

Prevalence and Factors Associated With Utilization of HIV Self Testing Among Students of Universities in South Western Uganda.

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Abstract



Background

HIV self-testing (HIVST) is globally accepted as an important complement to existing HIV Counseling and Testing approaches. This study aimed at determining the prevalence and factors associated with the utilization of HIV self testing among university students of South western Uganda.

Methods

An online cross-sectional study design that used the quantitative approach was conducted purposely among 356 university students of Kampala International University (KIU) and Mbarara University of Science and Technology (MUST) in South western Uganda between 12th August 2020 and 31st August 2020. Mapping different course leaders in launching the Google form link that contained the structured questionnaires in their respective formal class WhatsApp groups for enrolling potential participants. Descriptive analysis of numeric data was summarized in means with standard deviations and presented using tables. Descriptive analysis of categorical data was summarized in frequencies, proportions and presented using tables. Association between independent and dependent variables was assessed using Chi square test (X^2) for bi variate analysis in SPSS IBM version 20.

Results

Of the 356 participants, the study had 57.3% of the participants from KIU and 42.7% were from MUST. The study found that university students who had ever self tested were 43.2%. Socio demographic variables associated with utilization of HIV self testing were the student's year of study ($p = 0.007$), having a sexual partner ($p = 0.012$), and place of residence ($p = 0.000$).

Conclusions^a

The study demonstrates low levels of utilization of HIV self testing among University students in association with a number of factors that include how they are aware towards HIV self testing, places of their residence, having a sexual partner.

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1 Introduction

Globally, 37.9 million people are living with HIV of which 36.2 million people are more than 15 years old. The UNAIDS set 90-90-90 strategy by 2020 was not fulfilled given the increased population number of people who were living with HIV not knowing their status [1]. Related research in Ghana indicates that the lifestyles of students on university campuses are placing them at risk of contracting the HIV [2] as the university environment has been shown to promote sexual activity among the general student population [3]. It is therefore not surprising that sexual intercourse has become the most predominant mode of transmission of HIV in sub-Saharan Africa, accounting for approximately 90% of all infections [4]. A 2010 HIV sero-behavioural study in six universities in Uganda showed that the HIV prevalence rate is estimated at 1.2 percent [5] and this contributes to the high rate of youth in sub-Saharan Africa that were reported to be unaware of their HIV status [6]. The increased unawareness of youth's about their status can be addressed by increased coverage of HIV self-testing (HIVST). HIV self testing has been defined a process in which a person collects his or her specimen (oral fluid or blood), performs a test, and interprets the results; often in private or with someone they trust and seen as an additional approach offered to HIV testing services that would increase the number of people knowing their status and reduce barriers of HIV counseling and Testing (HCT) [7].

Studies have documented a lot of work on HIV self testing, including acceptability, feasibility among various categories of population including university students with results showing high levels of acceptability in these populations. Additionally, HIV self-testing (HIVST) is globally accepted as an important complement to existing HCT approaches, and several countries including Uganda have already introduced or are considering the introduction of HIVST as part of their testing strategies [8]. Moreover, HIVST has the potential to facilitate more people getting tested because it has advantages that seem to influence the uptake of HIV self testing such convenience, speed, privacy, anonymity, confidentiality, and accessibility. HIVST has the potential to be an acceptable option for high risk populations who would otherwise not test for HIV using currently available HCT services for various reasons, including stigma [8]. Benefits of the HIVST

are in the positive face of World Health Organization (WHO) HIV testing guidelines and have played an important in narrowing the gaps and challenges in the global HIV testing coverage [7].

The utilization of HIV self testing is driven by a number of factors that contribute to the self testing practice among youth. To the university student populations previous studies have focused on the acceptability, feasibility and perceptions they have towards HIV self testing. This has left a very big gap on pointing out the factors that drive the uptake of these HIV self testing services. Therefore the study's main objective was to determine the prevalence and factors associated with the utilization of HIV self testing among university students of South western Uganda.

2 Methods

Study design

A cross-sectional study design that used a quantitative approach to study prevalence and factors associated with utilization of HIV self testing among University students. The study took place between 12th August 2020 to 31st August 2020

Study setting

The study was an online study which targeted two Universities in South western Uganda (Kampala International University Western Campus (KIU-WC) and Mbarara University of Science And Technology (MUST)). Mbarara University of Science and Technology is the only public university found in Mbarara city accredited by the National Council for Higher Education (NCHE), Uganda. This University commenced its intake way back in 1989 and it has two campuses, that is, the Mbarara and Kihumuro campuses. The total student population in both campuses is 4142 students. MUST offers Certificates, Diplomas, Bachelors and Masters Degrees and PhD studies in all disciplines. These programs are offered across six (6) faculties of Medicine, Science, Computing and informatics, Business and Management science, Applied sciences and Technology, Interdisciplinary studies, and two (2) institutes of Tropical forest conservation and Maternal newborn and child health. Kampala International University (KIU) is a private, not-for-profit institution based in Uganda. It was established in 2001 and assumed chartered status in 2009. The University offers a variety of programmes in Health Sciences, Science and Technology, Engineering, Busi-

ness and Education with five faculties (Biomedical sciences, Clinical medicine, Business and Management, Science and and Technology, Education) and four schools (Allied health, Engineering, nursing science and pharmacy). This campus has over 5,000 students. Certificate, diploma, undergraduate, and postgraduate programs are offered at this campus.

The study population

This study considered students currently enrolled at MUST and KIU who were in their respective formal class WhatsApp groups. Some students are classified as medical students if they do courses offered in medical/health science faculties and schools whereas others are referred to as non medical students. The students of these institutions are all adults above 18 years of age the legal age of an adult in Uganda. The students are of both gender, and their level of education in each University is differentiated according to the academic years of study a student has finished in the University.

Sample size estimation

Sample size estimation was calculated using a formula by Keish Lesile (Keish, 1965). We used a prevalence of 50%, Z value score of 1.96 and confidence interval of 95% was used. The margin of error was estimated at 0.05. The calculated sample size was 384 participants.

Sampling and data collection

Due to the country's lockdown, that found the student participants not in their respective universities at the time of data collection, The study used a purposive sampling method where by any formal course WhatsApp group that was present at the time of data collection was targeted. The online data collection tool was designed and executed using Google form (via docs.google.com/forms), The data collection tool was adopted from a similar study in KwaZulu-Natal province, South Africa [9] and modified to suit the context of the study site and units. Student agents in each course offered at the two universities were identified and assisted in mapping different course leaders in launching the Google form link that contained the data collection tool in their respective formal class WhatsApp groups using WhatsApp Messenger (Facebook, Inc., California, USA 2020) for enrolling potential participants. The Google form link was displaying a consent form to the participant on the first click that gave a chance to the participant to read and accept to enter the data collection tool on the sec-

ond click. The tool collected information on socio-demographics, awareness, practices and utilization of HIV self testing services in university students.

Data Management

Prior to data entry, data collection tool was checked for completeness and this was done automatically by providing a super script star on the required questions. This ensured that a participant could not proceed to the next question before attempting the required question. The control system that was receiving responses from participants was on a recognized and secure email. The system was removing multiple IP addresses from individuals who could have attempted to fill out the survey form more than once on the same device. Fully completed questionnaires were extracted from the Google form to Microsoft Excel 2016 were data cleaning was done

3 Data analysis

Cleaned data was exported from Microsoft excel to SPSS IBM version 20 and coded. Descriptive analysis of numeric data was summarized in means with standard deviations and presented using tables. Descriptive analysis of categorical data was summarized in frequencies, proportions and presented using tables. Association between independent and dependent variables was assessed using Chi square test (X^2) for bivariate analysis in SPSS IBM version 20.

Ethics considerations

The study protocol was reviewed by the research ethics committee of Mbarara University of Science and Technology (MUREC 12/01-20) and the regulatory body of research in Uganda (Uganda National Council of Science and technology) UNCST (RESCLEAR/01) approved the continuation of the study. University clearance was sought from the Deans of students of the two universities Kampala International University Western Campus and Mbarara University of Science And Technology.

4 Results

Demographic characteristics of study participants

Of the 356 participants, the study had 57.3% of the participants from KIU and 42.7% were from MUST. 50.3% of participants were male and 40.2% females with the average at 24.7 (M = 24.7, SD = 3.3), 14.4% of the participants responded to have

a sexual partner and 85.6% had no sexual partner. 49.2% of participants were residing inside the university hostels and 50.8% were residing outside the university hostels. As shown in Table 1 below.

Utilization of HIV self testing among participants

The study found that university students who had ever self tested were 43.2%, those who had never were 56.8%. This captured the prevalence of HIV Self testing stand at 43.2%, university students who had ever heard about HIV self testing were 61.8% and those who had never 38.2%, preferred to test with their partner were 54.8% and not preferred 45.2%, those who preferred to first get a telephone counseling before self testing were 83.1% and those who never preferred were 16.6%, HIV self testing was redone most after three months with a high response at 54.1%, those of every after 2 months were 23.7%, monthly 18.6% and weekly 1.1%, University student wished to immediately inform their partners most after their test turned positive with a big percentage at 56.1%, those who wished to inform health workers were 17.7% and those who wished to inform their parents were 12.9% as shown in table 2 below.

Association of socio-demographics variables with the utilization of HIV self testing.

Socio demographic variables associated with utilization of HIV self testing were the student's year of study ($X^2=14.111$; d.f=4; $p=0.007$), having a sexual partner ($X^2=6.319$; d.f =1; $p=0.012$), and place of residence ($X^2=15.322$; d.f =1; $p=0.000$). The socio demographic variables of age and gender were not significantly associated with utilization of HIV self test and as shown in table 3 below.

Association of awareness of HIV self testing with utilization of HIV self testing.

The study found that those who had ever thought about HIV self test before ($x^2=8.571$; d.f=1; $p=0.003$), ever heard about HIV self testing ($x^2=139.975$; d.f=1; $p=0.000$), ever seen any self testing kit ($x^2=179.145$; d.f=1; $p=0.000$), ever self tested ($x^2=216.991$; d.f=1; $p=0.000$), ever read about HIV self testing ($x^2=162.312$; d.f=1; $p=0.000$), knew self testing is done using blood ($x^2=113.782$; d.f=1; $p=0.000$), knew that it was done using mouth fluids ($x^2=127.431$; d.f=1; $p=0.000$), knew that HIV self testing can be carried out by a person him/her self ($x^2=148.986$; d.f=1; $p=0.000$), knew that the test takes 20-40 minutes ($x^2=116.182$; d.f=1; $p=0.000$), test can be negative in less than 3

months ($x^2=151.59$; d.f=1; $p=0.000$), person needs to retest after 3 months if the test is negative ($x^2=141.668$; d.f=1; $p=0.000$), person needs to counseled by HIV counselor before taking HIV self testing ($x^2=128.485$; d.f=1; $p=0.000$) as shown in the table 4 below.

5 Discussion

According to the consensus statement from the first international symposium on HIVST, despite a lack of data regarding its effect on populations, HIVST has a vast potential to scale-up access to HTC services [10]. However, before promoting it widely, the WHO/UNAIDS meeting highlighted the need for evidence-based studies on the potential implementation of HIVST programs in various settings. Our study is a contribution towards this goal by providing data on the demographic and behavioral factors that are associated with the uptake of HIVST among students in the South western Uganda. First, it is important to note that although the proportion of university students reporting any form of HIV testing was higher than the specific use of HIV self testing where the reported levels of testing were still too low to serve as an effective HIV prevention tool. Unfortunately, the stigma, discrimination, and violence faced by Ugandans living with HIV/AIDS contribute to the avoidance of HIV testing by most people in the country and this is a similar situation Jamaica [11].

Among the study participants, the results have revealed significant gender differences in HIV testing utilization among university students in Southwestern Uganda, with males being more in using the services than females and this was in disagreement with a study by [12] that showed females mostly utilized HIV testing services than males. The high level of HIV self testing utilization among the students as revealed in this study could be attributed to availability of health education programmes towards HIV testing. Over the past decade the government of Uganda through the Uganda AIDS Commission and its development partners increased public awareness on the causes and preventive of STIs including HIV/AIDS. This has scaled up the citizens will to utilize HIV testing services to know their status [4].

Majority of students preferred disclosing their results to sexual partners than disclosing to parents. This is because the discussion of parents on sexual

Table 1. Demographic characteristics of University students in selected Universities, southwestern Uganda.

Characteristics	Category	Frequency(n)	Percent (%)
Gender	Male	179	50.3
	Female	143	40.2
	Prefer not to say	34	9.6
University	MUST	152	42.7
	KIU	204	57.3
Age group(Years) (24.7 ± 3.3)*	19-25	252	73.5
	26-30	73	21
	>30	19	5.5
Year of study	Year one	72	20.4
	Year two	160	45.5
	Year three	103	29.2
	Year four	13	3.7
	Year five	5	1.4
Have a sexual partner	Yes	51	14.4
	No	302	85.6
Place of residence	Inside the University	175	49.2
	Outside the university	185	50.8

% percentage, > greater than, (24.7 ± 3.3) Mean and standard deviation of age.*

issues with their children are rare in Uganda, due to the fact that the Ugandan culture is more conservative, religious and traditional beliefs on issues of sexuality, condom usage and marriage and these factors are the same as documented by a similar study in Ghana [13] The factor of willingness to take the test with a partner can be explained by a factor HIV self-testing is a novel strategy that is attractive to both women and men and may prove better at reaching male partners than many other current methods. The process of HIVST makes it a more convenient and independent than other kinds of HIV Testing and Counseling services and these phenomena can give a good way to shorten definitions of couples-HTC. Gender and power relations will continue to shape the different stages of decision-making, but the ability to discretely determine the circumstances and timing upon which a test is take has been shown to be empowering. This may enable women to influence domestic decision-making without provoking negative reactions from their male partners [14].

Another interesting finding of the study is that over 61.8% of the students had ever heard about HIV self testing, but only 43.2% had ever self tested for HIV. The previous study’s results are in agreement with the above finding [15] which showed that a number of university students had not had an HIV

test. The unwillingness of students to take HIV test could be attributed to fear, anxiety and stigma as well as discrimination associated with AIDS. Fear of stigma have been shown to influence young adults to become less likely to engage in preventive behaviours [16]and an increase in awareness about HIV does not predict behavioral change [17]. The fact that over 85.6% of the participants were not having sexual partners raises a lot of health concerns as only 54.8% preferred to have HIV test with their sexual partners. Previous research indicates that encouraging individuals to be tested if they engage in at-risk activities will not be appropriate or effective for individuals who have no perception of risk [18].

What may be more interesting and informative for developing and implementing programs promoting voluntary HIV testing is the finding that persons had been aware about HIV testing were more likely to have had an HIV test. These findings are not surprising; previous research has found that persons who have higher levels of HIV knowledge and awareness are more likely to seek HIV testing [19]. The high HIVST acceptability has also been illustrated in different population groups in other studies in Sub-Saharan countries [20]. It is possible that with the roll-out of a HIVST program, the frequency of HIV testing among students could there-

Table 2. Utilization of HIV self testing among University students

Characteristic	Category	Frequency	Percent
Ever thought about HIV testing before	Yes	258	95.2
	No	13	4.8
Ever utilized any HIV testing service	Yes	329	92.4
	No	13	7.3
Do you know the results of your last HIV test	Yes	232	91.7
	No	21	8.3
Ever tested for HIV with your partner	Yes	41	48.8
	No	43	51.2
Ever heard about HIV self testing	Yes	220	61.8
	No	136	38.2
Ever self tested for HIV	Yes	150	43.2
	No	197	56.8
Prefer to self test with partner	Yes	178	54.8
	No	147	45.2
Prefer get telephone counseling before HIV self testing	Yes	281	83.1
	No	57	16.9
Prefer to self test at health facility	Yes	111	35.4
	No	203	64.6
Seek help from clinic in case of HIV positive results	Yes	317	93.2
	No	23	6.8
Introducing HIV self testing will mean that everyone will easily know their status every year	Yes	332	93.3
	No	24	6.7
How often do u self test	Weekly	4	1.1
	Monthly	66	18.6
	After 2months	84	23.7
	After 3 months	192	54.1
	Others	9	2.5
Prefer keep test kits by self to test at convenience	Yes	330	92.7
	No	26	7.3
Immediate person to inform after HIV test is positive	Parents	46	12.9
	Friend	12	3.4
	Partner	200	56.2
	Counselor	32	9.0
	Health care worker	63	17.7
	Religious leader	2	0.6
	Others	1	0.3

% percentage, > greater than

Table 3. Association of socio-demographic variables with utilization of HIV self testing

Characteristic	Category	Ever had an HIV self test		Chi square value (X ²)	d.f	P value
		Yes	No			
Age	19-25	102	153	4.402	2	0.111
	26-30	37	36			
	>30	11	8			
Gender	Male	76	102	0.665	2	0.718
	Female	58	79			
	Prefer not to say	16	16			
Year of study	Year one	22	47	14.111	4	0.007
	Year two	63	94			
	Year three	53	47			
	Year four	10	3			
	Year five	2	3			
Have a sexual partner	Yes	29	20	6.3	1	0.012
	No	118	117			
Place of residence	Inside the University	55	114	15.3	1	0.000
	Outside the University	95	83			

Df - Degree of freedom > Greater than

Table 4. Association of awareness of HIV self testing with utilization of HIV self testing

Characteristic	Category	Ever had an HIV self test		Chi square value X ²	d.f	P value
		Yes	No			
Ever thought about HIV testing before	Yes	131	123	8.571	1	0.003
	No	1	11			
Ever utilized any HIV testing service	Yes	145	176	8.050	1	0.005
	No	4	21			
Ever heard about HIV self testing	Yes	147	71	139.975	1	0.000
	No	3	126			
Ever seen any HIV self testing kit	Yes	142	44	179.145	1	0.000
	No	8	153			
Ever read about HIV self testing	Yes	134	40	162.312	1	0.000
	No	16	157			
HIV self testing is done using blood	Yes	140	73	113.782	1	0.000
	No	10	124			
HIV self testing is done using fluid from mouth	Yes	126	45	127.431	1	0.000
	No	24	152			
A person can perform the HIVST on him/herself	Yes	144	61	148.986	1	0.000
	No	6	136			
Takes 20 to 40 minutes to get results from HIV self testing	Yes	121	44	116.182	1	0.000
	No	29	153			
Test can be negative if HIV infection is less than three months	Yes	135	46	151.59	1	0.000
	No	15	151			
Person needs to retest after three months if test is negative	Yes	138	55	141.668	1	0.000
	No	12	142			

fore increase. At the international symposium on HIVST [11], a concern was raised that the frequency of HIVST alone should not be used as a preventive strategy. The WHO has highlighted the importance of the message that HIVST does not provide a verified diagnosis on HIV, but requires further testing. HIVST should provide understandable procedural instructions for the use and providing meaningful interpretation of results, and also how to access the HIV prevention, care and treatment services [21]. In terms of confirming positive test results, less than half of the students reported their intention to confirm their HIV positive self-test at a local health care facility. This result was lower than that found by [22] in South Africa (75%) and almost equal to that found by [23] in Kenya (35.5%).

University students preferred to have at least a telephone counseling session during their HIV self testing session. This could be attributed to limited access to counseling services an individual can when he/she decides to use the HIV self testing model. A number of factors which were associated with the uptake of HIVST among these students, such as: the awareness about the test, their willingness to counseling and the willingness to take the test with a partner are recognized as important indicators of HIV awareness and prevention [24].

6 Limitations of the study

Even though every effort was made to maintain the quality of the data, the study has shortfalls that should be noted when interpreting the results. One of the limitations of this study was cross-sectional data; therefore, causal interpretation of the results cannot be established. Furthermore, it was conducted among only in one private university and one public university thus the results cannot be generalized to the entire population of university students in Uganda due to the relative sample size and the non-probability sampling technique used. Restricting non university students of the two universities from accessing the study Google link was certainly not controlled in case it was forwarded and attempted by non students of the two Universities however this was mitigated by inactivating the Google link every after thirty minutes it was loaded in the student whatsapp groups.

7 Conclusion

The study demonstrates low levels of utilization of HIV self testing among University students in association with a number of factors that include how they are aware towards HIV self testing, places of their residence, having a sexual partner. Adapted communication like pre test counseling from a counselor appears likely essential to increase the uptake of HIV self testing among university students.

Implication to practice and policy:

University administrators and authorities can actively help to develop and implement HIV education and prevention strategies in their campuses.

Effective messages and prevention programs need to be developed and implemented to promote universal HIV testing and counseling, especially among younger, sexually experienced students, so that these persons may make informed sexual decisions with respect to protective sexual behaviors, including having discussions about safer sex, inquiring about a potential partner's HIV status, and the adoption of condom use with all sex partners, especially where HIV status is unknown.

7.1

7.1.1 What is known about this topic

- HIV self-testing (HIVST) is globally accepted as an important complement to existing HIV counseling and testing (HCT) approaches;
 - The acceptability of HIVST among students and the population groups with poor uptake of HCT remain limited in Africa;
 - HIVST can be performed accurately and it is an acceptable and feasible testing approach in a variety of contexts; including populations at ongoing HIV risk and those who may not otherwise be tested.

7.1.2 What this study adds

- The proportion of University students in South Western Ugandan that have ever done HIV self testing
 - A majority of students had the will to confirm the result of a HIVST in a local health care facility, which reinforces the link between the patients and the health system;

Future research

Future studies should use a qualitative approach to explore the possible reasons for not willing and

those willing to test for HIV using HIV self testing, among students.

Data availability

We have a full data set in Microsoft excel which can be shared on request

Conflict of interest

No conflicts of interest. Submitting author is responsible for coauthors declaring their interests.

Author contribution

All authors reviewed and approved the final manuscript.

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10 References:

- World Health Organization, 2018. Report on the first international symposium on self-testing for HIV; the legal, ethical, gender, human rights and public health implications of self-testing scale-up. Meeting report-Geneva, Switzerland 8-9.
- Anarfi, J. (2000). Universities and HIV/AIDS in Sub Saharan Africa: A Case Study of the University of Ghana, Legon. Paper prepared for ADEA Working Group in Higher Education. Accra, Ghana
- Sadgrove J 'Keeping Up Appearances': Sex and Religion amongst University Students in Uganda. *Journal of Religion in Africa* Vol. 37, Fasc. 1, AIDS and Religious Practice in East Africa (2007), pp. 116-144 (29 pages) <https://doi.org/10.1163/157006607X166618>
- UNAIDS: UNAIDS Report on the global HIV/AIDS epidemic update. 2010, Geneva,
- EAC/EALP (2010): HIV Sero-Behavioural Study in 6 Universities in Uganda, Study Report, September 2010.
- UNAIDS, 2018. Prevention Gap Report. Geneva, Switzerland: Joint United Nations Programme on HIV/AIDS
- World Health Organization, 2016. The global health sector strategy on HIV/AIDS: an interim review of progress.
- Rooyen Van , Olivia Tulloch , Wanjiru Mukoma ,Tawanda Makusha Lignet Chepuka Lucia C Knight Roger B Peck Jeanette M Lim Nelly Muturi , Miriam Taegtmeier. What are the constraints and opportunities for HIVST scale-up in Africa? Evidence from Kenya, Malawi and South Africa. *Journal of International AIDS society*. 2015,18(1). <https://doi.org/10.7448/IAS.18.1.19445> PMID:25797344 PMCID:PMC4369555
- Gumede, S. D., & Sibiyi, M. N. (2018). Health care users' knowledge, attitudes and perceptions of HIV self-testing at selected gateway clinics at eThekweni district, KwaZulu-Natal province, South Africa. *SAHARA J : journal of Social Aspects of HIV/AIDS Research Alliance*, 15(1), 103-109. <https://doi.org/10.1080/17290376.2018.1517607> <https://doi.org/10.1080/17290376.2018.1517607> PMID:30175655 PMCID:PMC6127809
- World Health Organization . Report on the first international symposium on self-testing for HIV. Geneva: 2013.
- Carr R: Stigma, coping and gender: a study of HIV+ Jamaicans. *Race Gender Class* 2002, 9: 122-144.
- Oppong Asante: HIV/AIDS knowledge and uptake of HIV counselling and testing among undergraduate private university students in Accra, Ghana. *Reproductive Health* 2013 10:17. <https://doi.org/10.1186/1742-4755-10-17> PMID:23537116 PMCID:PMC3623656
- Asante KO, Doku PN: Cultural adaptation of the condom use self-efficacy scale (CUSES) in Ghana. *BMC Publ Health*. 2010, 10: 227-10.1186/1471-2458-10-227. <https://doi.org/10.1186/1471-2458-10-227> PMID:20433724 PMCID:PMC2874779
- Kumwenda M, Munthali A, Phiri M, Mwale D, Gutteberg T. Factors shaping initial decision-making to self-test amongst cohabiting couples in Urban Blantyre, Malawi. *AIDS Behav*. 2014;18:S396-S404. <https://doi.org/10.1007/s10461-014-0817-9> PMID:24929834 PMCID:PMC4102820
- Tagoe M, Aggor RA: Knowledge, behaviour, perceptions and attitudes of university of Ghana students towards HIV/AIDS: what does behavioural

surveillance survey tell us?. *J Health Hum Serv Adm.* 2009, 32 (1): 51-84.

16. UNICEF, UNAIDS, WHO: *Young People and HIV/AIDS, Opportunity in Crisis.* 2002, Washington: PSI Research Division,

17. Onah HE, Mbah AU, Chukwuka JC, Ikeme AC: HIV/AIDS awareness and sexual practices among undergraduates in Enugu, Nigeria. *Niger Postgrad Med J.* 2004, 11 (2): 121-125

18. Jackson LA, Millson P, Calzavara L, et al.: HIV-positive women living in the metropolitan Toronto area: their experiences and perceptions related to HIV testing. The HIV Women's Study Group. *Can J Public Health* 1997, <https://doi.org/10.1007/BF03403852> PMID:9094799 PMCID:PMC6951324

19. Kalichman SC, Simbayi LC: HIV testing attitudes, AIDS stigma, and voluntary HIV counseling and testing in a black township in Cape Town, South Africa. *Sex Transm Infect* 2003, 79: 442-447. <https://doi.org/10.1136/sti.79.6.442> PMID:14663117 PMCID:PMC1744787

20. Gaydos CA, et al. The uptake and accuracy of oral kits for HIV self-testing in high HIV prevalence setting: a cross-sectional feasibility study in Blantyre, Malawi. *PLoS Med.* 2011;8(10):e1001102. <https://doi.org/10.1371/journal.pmed.1001102> PMID:21990966 PMCID:PMC3186813

21. Kalibala S, Tun W, Muraah W, Cherutich P, Oweya E, Oluoch P. 'Knowing myself first': feasibility of self-testing among health workers in Kenya'. Nairobi: population council; 2011 <https://doi.org/10.31899/hiv1.1009>

22. Mokgatle MM, Madiba S. High acceptability of HIV Self-Testing among Technical Vocational Education and Training College Students in Gauteng and North West Province: what are the implications for the scale up in South Africa? *PLoS ONE.* 2017 Jan 31;12(1):e0169765. <https://doi.org/10.1371/journal.pone.0169765> PMID:28141858 PMCID:PMC5283675

23. Kurth AE, Cleland CM, Chhun N, Sidle J, Were E, Naanyu V, et al. Accuracy and acceptability of oral fluid HIV Self-Testing in a general adult population in Kenya. *AIDS Behav.* 2016;20(4):870-879. <https://doi.org/10.1007/s10461-015-1213-9> PMID:26438487 PMCID:PMC4799243

24. Schwartländer B, Stover J, Hallett T, Atun R, Avila C, Gouws E, et al. Towards an improved investment approach for an effective response to HIV/AIDS. *Lancet.* 2011 Jun 11;377(9782):2031-41 [https://doi.org/10.1016/S0140-6736\(11\)60702-2](https://doi.org/10.1016/S0140-6736(11)60702-2)