Deterrent, Binary Logistics Regression

1. Introduction

HIV infection remains the most challenging health and development crisis in the last two decades as it continues to create health and socio-economic challenges in many parts of Nigeria and the world at large. Globally, the HIV epidemic has stabilized, although with unacceptably high levels of new HIV infections and AIDS deaths, there were estimated 33 million persons living with HIV at the end of 2015 out of
which 12.5 million are young people (aged 1-24 years) with new HIV infection at 2.7 million in 2015 [1]. The annual number of new infections declined from 3.0 million in 2001 to 2.7 million in 2015. Overall, 2.0 million died due to AIDS in 2015, compared with an estimated 1.7 million in 2001 and the Sub-Saharan African nations remain the region most affected by HIV. Among regions of the world, Sub-Saharan Africa has the leading cause of death due to AIDS [2] with about 68% of worldwide infection [3] and about three-quarter of all youth in the world living with HIV despite being home only to on-tenth of the youth worldwide. HIV has claimed about 25 million lives worldwide with staggering economic and social impacts. The disease affects individuals, families, communities, nations and their economies by causing life threatening symptoms and sometimes premature deaths at productive ages [4].

In Nigeria, 2.98 million people are estimated to be living with HIV in 2009, only second to South Africa [5] but this figure has risen to 3.1 million by 2017. Nigeria stands at a critical point where increased prevention and treatments efforts today could help avert much more significant epidemic in future. The HIV epidemic in Nigeria has been classified as a mixed epidemic with the burden of disease greater among certain high risk groups [6]. As the most populous country in Africa and one of the most populous nations in the world, a small increase in HIV/AIDS prevalence rate in Nigeria would represent a significant threat to the global HIV/AIDS burden.

HIV testing can identify infection in early stages as it involves analysis of blood or body fluids for the presence of antigens or antibodies produced in response to HIV. There are HCT (HIV counselling and testing) centres located in several medical facilities in the country. HCT services are now being offered in various settings including sexually transmitted infection (STI) clinics and general outpatient clinics as well as in field settings by mobile testing means. HCT forms the gateway to HIV prevention, treatment, care and support interventions and has been found to be effective [7-9]. It consist of two processes namely HIV counselling and HIV testing. The counselling process is confidential and also divided into two parts namely pre-test and post-test counselling. The pre-test counselling assists individuals and or couples to consider their risk of acquiring or transmitting HIV. It also helps them determine whether to be tested or not. The post-test counselling provides support when the individuals receive the test results. HCT strategies serve as important tools for identifying HIV-infected persons, a necessary first step in accessing HIV care [10]. HCT has proven to be a cost effective ways for preventing HIV in the developing countries.

In order to achieve global zero prevalence rate of HIV, HCT services must be optimally utilized [11]. Low uptake of HCT services by people living with HIV/AIDS often times increases the prevalence rate of HIV/AIDS since people who are HIV negative may not be counselled while people living with the virus may not access appropriate treatment and care consequently leading to the inevitable spread of the infection. One of the ways out of this problem is through the identification and analysis of the present level of utilization and the deterrents to utilization of these HCT centres by people either uninfected or people living with HIV/AIDS in Nigeria. This will help to provide recommendations on the HCT utilization rate, odds ratio in favour or against uptake and probability that an average individual will uptake HCT.

High knowledge about HIV Voluntary Test and Counselling (VCT) has not led to increase in HCT uptake [12, 13]. HCT interventions are key to controlling the HIV epidemic [14, 15]. About 67% of new HIV infections in West Africa in 2017 occurred in Nigeria. Despite achieving a 5% reduction in new infections between 2010 and 2017 [3], Nigeria along with South Africa and Uganda accounts for about 50% of all new HIV infections in sub-Saharan Africa every year [16].

In West and Central Africa reported infections, Nigeria alone accounted for 59% of all new cases in 2016 [17]. Also, in 2016, 34% of adults living that were HIV positive were aware of their status [18]. With Nigeria’s aims of reaching UNAIDS target of having 90% of people living with HIV knowing their status by 2021[19], HIV testing in Nigeria is relatively low with only 15.1% of people from age 15 to 49 years got tested in the last 12 months [20]. A lot of reasons had been associated with why people are not interested in HCT in Nigeria. Some of these include testing kits supply and logistic issues with getting further supplies. A common belief among residents is that HCT centres are where HIV-positive people go for care, rather than being a testing centres [21].

Significant efforts are being made in the sub-Saharan African towards expanding HCT in order to reach a wider population and slow the spread of HIV [22] but most of these efforts are yet to bring about much needed change. Focal point of HCT interventions are the young people in most African countries. However, HCT uptake among these group (15 to 24 years) in Nigeria is very low [23]. Young people often indicate willingness for HCT, yet only few have accessed the service hence causing a huge gap between willingness and the actual uptake [7, 23].

Despite the importance of HCT, access and uptake remain quite low [10, 24, 25] particularly in rural areas [26]. Like other countries of the world, uptake of HCT services remain very low in Nigeria as the scourge of HIV/AIDS remains a major global public health problem, with death toll of over three million recorded per year. Many factors have been associated with low uptake including low perceived risk of infection, lack of resources necessary to provide HCT at all sites with identified need and intense stigma associated with HIV leads to ambivalence towards HIV testing [26]. As a result, certain factors are considered in this study as deterrents to HCT service utilization in Nigeria. These include quality of medical equipment, misconception of HCT services, economic barriers, and location of HCT centres to mention a few.

To this end we apply the k-order binary logistic regression model of the form
\[
\ln \left( \frac{p_i}{1 - p_i} \right) = \beta_0 + \beta_1 X_{i1} + \cdots + \beta_k X_{ik} + \mu_i
\]

Where \( p_i \) is the probability that an individual uptakes HCT services regularly or not, \( X_i \)’s are explanatory variables (the deterrents), \( \beta_i \)'s are the parameters and \( \mu_i \) is the disturbance error term.

### 2. Materials and Methodology

The research team developed a structured questionnaire that was administered to the literate respondents by a team of enumerators employed for the purpose. Responses from the non-literate respondents were filled by research assistant who understands the language of the respondents. The questionnaire was divided into several sections which include the socio-demographic details of the respondents (age, sex, ethnicity, religion, occupation, marital status, and educational status), knowledge and awareness on HCT services, knowledge on location of HCT services, myth and misconception about HCT services, etc. Frequency table and simple bar chart are used to describe the socio-demographic details of the respondents, and to compare responses on some different variables that could affect uptake of HCT. The Pearson's Chi-square of independence is used to examine relationship between the selected variables and HCT uptake.

The binary logistic regression is the most common method to analyze binary response data [27]. It is used to model relationships between the response variable and several explanatory variables, which may be discrete or continuous, that is, when the response, \( Y \), can only take one of two possible values. The responses may be Yes/No, Alive/Dead, Present/absent; etc. For analysis purpose, it is easier to denote the two levels by 0 and 1 ("failure" or "success"). The model can be used to predict the probability of the occurrence of an event and that the adequacy of the data on the logistic curve. It may also be used to predict odds of being in a case based on the values of the independent variables [28, 29].

Efficiency of logistic regression has been proven in analyzing categorical data [30, 31, 32]. The response variable defined as “Ever tested for HIV” is a categorical variable and thus requires use of the logistic regression approach.

The main objective is to investigate the relationship between the response probability \( \pi = \pi(x) \) and the explanatory variables \( x_1, x_2, \ldots, x_p \).

A binary random variable can be defined as:

\[
Y = \begin{cases} 
1 & \text{if the outcome is a success} \\
0 & \text{if the outcome is a failure} 
\end{cases}
\]

with probabilities \( P(Y = 1) = \pi \) and \( P(Y = 0) = 1 - \pi \).

Suppose \( X_i \) is a random variable and \( Y_i = 1 \) for the occurrence of an event of interest and 0 if otherwise then

\[
P_i = E(Y = 1 / X_i) = \left( \frac{1}{1 + e^{-Z}} \right)
\]

Where \( Z = \beta_0 + \beta_1 X_{i1} + \cdots + \beta_k X_{ik} \).

The equation represents what is known as the (cumulative) logistic distribution function. It is easy to verify that as \( Z \) ranges from \(-\infty\) and \( \infty \), \( p_i \) ranges between 0 and 1 and that \( p_i \) is non-linearly related to \( Z \) through \( X_i \). In a bid to satisfy these requirements, an estimation problem will be created because \( p_i \) is non-linear in \( X_i \) but also \( \beta_i 's \) as can be seen in the equation below. This violation of assumption makes OLS procedure inappropriate for estimating \( \beta_i 's \).

To fit a binary logistic regression model, a set of regression coefficients that predict the probability of the outcome of interest are estimated. Given probability that an individual will uptake HCT as \( p_i \) and \( 1-p_i \) for not using HCT, the probabilities results in a linear combination as:

\[
\ln \left( \frac{\text{prob(event)}}{1 - \text{prob(event)}} \right) = \ln \left( \frac{p_i}{1 - p_i} \right) = \beta_0 + \beta_1 X_{i1} + \beta_2 X_{i2} + \cdots + \beta_k X_{ik}
\]

The equation above has been extensively applied to numerous real life situations [27, 33-35]. The quantity to the left of the equal sign is called a logit. It’s the log of the odds that an event occurs. The coefficients in the logistic regression model tell how much the logit changes based on the values of the predictor variables. When there are more than two events, binary logistics regression model can be extended to multinomial regression model.

The general linear logistic regression model can also be rewritten in terms of the probability of a positive response:

\[
\pi_i = \frac{\exp(\beta_{10} + \beta_{11}x_{1i} + \cdots + \beta_{ip}x_{ip})}{1 + \exp(\beta_{10} + \beta_{11}x_{1i} + \cdots + \beta_{ip}x_{ip})}
\]

Above equation is the probability of the event of interest occurring given the covariates.

### 3. Results and Discussion

The socio-demographic details of respondents (table 1) reveals that out of 788 people (out of 800 administered questionnaires) that were interviewed, 452 (57.4%) have had HCT while 336 (42.6%) never had HCT, this supports the findings by Like other researches [26, 36] where a little above average of respondents have had HCT. Among the age groups considered, age 15-19 (the adolescent) with 68.1% are the groups with the highest respondents with HCT uptake while age group 25-29 with 48.4% of the respondents that are above average of respondents have had HCT. Above equation is the probability of the event of interest occurring given the covariates.
slightly higher than the Christian (55.5%). This is also supported by the research by [38]. Married people with 58.6% HCT uptake have the highest percentage among other marital status and widow/widower have least HCT uptake percentage, though the marital status is independent of HCT uptake as also noted [37]. At 10% level of significance, educational status of respondent is significant to HCT uptake but not significant at 5% level. Respondents with no formal education has the least percentage HCT uptake. Place of residence is dependent on HCT uptake with those who stay in rural areas (71.6%) more likely to uptake HCT compared with those staying in urban centres (53.3%). Employment status respondents is not associated with HCT uptake though students (those currently schooling) are the group with highest percentage of HCT uptake.

### Table 1. Socio-demographic characteristics of respondents and uptake of HCT.

| Characteristics        | Have you ever had HCT? | Chi-Square P-value (α=0.05) |
|------------------------|------------------------|----------------------------|
|                        | No n=336(42.6%) | Yes n=452(57.4%) |
| **Age**                |                        |                            |
| 15-19                  | 69(8.8%)            | 22(31.9%)                 | 47(68.1%) | 0.217 |
| 20-24                  | 130(16.5%)          | 56(43.1%)                 | 74(56.9%) |
| 25-29                  | 157(19.9%)          | 81(51.6%)                 | 76(48.4%) |
| 30-34                  | 148(18.8%)          | 58(39.2%)                 | 90(60.8%) |
| 35-39                  | 106(13.5%)          | 45(42.5%)                 | 61(57.5%) |
| 40-44                  | 52(6.6%)            | 23(44.2%)                 | 29(55.8%) |
| 45-49                  | 45(5.7%)            | 19(42.2%)                 | 26(57.8%) |
| 50 and above           | 81(10.3%)           | 32(39.5%)                 | 49(60.5%) |
| **Gender**             |                        |                            |
| Male                   | 346(43.9%)          | 146(42.2%)                | 200(57.8%) | 0.824 |
| Female                 | 442(56.1%)          | 190(43.0%)                | 252(57.0%) |
| **Ethnicity**          |                        |                            |
| Yoruba                 | 388(49.2%)          | 133(34.3%)                | 255(65.7%) | 0.000 |
| Igbo                   | 203(25.8%)          | 90(44.3%)                 | 113(55.7%) |
| Hausa                  | 51(6.5%)            | 29(56.9%)                 | 22(43.1%) |
| Others                 | 146(18.5%)          | 84(57.5%)                 | 62(42.5%) |
| **Religion**           |                        |                            |
| Christianity           | 611(77.5%)          | 272(44.5%)                | 339(55.5%) | 0.220 |
| Islam                  | 158(20.1%)          | 58(36.7%)                 | 58(63.3%) |
| **Marital Status**     |                        |                            |
| Married/Living together| 372(47.2%)          | 154(41.4%)                | 218(58.6%) | 0.804 |
| Separated/Divorced     | 48(6.1%)            | 22(45.8%)                 | 26(54.2%) |
| Widow/Widower          | 37(4.7%)            | 18(48.6%)                 | 19(51.4%) |
| Single/Never married   | 331(42.0%)          | 142(42.9%)                | 189(57.1%) |
| **Educational Status** |                        |                            |
| No formal education    | 82(10.4%)           | 46(56.1%)                 | 36(43.9%) | 0.052 |
| Primary                | 58(7.4%)            | 19(32.8%)                 | 39(67.2%) |
| Secondary/Vocational   | 247(31.3%)          | 106(42.9%)                | 141(57.1%) |
| College/Poly./University| 337(42.8%)         | 137(40.7%)                | 200(59.3%) |
| Post-graduate          | 64(8.1%)            | 28(43.8%)                 | 36(56.3%) |
| Residence              | Total (%)           |                            |
| Urban                  | 612(77.7%)          | 286(46.7%)                | 326(53.3%) | 0.000 |
| Rural                  | 176(22.3%)          | 50(28.4%)                 | 126(71.6%) |
| Occupation              | Total (%)           |                            |
| Employed               | 255(32.4%)          | 112(43.9%)                | 143(56.1%) | 0.156 |
| Self-employed          | 294(37.3%)          | 127(43.2%)                | 167(56.8%) |
| Unemployed             | 89(11.3%)           | 37(41.6%)                 | 52(58.4%) |
| Schooling              | 124(15.7%)          | 44(35.5%)                 | 80(64.5%) |
| Others                 | 26(3.3%)            | 16(61.5%)                 | 10(38.5%) |

Source: 2019 HCT uptake Survey

Examining the effects of knowledge and awareness on HCT uptake, table 2 reveals that responses from factors considered are significant to the HCT uptake except “knowledge of HCT centres”. Higher percentage (61.3%) of those that have had HCT believed that to a great extent that “Increasing awareness programs on HIV has improved HCT service uptake thereby controlling the spread of the disease” and (50.2%) responded that they learnt about HCT on the radio and social media. The other two factors have impact on having HCT to some extent with relatively higher percentage compared to the responses on “Not at all”.


Table 2. Association between Knowledge and awareness on HCT services and uptake of HCT.

| Factor                                                                 | Have your ever used HCT? | Chi-Square P-value (α=0.05) |
|------------------------------------------------------------------------|--------------------------|----------------------------|
|                                                                        | No                       | Yes                       |
|                                                                        | n=336(42.6%)             | n=452(57.4%)              |
| Increasing awareness programs on HIV has improved HCT service uptake thereby controlling the spread of the disease. |                          |                           |
| To a great extent                                                      | 164(48.8%)               | 277(61.3%)                | 0.001                     |
| To some extent                                                        | 136(40.5%)               | 146(32.3%)                |                           |
| Not at all                                                            | 36(10.7%)                | 29(6.4%)                  |                           |
| I do not know where HCT centres are situated, this reduces the uptake of HCT services |                          |                           |
| To a great extent                                                      | 70(20.8%)                | 124(27.4%)                | 0.097                     |
| To some extent                                                        | 200(59.5%)               | 251(55.5%)                |                           |
| Not at all                                                            | 66(19.6%)                | 77(17.0%)                 |                           |
| I never thought of using HCT services because I do not know specific centres where testing will be carried out |                          |                           |
| To a great extent                                                      | 74(22.0%)                | 172(38.1%)                | 0.000                     |
| To some extent                                                        | 187(55.7%)               | 171(37.8%)                |                           |
| Not at all                                                            | 75(22.3%)                | 109(24.1%)                |                           |
| I learnt about the availability of HCT on the radio and social media  |                          |                           |
| To a great extent                                                      | 151(44.9%)               | 227(50.2%)                | 0.000                     |
| To some extent                                                        | 102(30.4%)               | 126(27.9%)                |                           |
| Not at all                                                            | 83(24.7%)                | 99(21.9%)                 |                           |

Source: 2019 HCT uptake Survey

“Testing centres located in rural areas do not have adequate supply of electricity and other basic amenities” is not a significant factors on having HCT or not (table 3). “Accessibility of HCT centres”, has a significant effect on up-taking HCT with higher percentage of responses indicating the transportation and accessibility related factor affect the uptake to an extent.

Table 3. Association between Location of HCT Services and uptake of HCT.

| Factor                                                                 | Have your ever used HCT? | Chi-Square P-value (α=0.05) |
|------------------------------------------------------------------------|--------------------------|----------------------------|
|                                                                        | No                       | Yes                       |
|                                                                        | n=336(42.6%)             | n=452(57.4%)              |
| Location of HCT centres are mostly remote and not central making it almost inaccessible |                          |                           |
| To a great extent                                                      | 88(26.2%)                | 192(42.5%)                | 0.000                     |
| To some extent                                                        | 182(54.2%)               | 193(42.7%)                |                           |
| Not at all                                                            | 66(19.6%)                | 67(14.8%)                 |                           |
| Road network linking centres are usually bad and discouraging          |                          |                           |
| To a great extent                                                      | 46(13.7%)                | 121(26.8%)                | 0.000                     |
| To some extent                                                        | 211(62.8%)               | 252(55.8%)                |                           |
| Not at all                                                            | 79(23.5%)                | 79(17.5%)                 |                           |
| Testing centres located in rural areas do not have adequate supply of electricity and other basic amenities |                          |                           |
| To a great extent                                                      | 160(47.6%)               | 219(48.5%)                | 0.540                     |
| To some extent                                                        | 115(34.2%)               | 164(36.3%)                |                           |
| Not at all                                                            | 61(18.2%)                | 69(15.3%)                 |                           |
| Establishment of HCT centres in only strategic locations prevent people from readily having HCT service delivery at their door-steps |                          |                           |
| To a great extent                                                      | 100(29.8%)               | 179(39.6%)                | 0.017                     |
| To some extent                                                        | 169(50.3%)               | 195(43.1%)                |                           |
| Not at all                                                            | 67(19.9%)                | 78(17.3%)                 |                           |

Source: 2019 HCT uptake Survey

Table 4 shows that “Misconception and prejudice of one’s character and status emanating from being seen in testing centre limits voluntary uptake of HCT services” is rated first by the respondents on effect of myth and misconception on HCT uptake. Most respondents do not “believe that counselors would inject them with drugs capable of killing tested positive”. “Misconception and prejudice of one’s character and status emanating from being seen in testing centre limits voluntary uptake of HCT services” is not significant in the choice of HCT uptake.
Table 4. Association between Myth and Misconception about HCT Services and uptake of HCT.

| Factor                                                                 | Have your ever used HCT? | Chi-Square P-value (α=0.05) |
|------------------------------------------------------------------------|--------------------------|-----------------------------|
| I believe counselors would inject me with drugs capable of killing me if I test positive | No: n=336(42.6%) Yes: n=452(57.4%) | 0.000                       |
| To a great extent                                                      | 76(22.6%)                | 172(38.1%)                  |
| To some extent                                                        | 86(25.6%)                | 101(22.3%)                  |
| Not at all                                                            | 174(51.8%)               | 179(39.6%)                  |
| People that printed lists of names and test results will be pasted on the wall of the counseling office | No: n=336(42.6%) Yes: n=452(57.4%) | 0.000                       |
| To a great extent                                                      | 42(12.5%)                | 123(38.1%)                  |
| To some extent                                                        | 123(36.6%)               | 162(22.3%)                  |
| Not at all                                                            | 171(50.9%)               | 167(39.6%)                  |
| Misconception and prejudice of one’s character and status emanating from being seen in testing centre limits voluntary uptake of HCT services | No: n=336(42.6%) Yes: n=452(57.4%) | 0.107                       |
| To a great extent                                                      | 112(33.3%)               | 184(40.7%)                  |
| To some extent                                                        | 146(43.5%)               | 174(38.5%)                  |
| Not at all                                                            | 78(23.2%)                | 94(20.8%)                   |
| It is generally believed that an individual who test positive may be secluded and prevented from going home | No: n=336(42.6%) Yes: n=452(57.4%) | 0.083                       |
| To a great extent                                                      | 95(28.3%)                | 147(32.5%)                  |
| To some extent                                                        | 102(30.4%)               | 153(33.8%)                  |
| Not at all                                                            | 139(41.4%)               | 152(33.6%)                  |
| Fear of rejection by the society often discourage people from up-taking HCT services | No: n=336(42.6%) Yes: n=452(57.4%) | 0.267                       |
| To a great extent                                                      | 124(36.9%)               | 187(41.4%)                  |
| To some extent                                                        | 153(45.5%)               | 202(44.7%)                  |
| Not at all                                                            | 59(17.6%)                | 63(13.9%)                   |
| Fear of testing positive is synonymous to knowing one’s ‘death-day’ and the associated depression will accelerate the course of the disease | No: n=336(42.6%) Yes: n=452(57.4%) | 0.004                       |
| To a great extent                                                      | 106(31.5%)               | 182(40.3%)                  |
| To some extent                                                        | 110(32.7%)               | 155(34.3%)                  |
| Not at all                                                            | 120(35.7%)               | 115(25.4%)                  |

Source: 2019 HCT uptake Survey

There is significant difference in the response of those that have had HCT and those that never had on the fear of rejection by the society on HCT uptake with both groups agreeing that the factor highly deterred people from up-taking HCT. In fact, all factors investigated on fear of stigmatization and social exclusion are deterrent on the uptake with high percentage responses on their effects.

However, “consequences of test results in relation to spouses and family” is considered the number one deterring factors while “Fear of testing positive is synonymous to knowing one’s ‘death-day’ and the associated depression will accelerate the course of the disease” is the least deterring among the rest.

Table 5. Association between Fear of stigmatization and social exclusion and uptake of HCT.

| Factor                                                                 | Have your ever used HCT? | Chi-Square P-value (α=0.05) |
|------------------------------------------------------------------------|--------------------------|-----------------------------|
| Fear of the consequences of test results in relation to reaction of spouses and family | No: n=336(42.6%) Yes: n=452(57.4%) | 0.000                       |
| To a great extent                                                      | 150(44.6%)               | 231(51.1%)                  |
| To some extent                                                        | 146(43.5%)               | 157(34.7%)                  |
| Not at all                                                            | 40(11.9%)                | 64(14.2%)                   |
| Fear of being excluded by friends and partners which emanates from rumours of being seen at the counseling office | No: n=336(42.6%) Yes: n=452(57.4%) | 0.267                       |
| To a great extent                                                      | 124(36.9%)               | 187(41.4%)                  |
| To some extent                                                        | 153(45.5%)               | 202(44.7%)                  |
| Not at all                                                            | 59(17.6%)                | 63(13.9%)                   |
| Fear of rejection by the society often discourage people from up-takingHCT services | No: n=336(42.6%) Yes: n=452(57.4%) | 0.613                       |
| To a great extent                                                      | 128(38.1%)               | 187(41.4%)                  |
| To some extent                                                        | 159(47.3%)               | 199(44.0%)                  |
| Not at all                                                            | 49(14.6%)                | 66(14.6%)                   |

Source: 2019 HCT uptake Survey

Table 6 shows that type treatment by health workers is insignificant towards HCT uptake, responses from both that had HCT and those that never had are similar for the factor. Highest percentage (50.7% and 46.7% respectively for both that had HCT and those that never had) of respondents believed to a great extent that “Most HIV discordant couples tend to lack the required motivation to uptake HCT because of disagreement between partners”.

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Disdaining treatment by health workers usually discourage uptake of HCT services

| Factor | Have your ever used HCT? | Chi-Square P-value (α=0.05) |
|--------|--------------------------|----------------------------|
|        | No (n=336(42.6%))       | Yes (n=452(57.4%))         |
|        |                          |                            |                            |
| To a great extent | 153(45.5%) | 226(50.0%) | 0.286 |
| To some extent  | 123(36.6%) | 162(35.8%) |                            |
| Not at all     | 60(17.9%)  | 64(14.2)   |                            |

Lack of incentives such as food, toiletries and relief materials in the centres does not encourage uptake of HCT services

| Factor | Have your ever used HCT? | Chi-Square P-value (α=0.05) |
|--------|--------------------------|----------------------------|
|        | No (n=336(42.6%))       | Yes (n=452(57.4%))         |
|        |                          |                            |                            |
| To a great extent | 143(42.6%) | 214(47.3%) | 0.000 |
| To some extent  | 95(28.3%)  | 160(35.4%) |                            |
| Not at all     | 98(29.2%)  | 78(17.3%)  |                            |

I do not uptake HCT services because I cannot maintain standard of dress and appearance in the centre

| Factor | Have your ever used HCT? | Chi-Square P-value (α=0.05) |
|--------|--------------------------|----------------------------|
|        | No (n=336(42.6%))       | Yes (n=452(57.4%))         |
|        |                          |                            |                            |
| To a great extent | 60(17.9%)  | 147(32.5%) | 0.000 |
| To some extent  | 126(37.5%) | 144(31.9%) |                            |
| Not at all     | 150(44.6%) | 161(35.6%) |                            |

Most HIV discordant couples tend to lack the required motivation to uptake HCT because of disagreement between partners

| Factor | Have your ever used HCT? | Chi-Square P-value (α=0.05) |
|--------|--------------------------|----------------------------|
|        | No (n=336(42.6%))       | Yes (n=452(57.4%))         |
|        |                          |                            |                            |
| To a great extent | 157(46.7%) | 229(50.7%) | 0.002 |
| To some extent  | 121(36.0%) | 183(40.5%) |                            |
| Not at all     | 58(17.3%)  | 40(8.8%)   |                            |

Among reasons considered on how economic barriers to HCT services affect the uptake (table 7), “Not all the resources obtainable at the HCT centres are free e.g. registration cards” is the most deterring factor with 40.5% and 48.5% of those who never had HCT and those that had HCT respectively agreeing to a great extent. Another highly deterring factor under this category is “the work schedule” of respondents with the distance and means of transportation being the least deterring factor. All the factors considered are significant at 5% level.

| Factor | Have your ever used HCT? | Chi-Square P-value (α=0.05) |
|--------|--------------------------|----------------------------|
|        | No (n=336(42.6%))       | Yes (n=452(57.4%))         |
|        |                          |                            |                            |
| Testing sites around here are too far and there are no means of transportation to the centres | 50(14.9%) | 159(35.2%) | 0.000 |
| To a great extent | 195(58.0%) | 228(50.4%) |                            |
| To some extent  | 91(27.1%)  | 65(14.4%)  |                            |
| Not at all     | 74(22.0%)  | 80(17.7%)  |                            |

HCT centres are too far and remote with limited transportation means which are expensive and unaffordable

| Factor | Have your ever used HCT? | Chi-Square P-value (α=0.05) |
|--------|--------------------------|----------------------------|
|        | No (n=336(42.6%))       | Yes (n=452(57.4%))         |
|        |                          |                            |                            |
| To a great extent | 59(17.6%)  | 157(34.7%) | 0.000 |
| To some extent  | 203(60.4%) | 215(47.6%) |                            |
| Not at all     | 74(22.0%)  | 80(17.7%)  |                            |

Not all the resources obtainable at the HCT centres are free e.g. registration cards

| Factor | Have your ever used HCT? | Chi-Square P-value (α=0.05) |
|--------|--------------------------|----------------------------|
|        | No (n=336(42.6%))       | Yes (n=452(57.4%))         |
|        |                          |                            |                            |
| To a great extent | 136(40.5%) | 219(48.5%) | 0.048 |
| To some extent  | 118(35.1%) | 149(33.0%) |                            |
| Not at all     | 82(24.4%)  | 84(18.6%)  |                            |

My work schedule is very tight and prevents me from making time to uptake HCT services

| Factor | Have your ever used HCT? | Chi-Square P-value (α=0.05) |
|--------|--------------------------|----------------------------|
|        | No (n=336(42.6%))       | Yes (n=452(57.4%))         |
|        |                          |                            |                            |
| To a great extent | 95(28.3%)  | 169(37.4%) | 0.000 |
| To some extent  | 110(32.7%) | 174(38.5%) |                            |
| Not at all     | 131(39.0%) | 109(24.1%) |                            |
can be trusted”. Most of the respondents believed that inadequate qualified medical personnel in HCT centres limit utilization of HCT services. All the factors considered under quality of HCT services and utilization are significant in the choice of HCT uptake by respondents. In all, lack of trust of health workers to give accurate result is the number one factor that deterred respondents on HCT uptake with a combined (77.4%) responses for both that have had HCT and those that never had.

| Table 8. Association between Quality of HCT services & Utilization of HCT centres and uptake of HCT. |
|-------------------------------------------------|
| **Factor**                                      | **Have you ever used HCT?** | **Chi-Square** |
|                                                 | No                      | Yes                     | P-value |
|                                                 | n=336(42.6%)         | n=452(57.4%)            | (α=0.05) |
| Lack of trust in health worker to give adequate results prevent the utilization of HCT services | 118(35.1%)  | 191(42.3%)  | 0.000 |
| To a great extent                                | 146(43.5%)  | 188(41.6%)  |
| To some extent                                   | 72(21.4%)   | 73(16.2%)   |
| Not at all                                       | 82(24.4%)   | 175(38.7%)  |
| Many of the workers in HCT centres cannot be trusted to give appropriate (accurate) results | 168(50.0%)  | 200(44.2%)  | 0.000 |
| To a great extent                                | 86(25.6%)   | 77(17.0%)   |
| To some extent                                   | 146(43.5%)  | 188(41.6%)  |
| Not at all                                       | 91(27.1%)   | 89(19.7%)   |
| Inadequate qualified medical personnel in HCT centres limit utilization of HCT services | 90(26.8%)   | 163(36.1%)  | 0.007 |
| To a great extent                                | 155(46.1%)  | 200(44.2%)  |
| To some extent                                   | 91(27.1%)   | 89(19.7%)   |
| Not at all                                       | 77(22.9%)   | 174(38.5%)  |
| Quality of equipment in HCT centres around cannot be trusted | 146(43.5%)  | 178(39.4%)  | 0.000 |
| To a great extent                                | 113(33.6%)  | 100(22.1%)  |
| To some extent                                   | 72(21.4%)   | 73(16.2%)   |
| Not at all                                       | 82(24.4%)   | 175(38.7%)  |

Source: 2019 HCT uptake Survey

The output of the logistic regression (table 9) of HCT uptake on the investigated socio-demographic details of respondents reveals that age is not a significant factor to HCT uptake. However, the age group (50 and above) has the highest odds of up-taking HCT while those in the group 25-29 years has the least. It is also noted that although gender of respondent is not significant variable on HCT uptake, male respondents have a slightly higher odds compared to female. Among the considered ethnic group, Yoruba (1.000) are the most likely to utilize HCT, followed by Igbo (0.677) while the Hausas has the least (0.316).

Results also revealed that religion is not a significant factor in HCT uptake although the traditionalist are the most likely to utilize HCT (1.635) with the Christianity (with 1.000) being the least. Those who are single or never married has a non-significant highest odds (1.092) among the marital status considered while those who are separated or divorced has the least (0.712). Higher disparities in odds are noted among various educational status. The odds of utilizing HCT is least among those with no formal education. People with Primary education are about three times more likely to take HCT compared to those with no formal education. The odds in favour of those with Secondary and those with college/Polytechnic/University educations are more than two times more likely (2.173 and 2.205 respectively) compared with those with no formal education. Rural settlers are about three times (2.818) more likely to uptake HCT in comparison with those who reside in urban centres. Finally, employment status of respondents is insignificant to HCT uptake, although the odds in favour of those that are schooling is highest (1.175), followed by those that are self-employed (1.013).

| Table 9. Logistic regression of HCT uptake on socio-demographic factors. |
|-------------------------------------------------|
| **Factor**                                      | **Std. Err.** | **P-value** | **Odds Ratio** | **95% C. I. for OR** |
| Age                                             |              |             |               |                      |
| 15-19 (reference category)                      | 0.657        |              | 1.000          | (0.352, 1.444)       |
| 20-24                                           | 0.360        | 0.347        | 0.713          | (0.301, 1.353)       |
| 25-29                                           | 0.383        | 0.242        | 0.639          | (0.450, 2.336)       |
| 30-34                                           | 0.420        | 0.952        | 1.025          | (0.357, 1.991)       |
| 35-39                                           | 0.438        | 0.698        | 0.843          | (0.341, 2.336)       |
| 40-44                                           | 0.491        | 0.816        | 0.892          | (0.332, 2.402)       |
| 45-49                                           | 0.505        | 0.823        | 0.893          | (0.423, 2.775)       |
| 50 and above                                    | 0.480        | 0.868        | 1.083          | (0.352, 1.444)       |
| Gender                                          |              |             | 1.000          | (0.672, 1.250)       |
| Male (reference category)                       |              |              |               |                      |
| Female                                          | 0.158        | 0.581        | 0.916          | (0.672, 1.250)       |
| Ethnicity                                       |              |              | 1.000          | (0.672, 1.250)       |
| Yoruba                                          |              | 0.001        | 1.000          | (0.672, 1.250)       |
|
4. Conclusion and Recommendation

Access to HCT and support is the global principle for HIV intervention and prevention. HCT is a very critical entry point for other interventions. Knowing one’s HIV status helps in adopting a healthier general lifestyle and hence assists in limiting the prevalence of the disease. Identified People Living with HIV (PLWH) would also receive necessary treatment interventions against HIV and AIDS, and critical to limiting the prevalence of the disease. HCT is essential for all support and treatment interventions against HIV and AIDS, and critical to mitigating against HIV.

Earlier researches had reported that majority of people are always willing to do HIV testing after been counselled but it is surprising that the willingness is has not resulted into the reality. This result obtained in this research showed that out of 788 respondents, only 57.4% have had HCT which is restively low considering the impact of the HIV/AIDS scourge in the society and the relevance of status identification towards treatment. It is therefore important for government and various non-governmental agencies on HIV/AIDS related support programmes to improve sensitization on the importance of HIV/AIDS counselling and testing.

Among the socio-demographic characteristics considered, **place of residence** is the most significant on HCT uptake with higher percentage of up-taking coming from those in rural areas. This may not be unconnected with the fact that most of the outreach on HCT is focused on those rural with the perception that those in urban centres are enlightened enough. No matter how this may be true, efforts must be geared towards orientation and reorientation of generality of people since fear and stigmatization has been found to be a very significant deterring factor in HCT up-taking. Those with “no formal education” are most likely not to uptake HCT as reported in the study. Hence, efforts must be directed towards groups of people that are less likely to be formally educated. Battle against the scourge of HIV/AIDS should be taken to churches and mosques since a number of worshippers are found not to uptake HCT. Religion leaders should be encouraged to discuss the relevance of HCT in programmes.

As recognizable efforts are being made on awareness HIV/AIDS, more efforts should go for counselling and testing to increase status identification. HCT service centres should be made more recognizable and accessible to encourage easy utilization.

In order to instill more confidence in the counselling and testing process, HCT providers are encourage to strictly respect and adhered to the “5 Cs” (Consent, Confidentiality, Counselling, Correct test results, and Connection/linkage to prevention, care and treatment). Also, to reduce societal fear and stigmatization, more actions are required by all agencies of government and NGOs on HIV/AIDS related programmes to improve on sensitization and education of the generality of the populace on the importance of supporting those tested positive and reintegrate them into society.

Funding partners are encourage to ensure HCT uptake is
made free by providing all necessary logistics and equipment needed. This may encourage those with financial challenges to signify interest in up-taking HCT and thereby improve on status identification. Such support may include training and retraining of HCT providers.

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