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ARTICLES

- Knowledge, attitude, practice and associated factors of voluntary counseling and testing for HIV/AIDS among Wolkite university students in Ethiopia** 98
Abdu O. Abdu, Teshome G., Dereje M. Melese, Girma A., Daniel K. and Agizie A.
- Immunological and clinical assessment of adult HIV patients following switch to second-line antiretroviral regimen in a large HIV Program in North-central Nigeria** 106
Stephen Boerwhoen Dapiap, Babatunde Adeshina Adelekan, Nicaise Ndembi, Fati Murtala-Ibrahim, Patrick Sunday Dakum and Ahmad Tijjani Aliyu
- Human immunodeficiency virus testing and counseling trends analysis, Midlands Province, Zimbabwe: A secondary data analysis** 117
Annamercy Makoni, Notion Gombe, Tsitsi Juru, More Mungati, Donewell Bangure, Gerald Shambira, Milton Chemhuru and Mufuta Tshimanga

Full Length Research Paper

Knowledge, attitude, practice and associated factors of voluntary counseling and testing for HIV/AIDS among Wolkite university students in Ethiopia

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Voluntary counseling and testing (VCT) for HIV is essential and critical way for prevention, care and treatment of HIV. It allows early detection of illness, reducing transmission, morbidity and mortality from it. But youth knowledge and attitude towards HIV testing services is not universal. The aim of this study was to assess knowledge, attitude, practice and factors associated with VCT for HIV among University Students in Ethiopia. Institution based cross sectional study was conducted among University students in Ethiopia using pretested, structured self-administered questionnaire. Single proportion formula was used to calculate the sample size (361). Multistage sampling with stratified sampling technique was used. Data was analyzed using SPSS version 16.0 with chi square test, bivariate and multivariate analysis via OR, AOR, p-value and confidence interval. Binary logistic regression was used. Out of 361 sample 93.6% of them responded, with 178 (52.7%) male and most are below 25 years. Majority were single, orthodox in religion, and from urban residence. 86% of them have heard of voluntary testing for HIV and know that having early test will prevent future spread of HIV. Based on the scoring 66% are knowledgeable about VCT. Almost 60% of participants were willing to undergo the test and 80% advices their friends to have test. Also 40.5% had good attitude toward test for HIV and 65.7 and 29.6% were ever tested and tested in the previous year respectively. Fear of HIV test results, stigma, and service related factors were major barriers for testing. Being male (AOR=1.607, CI: (1.01-2.57) p value= 0.047) and first year (AOR= 3.25, 1.33 – 8.83) were significantly had lower odds of being knowledgeable than females and seniors respectively. Those who were not knowledgeable have two times odd of poor attitude (AOR=1.901(1.20-3.02) P=0.006)). Students from urban (AOR=2.088, CI: (1.273- 3.425) P=0.004), unseparated family (AOR=2.24CI: (1.02-4.92) P=0.045) and with poor attitude (AOR= 1.76 CI: (1.08-2.89) p=0.024) were more likely not to have test than counterparts. Knowledge and attitude towards HIV testing is not satisfactory. Freshman students are the target for behavioral interventions. Improving awareness and attitude of students through peer to peer discussion and other packages is crucial to increase the practice and ultimately combat HIV in higher institutions.

Key words: Attitude, HIV/AIDS, Knowledge, University, voluntary counseling and testing (VCT), associated factors.

INTRODUCTION

HIV/AIDS remain major public health concern worldwide. Globally, 34.0 million people were living with HIV at the

end of 2011. Estimated 0.8% of adults aged 15-49 years worldwide are living with HIV. Even if it is global

pandemic, Sub-Saharan Africa remains most severely affected, where 4.9% of adults are infected. Thus this region account for 69% of the people living with HIV worldwide. Caribbean, central Europe and Asia have 1% prevalence of HIV among adults (UNAIDS, 2012). In Ethiopia, sero prevalence rate of 1.5% among 15-49 aged population with highest rate occurring among women (1.9%) and 1% among men (EDHS, 2011). HIV/AIDS goes beyond public health concerns because it primarily affects adult populations which greatly undermine the social and economic structures of developing countries (Admassu et al., 2006). Owing to this great burden of infection, Ethiopia has launched different prevention strategies like condom promotion, HIV counseling and testing, behavioral changes and others since 1985 (FHAPCO, 2007).

There are three options of HIV testing and counseling namely voluntary counseling and testing (VCT), client initiated and mandatory HIV screening. VCT is one of effective strategy in tackling HIV/AIDS (WHO, 2003).

VCT is essential and critical gateway for HIV prevention, care and treatment. Thus this allows early detection of illness, reducing transmission, morbidity and mortality from it (FHAPCO, 2007). VCT is also an effective strategy for facilitating behavioral change for both clients, whose test result is either negative or positive (FHAPCO, 2007; Zelalem et al., 2013). Testing for HIV is advocated as international arena for HIV prevention. The Ethiopian government developed guidelines since 1996 focusing on couple, youth and other VCT for HIV. It is also showed that VCT is instrumental in bringing about behavioral change, reducing unprotected sex and helping reduce the incidence of HIV and other sexually transmitted diseases (Admassu et al., 2006).

It has potential preventive effects on HIV transmission and serves as a gate way to other services. It includes both testing for HIV status and counseling on different issues. Counseling should guarantee confidentiality and include information about HIV transmission and personal discussion about an individual's risk. This enables people to make informed decisions about their future. Thus upgrading and expanding this service is critical for preventing HIV pandemic among youths (WHO (2003). Thus youth friendly counseling is appropriate for this age group.

Testing for HIV (VCT) is the process by which an individual undergoes counselling which would enable him or her to make an informed choice about being tested for HIV. It has comprehensive role in prevention of HIV. Knowledge and attitude towards VCT is not universal (FHAPCO, 2007; Awoke and Yilma, 2008). Despite its great role uptake or utilization rate is poor mainly due to

poor behavioural education communication, attitude and fear of stigma and result especially among youths (Awoke and Yilma, 2008).

Various studies showed low VCT utilization and poor attitude towards VCT but adequate awareness among university students. Fear of HIV test results, stigma, and not feeling at risk of HIV infection were major causes for non-uptake of VCT among university students (Abiy et al., 2009; Leta et al., 2012; Museve et al., 2013; Meda, 2013; Zelalem et al., 2013). Another study shows that the level of knowledge towards VCT, being male, senior student and attitudes of students about VCT are associated with VCT uptake (Tsehaye et al., 2010). Among students in the year before study, only 43.5% were tested (VCT registration, 2013).

University students are mostly in adolescent age group accompanied with freedom from family control may increase risk of acquiring HIV/AIDS. In contrast VCT is one main behavioural tool to combat the pandemics. Its use is determined by perception and other related factors. Thus this present study aimed to assess the knowledge, attitude and utilization of VCT and its associated factors among university students in Ethiopia. It will also inform concerned bodies with the current body of the problem among university students. It will ultimately help in planning appropriate, accessible, safe and confidential HIV counselling service in campus. It will show level VCT utilization among students and factors which hinder utilization, giving strategic directions and possible optional interventions to halt HIV pandemic among adolescent in university.

METHODS

Study design

Institution based cross sectional study was carried out among regular Wolkite university students in South Ethiopia. It is found in Ethiopia, located around 169 km from capital city Addis Ababa. In 2013/14 academic year, a total of 3715 students under seven colleges with above 30 departments were enrolled. The university has one student clinic with one VCT center. In previous academic year VCT service served 616 students with counseling. But in 2013/14 academic year it was not functioning well. It was conducted from May 18 to 26, 2014.

Sampling and sample size

Multistage sampling was employed to access the study units. First it was stratified in to seven colleges; out of this four colleges were selected by simple random sampling method. Then three departments from each of the four selected colleges were selected

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departments from each of the four selected colleges were selected by simple random sampling. Considering that the student's year of stay may affect their VCT uptake, the sample size per department was proportionately allocated. Thus the total sample size was allocated proportionately to each selected college, department, and year of study based on total population per stratum. Sample size was proportionally allocated to four selected colleges. And then departments were selected from each college to make sample representative.

Single proportion formula was used to estimate adequate sample size using prevalence of having VCT from other similar study as 0.585 (Girmay et al., 2011), marginal error 5 and, 95% confidence interval and total size of 3714(N).

$$n = \frac{z^2(pq)}{d^2}$$

Where n is sample size, taking marginal error (d) as 5 at 95% Confidence interval.

Thus the sample size became 360 and since the total population is less than 10,000, correction formula was used the sample size become 328. Finally considering non response rate of 10%, the final sample size became 361.

Data collection and analysis

Data was collected using pretested self administered questionnaire consisting of socio demographic information, knowledge, attitude and practice and some associated factors questions. Pretest was conducted in similar university on 36 students. Based on feedback from respondents and the analysis of pretest data necessary amendment in language, measurement, way of questioning and other areas was done. Final draft of tool was used for actual data collection. The data collected on knowledge and attitude was score based on the cutoff point above mean of the sum points of each questions. Correct answer was labeled as one and the counter part as zero. Thus value above mean of all respondent was considered as knowledgeable and good attitude. While counter parts are labeled as not knowledgeable and poor attitude.

Data was entered to SPSS version 16.0. Then it was analyzed via descriptive statistics like frequency, crosstabs and tables. Both bi-variate and multivariate analysis was carried out. To identify factors associated with the outcome variable binary logistic regression was used. The outcome variables are knowledge level, attitude towards VCT and practice of VCT. All the three dependents are binary outcomes. A significant level of 0.25 at bi-variate analysis and some important variables from previous studies were considered for multivariate analysis. Sex, family place of residence, year of study, having boy/girlfriend are some of the variables included in multivariate analysis. Both crude and adjusted odds ratio (AOR) were calculated with their 95% confidence interval and P value. Also mean comparison via t- test and ANOVA was used to test whether the knowledge and attitude score varies between groups. A P value below 0.05 was considered as statistical significant association.

Data quality was assured through care full training for data collectors, close supervision during data collection, pretested questionnaire and daily checks of the collected data was applied. The research was reviewed and ethically adopted by the university independent Research ethical review committee. Then a written informed consent considering their free will to participate in the study, confidentiality of their information and each participant was giving informed consent on separate paper and then they are eligible for the questionnaire. All possible ethical cares were respected throughout conduct of this research project.

RESULTS

Socio demographic Information

From total sample of 361, 338 (93.6%) responded to the questionnaire, and, 178 (52.7%) were males. Majority of study participants 333 (98.5%) were below 25 years old, 316 (93.5%) were single, 17 (5%) were divorced. Over two thirds 214 (63.3%), 67 (19.8%), and 46 (13.65) were orthodox, protestant, and Muslim religion. More than half (55%) are from urban resident. Almost half, 153 (45.3%) of their family livelihood depend on farming, while 8 (26.3%) work as government employees. Majority, 292 (86.4%) of parents of study respondents lived together (Table 1).

Knowledge and attitude towards VCT

Out of 336 respondents, 289 (86%) ever heard of VCT for HIV. Among those who have heard of VCT, 219 (66.8%) got information from mass media and 45 (13.7%) and 28 (8.5%) got it from anti AIDS clubs and friends respectively. Almost all 336 (99.4%) know that it is important for person to undergo VCT. Regarding place where VCT is given 207 (61.2%) mentioned government health facility, while 84 (24.9%) and 74 (21.9%) mentioned youth clubs and private clinics respectively. Majority, 291 (86.4%) know that early VCT for HIV prevents its future spread. Only 145 (45.3%) responded positively to the question that obese and healthy looking people may have HIV infection. And almost two thirds 223 (66%) are knowledgeable about VCT, while the rest are not knowledgeable. The mean knowledge and attitude scores were not significantly different between male and female (p value >0.05) (Table 2).

Attitude and practice towards VCT

More than three fourth of them 295 (87.3%) and 265 (78.4%) perceive VCT as good and they were comfortable in VCT service respectively. While 202 (59.8%) were willing to undergo VCT and 268 (79.3%) would advise their friends to undergo VCT. Interestingly 246 (73.4%) said that they would continue their friendship if their intimate friends gets positive HIV test result (Table 3.).

About 222 (65.7%) of students had ever undergone VCT, while only 100 (29.6%) have had VCT in the past year. Among those who had tested, 119 (35.2%) and 78 (23.1%) had undergone VCT at government institutions and private clinics respectively. Regarding habit discussion with parents about HIV and other sexual issues 185 (54.7%) had habit of discussion. 211 (62.4%) and 60 (17.8%) preferred face to face and through secret letter as way of obtaining their test result (Table 3.).

Regarding time preference to have test for HIV/AIDS,

Table 1. Socio demographic characteristics of study participants among Wolkite University students, in Ethiopia, 2014.

Socio demographic characteristics	Frequency	Percent
Sex		
Male	178	52.7
Female	160	47.3
Age		
15-20	167	49.4
20-25	166	49.1
>25	5	1.5
Marital status		
Married	5	1.5
Divorced	17	5.0
Single	316	93.5
Religion		
Orthodox	214	63.3
Muslim	46	13.6
Protestant	67	19.8
Catholic	6	1.8
Other	5	1.5
Residence		
Urban	186	55.0
Rural	152	45.0
Parents marital status		
Live together	292	86.4
Separated	46	13.6
Have boy/girl friend		
Yes	149	44.1
No	189	55.9
Total	338	100

Table 2. Knowledge of university students towards VCT among Wolkite University students in Ethiopia, May 2014.

Variables	Frequency	Percent
Ever heard about VCT (n=336)		
Yes	289	86
No	47	14
Place of VCT service		
Government health facility	207	61.2
Private clinics	74	21.9
Youth services	84	24.9
Campaigns	53	15.7
VCT prevent HIV/AIDS spread (n=337)		
Yes	291	86.4
No	46	13.6
Knowledge of VCT (n=338)		
Knowledgeable	223	66
Not knowledgeable	115	34

Table 3. Attitude and practices of students towards utilization of VCT among Wolkite University students in Ethiopia, May 2014.

Variables	Frequency	Percent
VCT good to prevent HIV/AIDS (n=338)		
Yes	295	87.3
No	43	12.7
Comfortable with using VCT service		
Yes	265	78.4
No	73	21.6
Willingness to undergo VCT		
Yes	202	59.8
No	136	40.2
Advice friends to have VCT		
Yes	268	79.3
No	70	20.7
Option if intimate friend become positive result?		
Stop friendship	89	26.6
Continue friendship	246	73.4
Attitude		
Good	137	40.5
Poor	201	59.5
Ever tested for HIV/AIDS (VCT)		
Yes	222	65.7
No	116	34.3
Had VCT in past 12 months		
Yes	100	29.6
No	230	68.4

138 (40.8%) and 97 (28.7%) preferred weekend and working time as convenient time respectively. While to history of sexual behavior 74 (21.9%) had history of sexual intercourse. Majority 259 (76.6%) reported that they had never chewed khat and 212 (62.7%) had never drank alcohol (Table 3). Fear of positive test results, the service not being accessible, and fear of stigma by friends were the major constraints for testing for HIV.

After adjusting for confounders males were two times more odds of being less knowledgeable about VCT (AOR=1.61, P=0.047). As the year of study advance the students are more likely to be knowledgeable. First year students were 3.4 times more likely to be less knowledgeable (AOR=3.428, P=0.011) than third year students. Students whose parents live together have a 53 percent likelihood of being less knowledgeable (AOR=0.48, P=0.027) (Table 4).

Year of study is associated with attitude towards VCT. Those who are not knowledgeable are almost two times more odds of poor attitude towards VCT than those knowledgeable (AOR=1.901, P=0.006) (Table 5). Family place of residence and parental marital status was found

to be significantly associated with having VCT (Table 6).

Students from urban (AOR=2.088, P=0.004) and parents live together (AOR=2.24, p=0.045) are two times not to undergo testing for HIV. Those having boy friend had 64% less odds of not having VCT (AOR=0.344, P=0.000). Having poor attitude is significantly associated with two times higher odds of not undergoing VCT (AOR=1.72, P value=0.024) (Table 6).

DISCUSSION

Majority about 66% were knowledgeable about VCT for HIV/AIDS based on knowledge score, with 86% had ever heard of VCT for HIV and 86.4% were aware of VCT prevent HIV transmission. Similar study showed 81.6% students were heard of VCT (Girmay et al., 2011). While other studies shows 86% were knowledgeable (Zelalem et al., 2013) and similarly in Kenya (Museve et al., 2013). This discrepancy may relate to the scoring system and the information communication system in the area regarding VCT. Since the campus was young it had no

Table 4. Association of factors with knowledge about VCT among Wolkite University students in Ethiopia, May 2014.

Variables	Knowledge about VCT ^a		Crude OR	Adjusted OR	
	Not knowledgeable	Knowledgeable			
Sex	Male	69	109	1.569 (0.994-2.476) P=0.053	1.607 (1.006-2.567) p- 0.047
	Female	46	114	1	1
Year of study	First	90	152	2.763(1.102-6.930) p-0.03	3.428 (1.331-8.827) p-0.011
	Second	19	43	2.06 (0.736-5.80) p-0.339	1.463 (0.795-2.695) p-value 0.222
	Third	6	28	1	1
Parent marital status	Live together	93	199	0.510 (.272-.956)P-0.036	0.477(.0247-.0921)p-0.027
	Separated	22	24	1	1

^aIt is assessed based a number of question assessing knowledge and scoring them.

Table 5. Factors associated with attitude of students towards VCT among Wolkite University students in Ethiopia, May 2014.

Variables	Attitude towards VCT ^a		COR ^b	AOR ^c	
	Poor	Good			
Year of study	First	102	140	1.749 (0.801-3.817) P=0.161	1.550 (0.703-3.418) P=0.278
	Second	25	37	1.62 (0.6-3.97)p-0 .795	1.034 (0.582-1.838) P=0.908
	Third	10	24	1	1
Knowledge	Not knowledgeable	59	56	1.959 (1.239-3.095) P=0.004	1.901 (1.199-3.015) P=0.006
	Knowledgeable	78	145	1	1

^aAssessed by scoring number of attitude measuring questions. ^b Crude and adjusted odds ratio with confidence interval and significant level.

well organized testing and education program for the students. Students were not well aware of the services given like having counseling, partner advising rather percept that VCT is like having blood testing only. Thus this gap should be narrowed through communication.

In this study 87.3% perceived that having VCT is good to prevent HIV/AIDS while more than half (60%) were willing to have VCT. This shows that students had optimistic attitude towards VCT. And more than two third responded they did not

stigmatize if their friends test become positive. Similar studies showed 88% (Girmay et al., 2011), 76.9% and 82% (Abiy et al., 2009) were willing to undergo VCT. But these should be seen in consideration of possible social desirability bias. And surprisingly only 40% of students had a good attitude towards VCT while other study reports higher level, 73.3% (Zelalem et al., 2013). This might be sampling composition, information accessibility and the variation while measuring the variable, keeping possibility of higher desirability

bias in second or under reporting in the former study.

In this study 65.7% (95% CI: 60.8%-70.6%) of the students reported as they ever had VCT and only 29% had tested in 2012. This low testing rate partially attributed to lack of functioning VCT center in the campus. While study among university students showed 61.8% (95% CI: 56.5%-67.04%) (Zelalem et al., 2013) and 58.5% (95% CI: 55-62%) (Girmay et al., 2011) had ever had VCT. There is no significant difference in

Table 6. Regression analysis showing factors associated with VCT service utilization for HIV/AIDS among Wolkite University students in Ethiopia, May 2014.

Variable	VCT use ^a		OR	AOR with CI, P-value	
	No	Yes			
Sex	Male		1.229 (0.783-1.931) P=.370	1.606 (0.975-2.647) P=0.063	
	Female		1	1	
Year of study	First	90	152	1.924 (0.836-4.432) P=0.1	1.699 (0.696-4.150) P=0.245
	Second	18	44	1.32 (0.51-3.49) P=0.233	1.508 (0.7892.884) P=0.214
	Third	8	26	1	1
Family residence	Urban	76	110	1.935 (1.216-3.078) P=0.005	2.088 (1.273-3.425) P=.004 ^b
	Rural	40	112	1	1
Parents Marital status	Live together	106	186	2.052 (0.979-4.300) P=0.057	2.237 (1.017-4.920) P=.045 ^b
	Separated	10	36	1	1
Boy/girl friend	Yes	33	116	0.363 (0.224-0.588) P=0.000	.344 (.207-.572) P=.000 ^b
	No	83	106	1	1
Knowledge level	Not knowledgeable	43	72	1.227 (0.767-1.964) P=0.39	1.154 (.6881.938) p= .587
	Knowledgeable	73	150	1	1
Attitude	Poor	57	80	1.715 (1.087-2.705) P=0.02	1.764 (1.079-2.883) p=.024
	Good	59	142	1	1

^aIt is measured through self-reporting by participants. ^bshows statistically significant association.

proportion of ever tested. This testing rate might be result of country's extensive work on service provision and increased accessibility to knowledge and services of testing through campaigns and integrated networks (FHAPCO, 2007).

In addition being male (AOR=1.607 (1.006-2.567) and first year (AOR=3.428 (1.33-8.83) were less likely to be less knowledgeable of VCT. Similarly to previous studies (Alemayehu, 2010; Zelalem et al., 2013) females are more knowledgeable. The result is conjunction with the previous results.

Level of education and knowledge about VCT were positively associated with good attitude. As level of year of study in the campus increases

their attitude towards HIV test become good. And those who are knowledgeable have good attitude towards test. This emphasizes the effect of knowledge and academic stage on improvement of positive attitude or behavioral change. First year students are less likely to undergo test (P>0.05). As the students stay more they acquire information about the VCT and will have the test.

VCT use was associated with sex, year of study, parental marital status, place of residence and having boy/girlfriend. Those females tend to use VCT more likely. It supported by female are more knowledgeable, thus tend to had VCT more likely than males. While study in Malawi showed

no association between sex and knowledge about VCT (Ntata et al., 2008). Students who report of having boy/girlfriend were significantly associated with test. It could be due to the fact students who enter to relationship have better communication and understanding of sexual issues.

Knowledge and attitude towards testing were associated with testing for HIV. Those students with good attitude were 1.76 more odds for not undergoing VCT. This emphasizes that importance of attitude change on the utilization of service. Since perceived benefit and risks will improve utilization, knowledge is also important. And fear of result, in availability of service and stigma are

major barriers for not had test for HIV. Other studies supported these (Museve et al., 2013; Zelalem et al., 2013). While previous study (Zelalem et al., 2013) showed urban, male were more likely to use VCT. It might be due to variation in sample composition. But those knowledgeable had less of odds of not having VCT for HIV (Zelalem et al., 2013). In general this study used mean knowledge and attitude score to assess knowledge and attitude might have distorted the final result of the study. The issue of respondents' social desirability and other bias should be taken in to consideration for the result.

Conclusion

Generally knowledge, attitude and practice of students towards VCT are relatively unsatisfactory. Different information education communication and peer to peer discussion are of great value. Sex, year of study and parent marital status is associated with knowledge about VCT. This will enable to target specific group in case where whole is not feasible. Senior students and those who are knowledgeable are significantly associated with good attitude. Having good attitude is significantly associated with greater use of having test. Students who engage in relationship use significantly more likely to had test.

RECOMMENDATION

The university should have plan and interventions to improve the attitude and practice of students towards VCT for HIV with special focus on freshman students. It should be through peer educations, counseling in VCT clinics and other feasible options.

CONFLICT OF INTERESTS

The authors have not declared any conflict of interests.

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Abbreviations:

A/OR, Adjusted/ odds ratio; **CI**, confidence interval;

HIV/AIDS, Human immunodeficiency virus/acquired immunodeficiency syndrome; **VCT**, voluntary counseling and testing.

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Full Length Research Paper

Immunological and clinical assessment of adult HIV patients following switch to second-line antiretroviral regimen in a large HIV Program in North-central Nigeria

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Antiretroviral (ART) regimen switch is a common occurrence in resource-limited settings where patients present late for care or with an AIDS-defining event. ART regimen switch can be attributed to several factors emanating from either the individual, program or facility level. This retrospective study was carried out in a resource-limited comprehensive facility in North-central Nigeria. Treatment records of 4,206 Adult HIV/AIDS patients initiated on first line ART regimen from 2006 to 2013 were extracted and examined for switch to second line ART regimen for the purpose of this study after ethical clearance had been sought. Absolute CD4 count, World Health Organisation (WHO) clinical stage and viral load results at treatment initiation, point of switch to second line and at the end of 2014 (end-point for the study) were obtained. About 75% of the 4,206 patients initiated on first line highly active antiretroviral therapy (HAART) were retained in care and were still on first line HAART at the end of 2014 with a significant difference in median CD4 count, BMI, WHO clinical staging and viral load at baseline compared to the end of the study period. Out of the 4,206 adults patients initiated on first line HAART, 71 were later switched to second line regimen due to either first-line immunological or virological failures although only 57 patients without traces of co-infection were included in this study. At end-point, a very high (87.7%) WHO defined immunological response was achieved. The study revealed that although immunologic and virologic response in patients before ART regimen switch was low, it improved tremendously after switch to second line regimen in all patients including those with available viral load results. The study results showed a 96.5% retention rate of patients switched to second line HAART and a correlation between virological suppression and immunological response.

Key words: Immunological assessment, virologic response, HIV diagnosis, first line regimen, second line regimen.

INTRODUCTION

Human Immunodeficiency Virus (HIV) testing coverage in most parts of the world at the beginning of the millennium was suboptimal, particularly among infants, adolescents and key populations (Antinori et al., 2011). Limited access to HIV diagnosis and treatment resulted in

substantial numbers of patients presenting for care only when they have reached an advanced stage of disease.

With the announcement of the U.S President's Emergency Plan for Acquired Immunodeficiency Disease Syndrome Relief in 2003 (Zeit, 2017), access to HIV

testing and Anti-retroviral therapy (ART) was made more available (WHO, 2016). As of 2006, WHO recommended a standard initial drug treatment option of two nucleoside reverse transcriptase inhibitors (NRTIs) and a non-nucleoside reverse transcriptase inhibitor (Gilks et al., 2006) to maximally suppress the HIV virus and stop the progression of HIV disease. In 2012 an estimated 1.6 million people died of HIV-related causes, and HIV/AIDS still ranks in the top five global causes of disability adjusted life years (Nathan et al., 2013). Huge reductions have been seen in rates of death and morbidity when use is made of a potent Anti-retroviral (ARV) regimen, particularly in the early stages of HIV disease (WHO, 2013).

In resource-limited settings, patients present far late for care, on average, with a CD4 cell count of <200 cells/mm³ or with an AIDS-defining event (Geng et al., 2011). Some of them are initiated on second line regimen even though late presentation is associated with lower survival. However, in high-income settings, a late presenter refers to any patient who presents with a CD4 cell count of < 350 cells/mm³ (Antinori et al., 2011). In 2007, it was estimated that a small proportion (4% adults and 1% children) of patients on ART were on second-line therapy (Renauld-Thery et al., 2007). The benefits of early access to HIV treatment led the WHO in 2013 to raise the CD4 threshold for initiating HIV treatment from 350 cells/mm³ to 500 cells/mm³ and to recommend ARV use for the prevention of HIV infection, particularly for pregnant women, young children, and key populations exposed to HIV risk. This recommendation increased the number of people eligible for treatment in low- and middle- income countries to 25.9 million even though it is estimated that 9.7 million people living with HIV are receiving treatment as against less than half a million people a decade ago (WHO, 2013).

Africa and Nigeria in particular continually face an increasing burden of HIV related death rates. For example, HIV related annual deaths in Nigeria increased from 192,000 deaths in 2008 to 217,148 deaths in 2012. Out of 1.5 million Nigerians confirmed to be HIV positive in 2012, only 500,000 had access to antiretroviral drugs (Chioma et al., 2012), however, as at December 2014, 747,382 individuals have been placed on ART (NASCP, 2014).

METHODS

Study population and data collection

The existing database from the beginning of HIV/AIDS care and treatment clinic in 2006 at Asokoro district hospital - a

comprehensive health facility was searched and data for 4206 adult patients initially placed on first line ART regimen but later switched to a second line ART regimen was retrieved. Asokoro district Hospital which is located in North central part of Nigeria serves the health care needs of the residents of Abuja and seven other surrounding states.

Eligibility criteria

Only patients initiated on first line ART, enrolled for treatment at the facility or transferred into the facility were included in the study. Patients with records of co-infection with tuberculosis and children were excluded from the study.

Data and statistical analysis

Basic demographic information such as sex, weight and age were obtained for patients who fulfilled the eligibility criteria. The number of months a patient had been on second line ART regimen was determined with respect to the cut-off point (end of 2014).

Data cleaning and descriptive data analysis of the patients' characteristics were computed and stratified based on WHO clinical staging, CD4 count, duration patients remained in care and other variables at the initiation of HAART, point of switch and cut-off point using SAS propriety software 9.2. Comparisons of proportions between the groups of patients (at initiation of HAART, point of switch and cut-off point) were computed using chi-squared test for categorical variables and Student's *t*-test and the comparison was considered significant at *P*-value less than 0.05.

Ethical statement

The data was extracted from the treatment centre database with the privacy of the patients protected using only the assigned US President's Emergency Plan For AIDS Relief (PEPFAR) identifiers. In addition, the data extraction and analysis were carried out anonymously. Medical ethics review was not required as the data obtained from the data base was retrospective from the previously provided treatment programme. However, the approval of the centre's management and the Institute of human virology Nigeria health research ethics review committee were obtained in order to access the data.

RESULTS

Characteristics of the patients who remained on first line at HAART throughout the study

The baseline characteristics of the patients who remained on first line HAART regimen (*n*=4206) throughout the study period as depicted in Table 1 shows that a majority of them (92.0%) are between 15-45 years while just about 8% are older than 45 years with a preponderance of females (70%) compared to males (30%) and an

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Table 1. Characteristics of patients on first line HAART throughout the duration of the study

Variables	Categories	HAART Initiation (first line)		Cut-off Date (first line)		P-value
		n	%	n	%	
Gender	Female	2884	69.75	2884	69.75	
	Male	1251	30.25	1251	30.25	
Age (years)	15-45	3816	92.29	3382	81.79	< 0.0001
	>45	319	7.71	753	18.21	
	Mean (SD)	33.35(±7.92)		38.08(±8.71)		
	Median	32.0		37.0		
	IQR	[28.0,38.0]		[32.0,43.0]		
	WHO clinical stage	I	597	14.44	3066	
	II	403	9.75	358	8.66	
	III	239	5.78	183	4.43	
	IV	79	1.91	24	0.58	
	missing	2817	68.13	504	12.19	
CD4 count (cells/μl)	≤ 200	2032	49.14	1159	28.03	< 0.0001
	201- 350	1205	29.12	1118	27.04	
	351-500	500	12.09	931	22.52	
	>500	399	9.65	927	22.42	
	Mean (SD)	249.66(±185.75)		358.47(±221.15)		
	Median	209.0		331.0		
Weight (kg)	IQR	[116.0,332.0]		[195.0, 485.0]		< 0.0001
	< 40	34	0.87	43	1.14	
	40-60	1393	35.60	1197	31.65	
	> 60	2486	63.53	2542	67.21	
	Mean (SD)	66.42(±13.53)		68.04(±14.54)		
	Median	65.0		67.0		
Height (m)	IQR	[57.0,75.0]		[58.0,77.0]		
	Mean (SD)			1.63(±1.57)		
	median			1.62		
BMI(kg/m ²)	IQR	[1.56,1.68]				<0.001
		24.77		25.53		
Viral Load copies/ml		First Viral load		Last viral load		
	< 400	3	0.05	55	1.33	
	400-1000	2	0.07	2	0.05	
	> 1000	98	2.4	46	1.11	
Loss to Follow up (LTFU) Retention	Missing (%)			4032 (97.51)		<0.001(*)
	Mean (SD)	39343.01(±9352.40))0)6)		90220.62(±430253.01)		
	Median	41739.00		287.00		
	IQR	[41501.0, 41828.0]		[20.0, 50994.0]		
	log	10.37		7.00		
				1024	24.76	
			3111	75.24		

* Likelihood ratio.

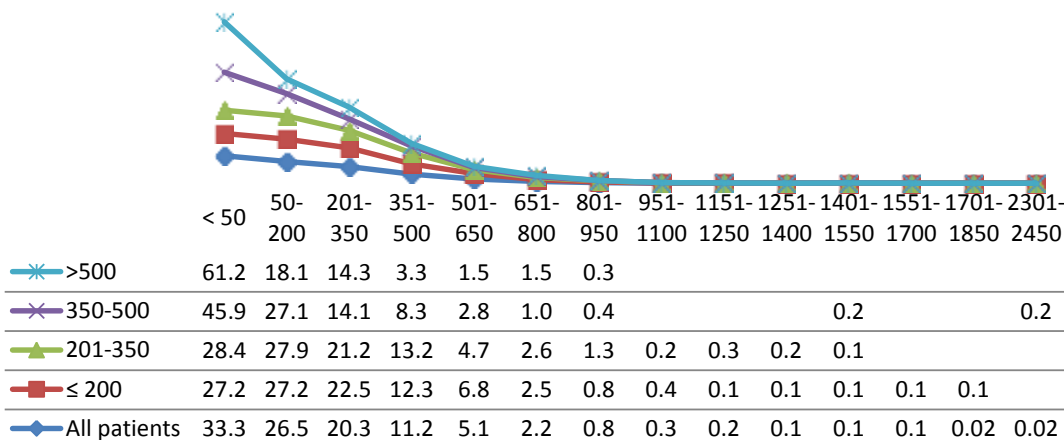


Figure 1. Changes in CD4 count (cells/μl) for patients still on First line ARV.

average body mass index (BMI) of 24.77 kg/m². The WHO clinical profile of the patients before ART initiation which was available for only a third of them showed that 14% of the patients were at clinical WHO stage I, while the rest were at WHO clinical stages II (10%), III (6%) and IV (2%) respectively. The CD4 count profile showed 50% of them with a CD4 count of ≤ 200 cells/μl, 30% with ≤ 350 cells/μl, while the remaining had a CD4 count of between 351-500 cells/μl. The median (IQR) viral load was 41739.00 (41501.0, 41828.0).

Changes in characteristics of patients still on first line ART throughout the duration of the study

The immunological and clinical characteristics of the patients on first line HAART regimen at the cut-off point when compared to baseline revealed a significant and tremendous improvement as depicted in Table 1. It showed that the median age of the patients increased from 32 years (IQR: 28-38 years) at initiation of ART to 38 years (IQR: 32-43 years) at the cut-off point (p<0.001). Changes were also noticed in the median (IQR) CD4 count from 209 (116-332) cells/ μl at baseline to 331 (195-485) cells/μl (p<0.001) with a reduction in the proportion of patients at baseline compared to cut-off date with CD4 count levels of ≤ 200 cells/μl (49 to 28%) and 201-305 cells/μl (29 to 27%). However, there was an increase in the proportion of patients at the baseline compared to the cut-off point with CD4 count levels of 351-500 cells/μl (12 to 22%) and >500 cells/μl (10 to 22%).

Similarly, there was an increased change in the median (IQR) weight from 65 kg (57-75 kg) at baseline to 67 kg (58-77 kg) at cut-off point (p<0.001) while the mean BMI of patients increased from 24.77kg/m² at baseline to 25.33 kg/m² at the cut-off point. The WHO clinical stage profile of the patients showed that there was a general marked improvement in clinical response irrespective of

the level of the clinical stage at the cut–off point when compared to the baseline. The proportion of patients with clinical stage II, III and IV at baseline reduced from 10 to 9%, 6 to 4% and 2 to less than 1% respectively at the cut of point while the proportion of clients with clinical stage I increased from about 14 to 74% (p<0.001).

Although only about 3% of the patients had a viral load count result, there was a significant difference between baseline and the cut-off point results (p<0.001). A 50% reduction in the proportion of patients with viral load >1000 copies/ml at baseline was recorded at the cut-off point. Also more than 100% point increase in the proportion of patients having viral load of <400 copies/ml was noticed at the cut-off point. However, despite these significant improvements in clinical, immunological and relative virological profile of the patients only about 75% of them were retained in care while the remaining were lost to follow up.

The changes in CD4 count as seen in Figure 1 between ART initiation and the cut-off point indicated that 33.3% of the patients had <50 cells/μl CD4 count increase (immunological non-responders), 46.5% of patients had an increase of between 50 to 350 cells/μl, 19.3% had an increase of between 351 to 950 cells/μl while about 1.6% of the patients had an increase of between 951 to 2450 cells/μl CD4 counts.

The least and highest time patients spent on first line ART were less than 1 month and 116 months (9.7 years) respectively as shown in Figure 2. It was observed that about 12.12% of patients spent less than 10 months on treatment while 1.35% of the patients spent 9.7 years on treatment.

Characteristics of patients switched to second line regimen at HAART initiation

From the data, the patients were initiated on a WHO recommended two NRTI-based and one NNRTI-based

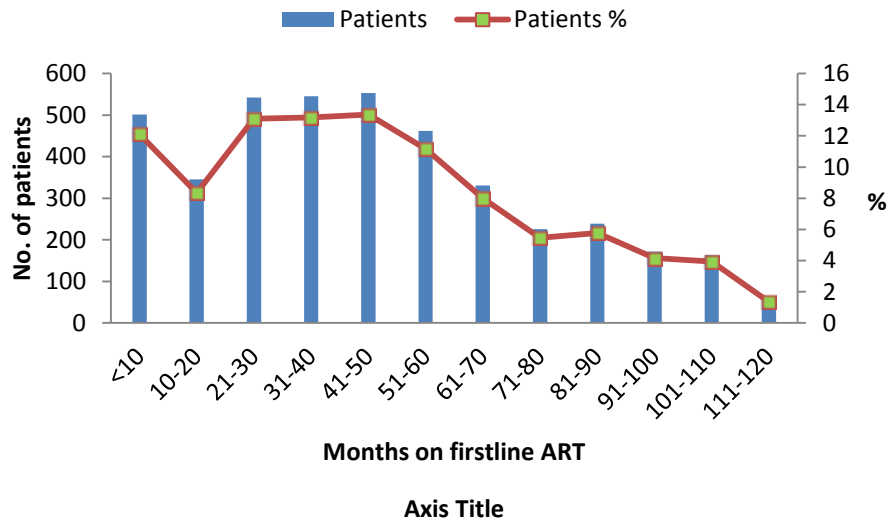


Figure 2. Time spent on ART since initiation for patients still on first line.

first-line ART regimen. The second line regimen were Protease Inhibitors (PI)-based (included two NRTI and atazanavir-rotonavir or lopinavir-ritonavir based). The baseline characteristics of the patients switched to second line HAART regimen is as depicted in Table 2. The age distribution of the patients shows that a majority of them (93.0%) were between 15-45 years while just about 7% were older than 45 years with a preponderance of females (64.9%) compared to males (35.1%). The WHO clinical stage profile of the patients before ART initiation showed that slightly above half of the patients were initiated while at clinical WHO stage I (54.4%) while the rest were at WHO clinical stages II (15.8%), III (19.3%) and IV (10.5%) in that order.

Results of the CD4 cells/ μ l count indicated that a majority of the patients (70.2%) had ≤ 200 cells/ μ l while 21.1 and 8.7% of the patients had absolute CD4 counts of 201-350 and >350 cells/ μ l respectively. The median (IQR) CD4 count for all the patients was 135.0 (92.5, 226.5) cells/ μ l. The weights of the patients fell mostly in the 40-60 kg (61.4%) range while only 38.6% of patients were >60 kg. None of the patients weighed less than 40 kg at the time of ART initiation. There were no viral load results available when patients were initiated on treatment.

Changes in characteristics after ART initiation to point of ART Switch

Patients spent an average (SD) and median (IQR) of 34.1 (± 25.4) and 34.5 (12.0, 55.0) months respectively on first line regimen before the switch to second line regimen ($p < 0.0001$). The WHO clinical stage profile of patients declined with 77.4% on stage I and 33.3% on stage II that have either moved to stage III or stage IV. There was an

evidence of immunological failure just before ART switch which was indicated by a drop in the median (IQR) CD4 cells/ μ l count from 135.0 to 95.0 cells/ μ l (36.0, 125.5) for all patients. In addition, the proportion of patients with CD4 absolute count of ≤ 200 cells/ μ l, increased from 70.2 to 86.0% while the proportion of patients with 201-350 and >350 cells/ μ l at ART initiation declined by about half as depicted in Table 2.

Changes were also noticed in the median (IQR) CD4 count for sex and age categories. There was a drop in the median CD4 absolute count by 52 points for females and 16.5 points for males just before ART switch compared to the baseline profile as shown in Table 3.

In a similar manner, there were changes in the weights of patients. The number of patients at baseline with body weight >60 kg reduced from 22 to 15 whereas there was a marginal increase in the number of patients that weighed 40-60 or <40 kg.

Changes in characteristics after ART switch to end of 2014

The median (IQR) and mean (SD) duration of time in care and treatment after switch to second-line treatment were 23.0 (18.0, 29.0) and 25.2 (± 12.7) months respectively. The least and highest time patients spent on second line ART as at end of 2014 depicted in Figure 3 were 7 and 87 months. By the 87th month, patient with the longest time spent on second HAART was still active and on treatment.

Two patients were lost to follow up (LTFU) - a male after 7 months on second line ART and a female after she was on second line ART for 14 months. Out of 57 patients that were on second line ART, 55 (96.5%) patients made up of 36 females and 19 males were still in

Table 2. Characteristics of patients at HAART Initiation and Switch to Second Line HAART.

Variables	Categories	HAART Initiation (first line)		Point of Switch (first line HAART)		Cut-off Date (2014) - second line HAART		P-value
		n	%	n	%	n	%	
Gender	Female	37	64.9					
	Male	20	35.1					
Age (years)	15-45	53	93.0			47	82.5	0.087
	>45	4	7.0			10	17.5	
	Mean (SD)	33.4 (\pm 7.0)				38.4 (\pm 7.6)		
	Median	34.0				38.0		
WHO clinical stage	I	31	54.4	7	12.3	43	75.4	0.067
	II	9	15.8	6	10.5	7	12.3	
	III	11	19.3	11	19.3	3	5.3	
	IV	6	10.5	33	57.9	4	7.0	
CD4 count (cells/ μ l)	\leq 200	40	70.2	49	86.0	12	21.1	<0.001
	201- 350	12	21.1	6	10.5	14	24.6	
	>350	5	8.7	2	3.5	31	54.3	
	Median	135.0		95.0		419.0		
	IQR	(92.5 , 226.5)		(36.0, 125.5)		[124.5, 535.0]		
Weight (kg)	< 40	0		4	7.0	0		0.003
	40-60	35	61.4	38	66.7	19	33.3	
	> 60	22	38.6	15	26.3	38	66.7	
	Mean (SD)	57.60(\pm 12.70)		54.86(\pm 11.03)		68.21(\pm 13.77)		
	Median	54.0		54.0		67.50		
	IQR	[40.0,65.0]		[47.0, 62.0)		[59.0,76.0]		
Height (m)	Mean (SD)	1.63(\pm 0.11)						
	median	1.62						
	IQR	[1.59, 1.69]						
BMI(kg/m ²)		20.58		20.58		25.72		<0.001
Viral Load copies/ml	< 400			0		15	26.3	<0.001
	400-1000			0		4	7.0	
	> 1000			30	52.6	2	3.5	
	Missing data			27	47.4	36	63.2	
	Median			209386		<100		
IQR			(69810, 307037)		(<20, 630)			
Loss to Follow up (LTFU)						2	3.5	
Retention						55	96.5	

care and on treatment at the end of 2014 as shown in Table 2. At the cut-off point (end of 2014), records of all 57 patients that were on second line ART including those who were LTFU showed that a very high WHO defined

immunological response was achieved in 50 patients (87.7%) post ART switch. The number is comprised of forty-three (74.4%) and seven patients (12.3%) on clinical stages I and II respectively. Only seven (12.3%) patients

Table 3. Median (IQR) CD4 cells/ μ l count changes.

Variables	Categories	N	Median (IQR) at point of switch	Median (IQR) after Switch
CD4 count (cells/μl)	All patients	57	-35(-75.0, -5.0)	+279(+136.0, + 433.0)
	≤ 200	49	-23.5(-23.5, -5.0)	+270 (+270.0, +433.0)
	201-350	6	-75(-75.0, -24.5)	+ 311.5(+311.5, +665.0)
	>350	2	-133(-133.0, -60.5)	+329
Female	All females	37	-52(-52.0, -9.0)	+326(+125.5, +470.0)
	Age			
	15-45	37	-52(-52.0, -9.0)	+326(+125.5, +470.0)
	>45	Nil		
Male	All males	20	-16.5(-16.5, -4.5)	+232.5(+131.5, +308.0)
	Age			
	15-45	17	-23(-23.0, -4.0)	+234.5(+105.0, +373.5)
	>45	3	-11(-11.0, -8.0)	+224.5(+183.5, +283.0)

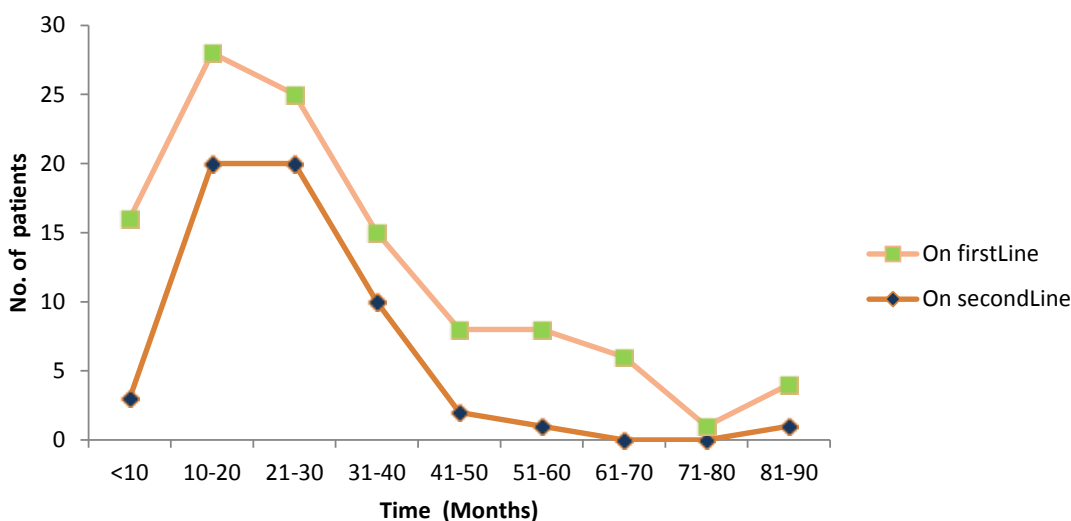


Figure 3. Time patients spent on first and second line regimen.

experienced low immunological response made up of three (5.0%) patients on clinical stage III and four (7.0%) on stage IV.

Furthermore, although only 30 out of 57 patients on second line ART had a viral load result before the ART switch, at the cut-off point only 21 patients' results could be accessed. Out of the 21 patients, 15 (74.4%) showed significant virological suppression with drop in viral load from >1000 copies/ μ l at ART switch to <400 copies/ μ l at the cut-off point ($p < 0.001$). The proportion of patients with absolute CD4 cells/ μ l count of ≤ 200 cells/ μ l reduced from 86% at ART switch to 21.1% at the cut-off point. That of patients with CD4 cells/ μ l >350 cells/ μ l increased from 3.5 to 54.3% while there was about 10% points increase in the proportion of patients with 201-350 cells/ μ

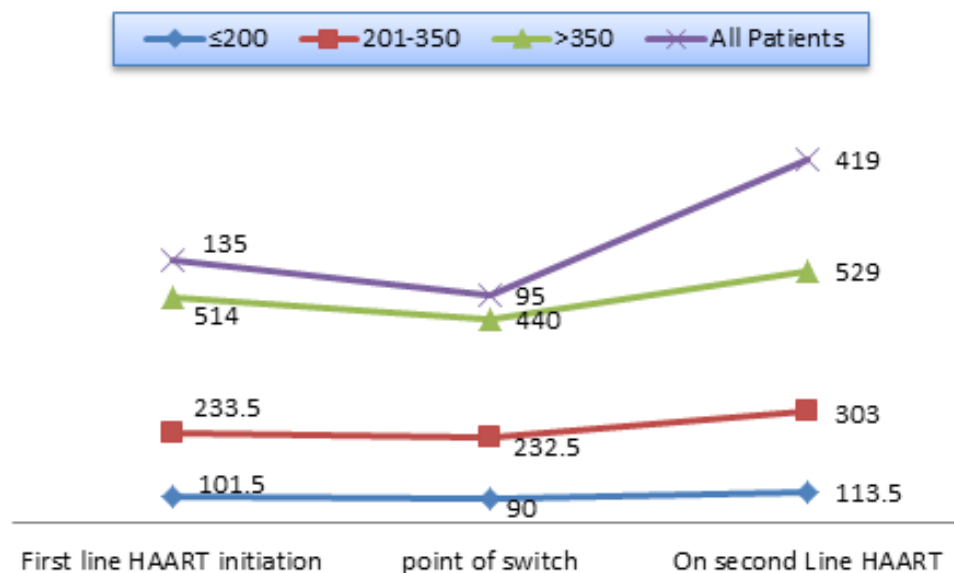
at ART switch compared to that at the cut-off point. Also the median (IQR) CD4 count for all patients improved at cut-off point to 419.0 (124.5, 535.0) from 95.0 (36.0, 125.5) before ART switch (Figure 4). This increased change in median CD4 count was also noticed irrespective of the CD4 level, age or sex of the patient as seen in Table 3.

All these changes are evidences of marked improvement in immunological response from ART switch to post ART switch at the cut-off point. However Table 4 showed that baseline characteristics; age, WHO clinical stage, sex, baseline CD4 count and weight were not predictors of CD4 gain on second line regimen.

The changes in CD4 count after patients had been on second line regimen as seen in Figure 5 indicated that

Table 4. Logistic regression results of baseline characteristics as predictors of < +50 cells/ μ l gain on second line regimen.

Characteristics	Category	Risk of immunological non-response on second line HAART		
		OR	95% CI	P value
Age (years)	15-45	1	(-2.7718, 2.7718)	1.000
	>45	1	(-2.7718, 2.7718)	1.000
WHO clinical stage	I	1		
	II	4.0799	(-0.9205, 1.9422)	0.4843
	III	3.2388	(-1.3837, 2.1947)	0.6569
	IV	3.2388	(-1.3837, 2.1947)	0.6569
Gender	Female	1		
	Male	3.7098	(-1.6815, 1.1092)	0.6553
Baseline CD4 count	≤ 200	0.6931	(-1.7073, 3.0936)	0.5714
	201-350			
	>350			
Weight (kg)	< 40			
	40-60	1	(-2.7718, 2.7718)	1.0000
	> 60	0.6931	(-1.7073, 3.0936)	0.5714

**Figure 4.** Median CD4 cell count (cells/ μ l).

12.3% of the patients had <50 cells/ μ l CD4 count increase (immunological non-responders). About 70% of the patients had an increase of between 50 to 350 cells/ μ l while 17.7% of the patients had an increase of between 351 cells/ μ l to 950 cells/ μ l. The increased change in CD4 count that was noticed for all patients was substantially contributed by patients with CD4 count of ≤ 200 cells/ μ l irrespective of the magnitude of the change.

DISCUSSION

The findings of this study aimed at assessing the performance of patients on second line HAART after failing on first line HAART showed a potential correlation between virological suppression and immunological response.

In addition, the contribution of the patients' baseline

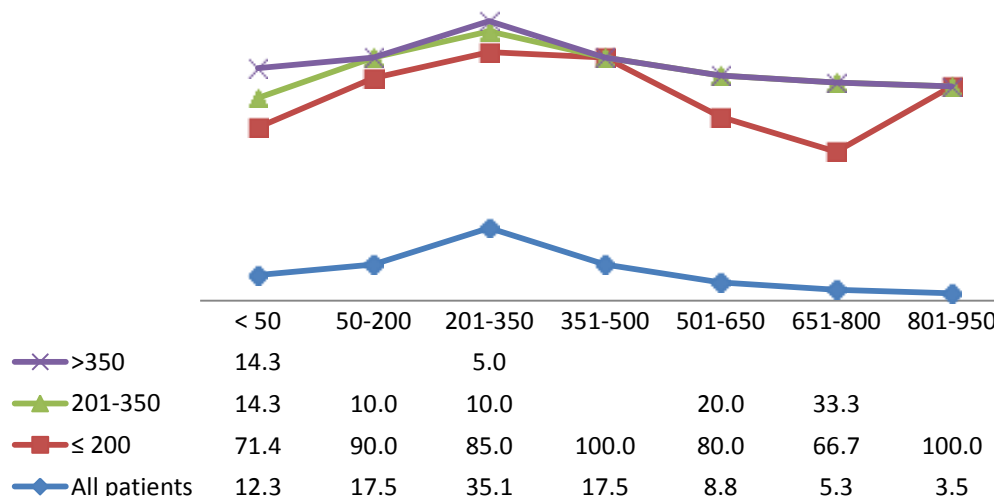


Figure 5. Changes in CD4 count (cells/μl) for patients on second line.

characteristics to CD4 count improvement was investigated and the results did not show any significant influence of the factors as risks to immunological failure. However, a study by Addisu et al. (2015) found that very low CD4 count before ART initiation influences immune reconstitution after patients are placed on ART which is similar to our findings. This is in contrast to another study which reported that treatment outcomes in adult HIV naïve patients were not based on the baseline CD4 cell count (Kyaw et al., 2013). Specifically in terms of gender, some studies dissociated sex as a risk factor of immunological failure (Lawn et al., 2006; Smith et al., 2004) which is in tandem with our results.

It was observed in this study that the patients appeared to have had late enrolment into HIV care with 70.2% of the patients having absolute CD4 count of ≤ 200 cells/μl (median CD4 <140.0 cells/μl) at ART initiation. This aligns with a statement that “in resource-limited settings, patients present far late for care on average with a CD4 cell count of <200 cells/mm³ or with an AIDS-defining event” (Geng et al., 2011).

Furthermore, the above findings agree with a similar study which posited that substantial numbers of patients continue to present for care only when they have reached an advanced stage of disease despite progressive improvements in HIV diagnosis and access to treatment and care (Nathan et al., 2013).

In this study we excluded patients with co-infections in order to allow for common characteristics of the patients to determine their retention on second line treatment and to prevent bias in treatment outcomes as a result of the risk of early mortality for HIV patients co-infected with tuberculosis (Attia et al., 2001; Marshall et al., 2013)

The results of this study revealed that patients with depleted CD4 count of ≤ 200 cells/mm³ after failing first line ART had highest improvement in CD4 count rates as compared to other patients with higher CD4 count

categories when switched to second line HAART. This is in concordance with a study which reported similar results for HIV patients with very advanced immunodeficiency starting ART in sub-Saharan Africa (Lawn et al., 2006). Other factors such as drug resistance or level of adherence by patients might be responsible for switching as pointed out in a previous study by Ford et al. (2012) which our study could not ascertain based on the limitation of the data.

Also, our study revealed that only the patients with ≤ 200 cells/mm³ after failing on first line regimen attained absolute CD4 cell count of >1000 cells/mm³. This is somehow contrary to the observation that patients with CD cell counts of ≤ 200 cells/mm³ as a result of treatment delay do not achieve a normal CD4 cell count even after a decade of effective therapy (Kelley et al., 2009) or are likely to die early in HIV care and treatment when there is delay in enrolling them in care (Bouille et al., 2010).

However, in our study only about 4.1% of the patients with ≤ 200 cells/mm³ had CD4 cell count >1000 cells/mm³, 24.5% achieved 500-1000 cells/mm³, 36.7% improved to between 300- 499 cells/mm³ and 24.5% still remained in the same stratum. Our results seems to differ with a report by (PAGAA, 2015) which stated that patients commenced on HAART with CD4 count below 350 cells/mm³ are very unlikely to improve to a high CD4 cell count compared to those with ≥ 350 cells/mm³.

Results of this study also indicated that patients despite spending close to 3 years on first line HAART, still had median CD4 count <100 cells/μl (Immunological non-response) before ART switch to second line HAART. The drop in absolute CD4 count was as high as >500 cells/μl with median CD4 count drop of >50 cells/μl in females and about 20 cells/μl in males. There was pronounced weight loss in most of the patients while on the first line regimen and the available viral load results indicated all the patients had virological non-suppression.

Treatment effectiveness was not closely monitored after ART initiation while ART switch was unnecessarily delayed. It was noticed that there was rapid immunological response and virological suppression within a short interval after patients had been initiated on second line HAART. It goes to show that when patients with signs of immunological non-response on first line regimen are early detected and switched to second line regimen, there is a positive tendency of them regaining immunological response and virologic suppression. Our findings revealed that patients with absolute CD4 count of >350 cells/ μ l at baseline performed better on first line regimen than the patients with \leq 200 cells/ μ l at baseline. It also indicated that patients with 201-350 cells/ μ l at baseline responded faster to immunologic build up effort than those with \leq 200 cells/ μ l absolute CD4 count.

The study findings was limited because of the inability of the facility in which our study was carried to conduct viral load test (which is vital in evaluating patients after being initiated on ART) for all patients due to financial resource constraint. The absence of the viral load results at ART initiation and in slightly above half of the population after ART switch is an indication that the patients at this centre were initiated on treatment based only on CD4 count results in addition to WHO clinical staging criteria. Also changes in WHO guidelines for initiating ARV within the period 2006 to 2014 (CD4 \leq 200 – recommended since 2003; CD4 \leq 350 – recommended since 2010; CD4 \leq 350 +TasP – recommended since 2012 and CD4 \leq 500 +TasP – recommended since 2013) was also a limitation affecting the outcomes of the study.

Conclusion

Based on the aforementioned findings we recommend that whenever patients in resource-limited settings are started on ART, funds should be made available for viral load test at baseline and subsequently to track regimen failure early and to monitor patients' performance. This would aid in avoiding the tendency of CD4 cells count depletion which may amount to an AIDS defining situation. Improved access to viral load test and availability of results is sine qua non for effective treatment monitoring and early diagnosis of treatment failure in patients. It is important to note that delayed ART switch for patients who failed on first line regimen can result in non-responsiveness to treatment and potential fatality.

CONFLICT OF INTERESTS

The authors have not declared any conflict of interests.

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Full Length Research Paper

Human immunodeficiency virus testing and counseling trends analysis, Midlands Province, Zimbabwe: A secondary data analysis

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HIV testing and counseling (HTC) indicators are captured for programming, decision making and program monitoring and evaluation. A preliminary review of Midlands province HTC data showed that a small proportion of men and children were being tested for HIV. The secondary HTC data to determine trends to inform programming was therefore analyzed. A descriptive study using secondary HTC data was carried out. Microsoft Excel was used to come up with Chi square for trends analysis and p-values were generated using Epi info 7. There were 623,174 clients in the HTC dataset from 2010 to 2014. There was a significant increase in HTC coverages from 4% (n=59 512) in 2010 to 21% (n=382 559) in 2014 ($X^2=898\ 517$; $p<0.01$). All districts recorded the highest HTC coverages in 2014, Gokwe having the lowest coverage of 14% (n=4 778). HTC positivity rates declined from 29% in 2010 to 7% in 2014 ($X^2=32\ 551$; $p<0.01$). There was a significant increase in HTC coverages across all age groups, sexes and districts. Positivity rates were significantly higher among males than females. Low HTC coverages and high positivity rates among men indicate the urgent need for routine HTC educational campaigns and behavior change communication programs for men.

Key words: Human immunodeficiency virus testing and counseling, secondary dataset analysis, Zimbabwe.

INTRODUCTION

Human immunodeficiency virus (HIV) testing and counseling (HTC) is the entry point to HIV prevention, treatment, care and support (Ministry of Health and Child Care (MOHCC), 2014). The knowledge of one's HIV status is an important prevention and treatment intervention strategy that influences behavior change (Ministry of Health and Child Care (MOHCC), 2014). HIV

testing is the critical first step in linking people living with HIV to the treatment cascade, and it also provides an important opportunity to reinforce HIV prevention (World Health Organization, 2013). Regular HIV testing and counseling is a vital gateway for people to take control early of their sexual lives. It empowers them to take the necessary steps to protect their own health and that of

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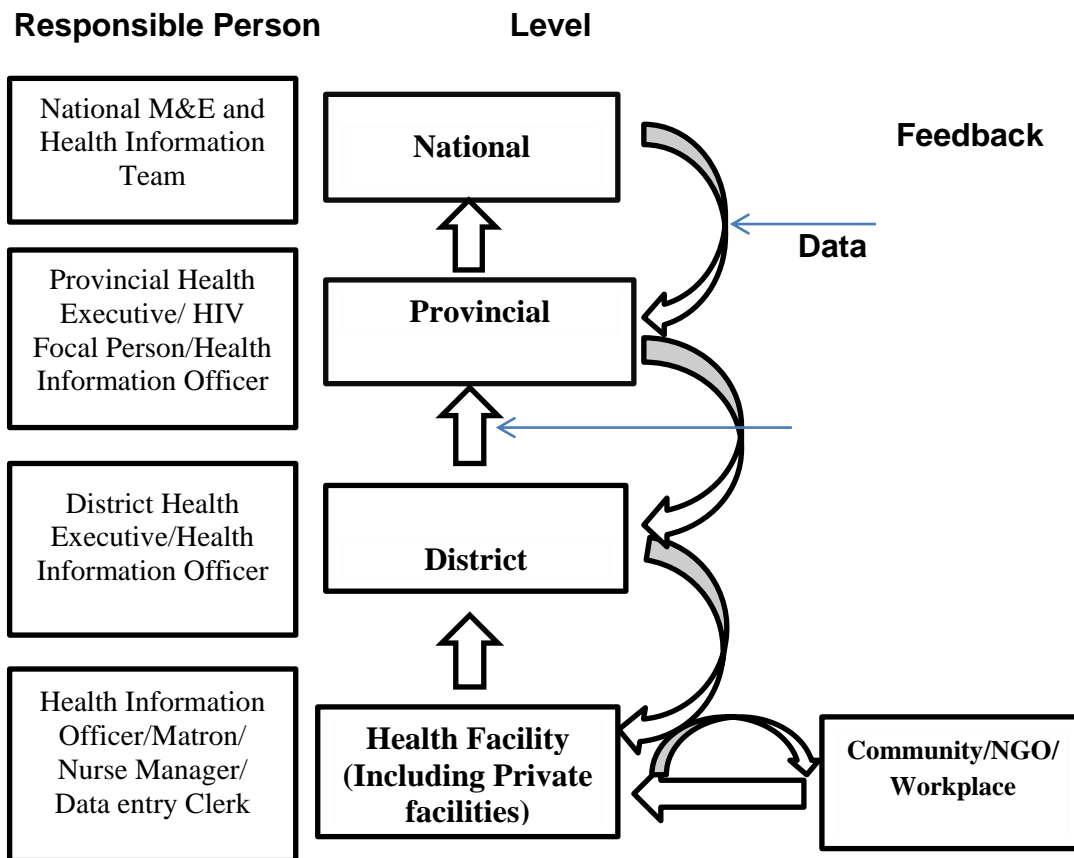


Figure 1. Flow of HIV testing and counseling data. Source: Zimbabwe National Guidelines on HIV Counseling and Testing, 2nd Edition, 2014.

others through positive living (AVERT, 2014). High coverage of provider initiated testing and counseling (PITC) has been achieved in antenatal care (ANC) and tuberculosis (TB) clinics.

Globally, about 118 million people in 124 low and middle income countries received HTC in 2012 (World Health Organization, 2013). Young people aged 15 to 24 years accounted for 39% of all new HIV infections worldwide in 2012 (AVERT, 2014). In sub Saharan Africa, 10% men and 15% women (15-24 years) knew their HIV status in 2013 (The National Strategic Plan for Eliminating New HIV Infections in Children and keeping mothers and families Alive 2011 to 2015, 2011). It is estimated that 1.4 million people are living with HIV in Zimbabwe (Ministry of Health and Child Care (MOHCC), 2014). In Zimbabwe, 36% men and 57% women had received HTC by 2011 (Zimbabwe National Statistics Agency (ZIMSTAT) and ICF International, 2012). HIV and Acquired Immunodeficiency Syndrome (AIDS) accounted for 21% towards the under-five mortality rate as well as 26% towards the maternal mortality ratio in the country in 2012 (The National Strategic Plan for Eliminating New HIV Infections in Children and keeping mothers and families Alive 2011 to 2015, 2011).

HTC data is captured in the “Prevention of Mother to Child Transmission of HIV(PMTCT), HTC, opportunistic infections(OI)/antiretroviral therapy (ART), post exposure prophylaxis (PEP), sexually transmitted infections (STI)/HIV, Sexual Violence and Male Circumcision (MC) monthly return form”, commonly known as the HIV monthly return form.

This data used to be entered into the HIV/TB Indicator database which was shifted to the district health information system (DHIS) 2 in October 2013. All stand-alone databases were incorporated into the new DHIS 2 online data repository software. Variables which include number of clients given pretest and post-test counseling, number of clients tested for HIV, number of clients who tested positive for HIV, number of clients tested as couples, number of clients referred for OI/ART and psychosocial support are captured.

Figure 1 shows the flow of HTC data from the community to the national level. HTC service providers submit monthly data to local health facilities. At the health facility, data are consolidated monthly into the HIV monthly return form and send to the district level. Data is received at the district level and consolidated into a district report. The district health information department

Table 1. Socio demographic characteristics of HTC clients, Midlands Province, 2010 to 2014.

Variable	Category	Frequency (n = 623 174 (%))
Sex	Males	244 726 (39)
	Females	378 447 (61)
Age group (years)	<15	67 988 (12)
	≥15	555 185 (88)
Tested as couples (n=43 898) (years)	≤19	3737 (9)
	20-49	35 376 (80)
	50+	4 786 (11)

enters the data into the electronic DHIS 2 software which can be accessed at the provincial and national levels. National annual HTC reports are produced by the Ministry of Health and Child Care and feedback is given to health facilities. The Ministry of Health and Child Care ensures that ongoing research is carried out to address specific program gaps. A preliminary review of Midlands province health facility based HTC data showed that a small proportion of men and children were being tested for HIV. This study therefore set out broadly to analyze the Midlands province secondary HTC data for the period 2010 to 2014 to determine trends.

MATERIALS AND METHODS

The HTC data set was set up in 2006 and is crucial for programming purposes, decision making, resource allocation and program monitoring and evaluation at all levels. A descriptive study was conducted using the HTC dataset in Midlands province for the period January 2010 to December 2014. Data was obtained from the HIV/TB indicator database and the DHIS 2 database, Midlands province health information office. Data was analysed using Microsoft Office Excel 2007. Graphs, bar graphs and linear graphs were generated to demonstrate the various trends in HIV testing and counselling in the past five years. Chi-square for trends and p-values were generated using Epi Info version 7. Variables analysed included: Number of clients tested for HIV by age group, and district, number of clients who tested HIV by age group, sex and district, and the HIV positivity rates among individuals tested as couples by age group.

Permission to carry out the study was obtained from the Provincial Medical Director (PMD) for Midlands Province and the Health Studies Office (HSO). All ethical considerations were observed including the non-use of identifiers and the secondary data was used for research purposes only.

RESULTS

There were 623,174 clients in the dataset from 2010 to 2014. Of these, 7% (43 622) were tested as couples. Females constituted the highest proportion (61%, n=43 622) of the clients who received HTC services as individuals. A higher proportion (88%, n=555 185) of the clients was 15 years old and above (Table 1).

There was a significant increase in the number of clients tested for HIV in Midlands province from 4% (n=59 512) in 2010 to 21% (n=382 559) in 2014. A sharp increase was noted from 2013 to 2014 from 6 to 21% (Figure 2). Age groups for HTC uptake were regrouped into two, <15 and ≥15 years. A smaller proportion of children below 15 years was tested for HIV each year, 0.74% (n=5 052), 0.7% (n=4 914), 1.2% (n=8 176), 0.8% (n=5 131) and 6% (n=44 715), from 2010 to 2014 respectively. However, there was a sharp increase in clients who were tested for HIV in both age groups from 2013 to 2014.

The increase in clients who received HTC from 2010 to 2014 was statistically significant for both age groups, $X^2=79\ 851$; $p<0.01$ and $X^2=207\ 138$; $p<0.01$ respectively. The difference between the two trends was statistically significant with $X^2=19.8$; $p<0.01$. HTC showed a significant increase across all districts from 2010 to 2014. All the districts recorded the highest HTC uptake in 2014 with Mberengwa having the highest uptake rate of 22% (n=11 643) and Gokwe with the lowest rate of 14% (n=4 778).

HTC positivity rate declined from 29% in 2010 to 7% in 2014. The decline was statistically significant, $X^2= 32\ 551$; $p<0.01$ (Figure 3).

Figure 4 shows a significant decline in HIV positivity across all age groups. Positivity rates were higher in the 25 to 49 years age group and declined from 36% in 2010 to 13% in 2014.

There was a significant decline in the positivity rate for both males and females. However males had higher positivity rates than females from 2010 to 2014. Average positivity rates for the whole period were 16% for males and 14% for females. The decline was statistically significant for both males and females, $X^2= 8\ 383.6$; $p<0.01$ and $X^2= 18\ 811.3$; $p<0.01$ respectively.

All districts show a decline in HIV positivity rates from 2010 to 2014, Gweru district with the highest rate of 50% in 2010. Gokwe had the highest positivity rate of 43% in 2011. Individuals in the 20 to 49 years age group who were tested as couples had the highest positivity rate from 2010 up to mid-2012. From 2013 to 2014, the above 50 years age group showed higher HIV positivity rates,

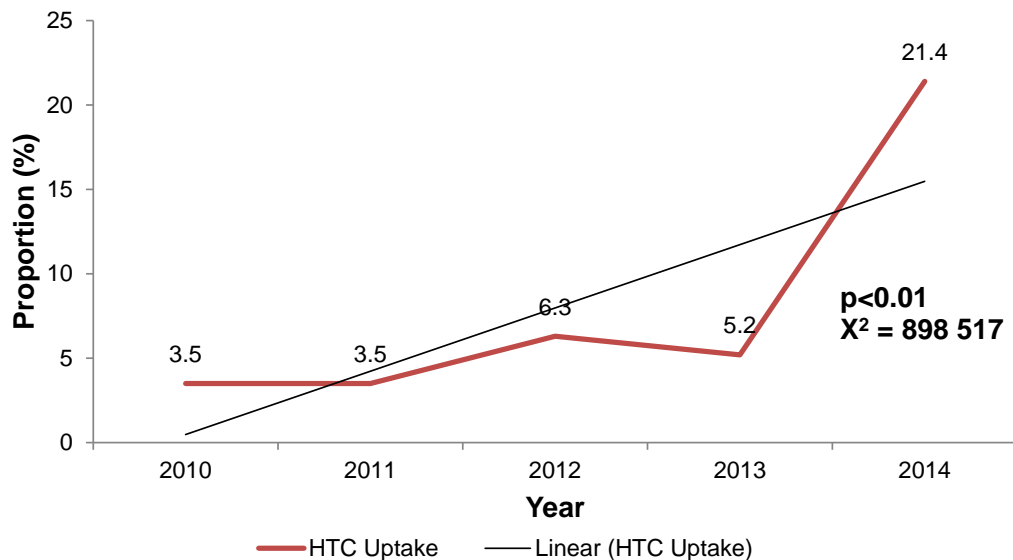


Figure 2. Trends in proportion of clients tested for HIV, Midlands Province, 2010 to 2014.

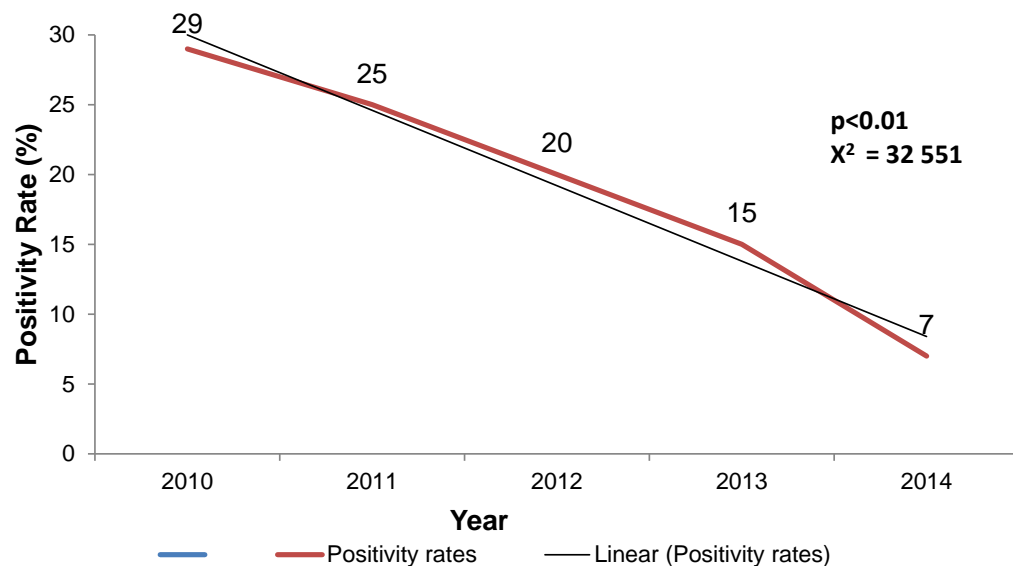


Figure 3. Trends in HIV positivity in Midlands Province from 2010 to 2014.

$X^2= 68.9$; $p<0.01$, $X^2= 708.2$; $p<0.01$ and $X^2= 26.9$; $p<0.01$ respectively.

DISCUSSION

From the secondary HTC data, more women received HIV testing and counseling than men. This was attributed to the fact that women have more contact with health facilities and as such have more opportunities for HTC which they take up as compared to men. In a study by Topp et al. (2016) in Zambia, it was found that among

those who accepted testing in the PITC program, 44% were men. Of the HIV positive, 41% of the men enrolled in HIV care and treatment. The study findings indicated that clinics in Lusaka were more acceptable to women than to men (Topp et al., 2016). Matovu et al. (2013) in Rakai, Uganda found out that being male was significantly associated with the less likelihood of individual HIV testing. Stigma and the fear of HIV positive results were found to be barriers to accessing VCT services in sub Saharan Africa (Matovu and Makumbi, 2007). In a cross sectional study by Sanga et al. (2015) in Arusha City in Tanzania, females were about twice more

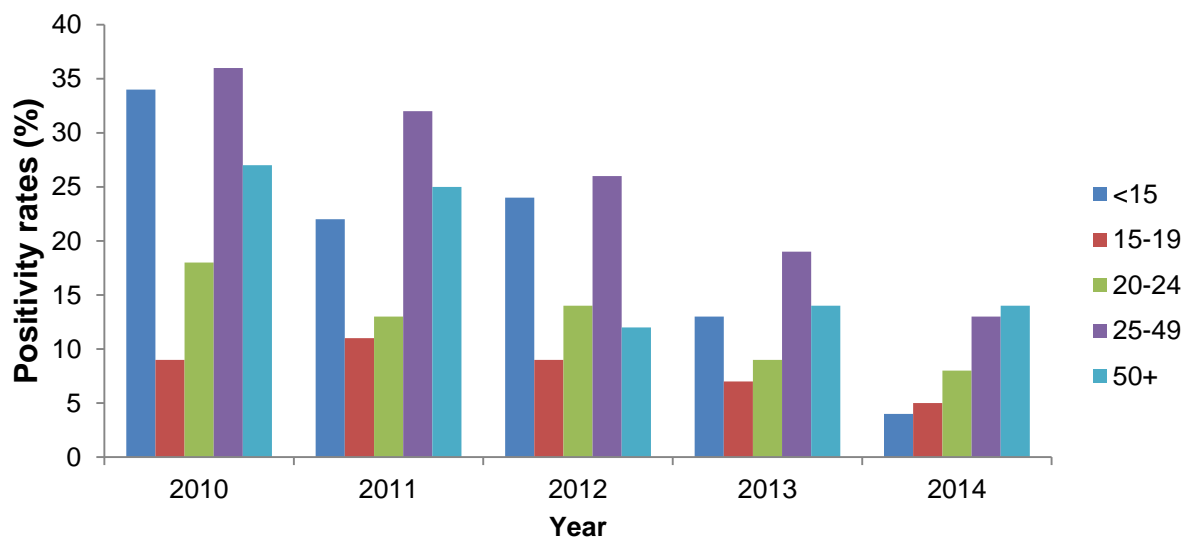


Figure 4. HIV positivity by age group, Midlands Province, 2010 to 2014.

likely to test for HIV than males. This implies the need to mobilize men for HTC for example in beer halls, churches and workplaces, where they are mostly found.

There was a significant increase in HTC uptake in both age groups and across all districts. This might be attributed to the increase in the number of testing centers and the integration of HIV and AIDS with other programs which include PMTCT, MC, Visual Inspection with acetic acid and Cervicography (VIAC) and TB/HIV collaborative activities through the PITC initiative. It was also highlighted by the provincial HIV focal person that the year 2014 recorded the highest HTC coverages due to the HTC campaigns which were done that year. Contrary to our findings, Matovu et al. (2013) in Rakai, Uganda, reported a decline in individual HCT uptake over time. Appiagyei et al. (2012) in Lusaka noted a high uptake of HTC among couples due to a mass media campaign, however, uptake declined as the campaign ended (Appiagyei et al., 2012). The District Medical Officer (DMO) for Gokwe North district reported that the low HTC coverages in Gokwe in 2014 were attributed to inadequate sensitizations due to the hard to reach populations.

The general decline in HIV positivity rates may be attributed to the expansion of the HTC services through the PITC initiative at all entry points, condom programming and behavior change among couples. Individuals who visit the health facility for any reason, including those without HIV related symptoms, are offered HIV testing and counseling through the PITC approach. All women who visit the antenatal care clinic are offered HTC in order to scale up the prevention of mother to child transmission of HIV.

Males had higher HIV positivity rates than females, on average 14% for males and 16% for females. This was contrary to the findings of the Zimbabwe 2010/2011

demographic health survey where higher positivity rates were recorded among females than males, 80 and 69% respectively (Zimbabwe National Statistics Agency (ZIMSTAT) and ICF International, 2012). This difference may be due to the fact that this study analyzed health facility based data unlike the demographic health survey data which was for the general population.

The higher positivity rates among males might be attributed to their poor health seeking behaviors. Due to the poor health seeking behaviors of men, majority of men present to the health facilities when they are sick (HIV related) and through PITC, a significant proportion of them test positive for HIV, hence higher positivity rates. This is supported by findings by Suthar et al. (2013) who found out that health facility based HTC positivity rates were higher than the community based rates. This was due to the fact that symptomatic people with HIV are more likely to visit health facilities than healthy people (Suthar et al., 2013). In a study by Kyaddondo et al. (2012) in Eastern Uganda, most respondents considered HTC in their own homes as more private than in health facilities. This implies that men need to be sensitized on the importance of routine HTC. Community and workplace based services might help improve HTC uptake among men.

The decline in the positivity rates among individuals tested as couples may be attributed to condom programming and ART. ART and consistent condom use reduce HIV transmission among couples. This implies that sensitizing couples to test for HIV, use condoms correctly and consistently and seek early treatment might reduce positivity rates among couples.

Few children had access to HTC in the province throughout the period 2010 to 2014. Children do not know the importance of knowing their HIV status and how HIV is transmitted. They cannot decide on their own to go

for HIV testing or seek medical care because they are dependent on their care givers. Only the exposed infants, children with HIV related illnesses and school going children who want to be circumcised are tested for HIV. Failure to catch them young means failure to reduce HIV transmission and delayed treatment. Similar findings were reported by Sanga et al. (2015) in Tanzania where the rate of voluntary HIV counseling and testing (VCT) uptake was found to be lower among those participants below 18 years.

The uptake of VCT was mainly found to be influenced by fear of HIV test results, knowledge on VCT services, age, education, engagement in sexual relationships, stigmatization and distance to the VCT centre (Sanga et al., 2015). Similar findings were reported in Cameroon where VCT uptake was found to increase with age (Mbopi-kéou et al., 2012).

Limitation

Health facility based data were analyzed hence results cannot be generalized. Two databases were used for the comparison of data over 5 years hence some variable which did not appear in both data bases could not be assessed.

Conclusion

HTC uptake remained low among men and children below 15 years of age despite the increase in the number of clients tested for HIV across all age groups, sexes and districts. Low HTC coverages and high positivity rates among men indicate an urgent need to mobilize men for early HTC and behavior change in order to prevent HIV transmission to others. From the dataset analysis we recommended an analytical study on determinants of HTC uptake among males, routine HTC campaigns in order to reach men and community based HTC integrated with other programs for cost effectiveness. Findings of the analysis were shared with the Provincial Health Executive (PHE) members and as a result recommendations were taken up. Following the recommendations from this analysis, a study on factors associated with male partner involvement in the prevention of mother to child transmission of HIV was conducted in the province.

CONFLICT OF INTERESTS

The authors have not declared any conflict of interests.

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Abbreviations: **ANC**, Antenatal care; **ART**, antiretroviral therapy; **AIDS**, acquired immunodeficiency syndrome; **DHIS**, district health information system; **HIV**, human immunodeficiency virus; **HSO**, health studies office; **HTC**, HIV testing and counseling; **MC**, male circumcision; **OI**, opportunistic infections; **PEP**, post exposure prophylaxis; **PITC**, provider initiated testing and counseling; **PMD**, provincial medical director; **PMTCT**, prevention of mother to child HIV transmission; **STI**, sexually transmitted infections; **TB**, tuberculosis; **VCT**, voluntary HIV counseling and testing.

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