Original Article

Human Immunodeficiency Virus Self-Testing: Perspectives from Primary Healthcare Workers in Enugu State, Southeast Nigeria

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Abstract

Background: Stigmatization remains an intractable issue surrounding human immunodeficiency virus (HIV) management. Testing services are the gateway to treatment and prevention. HIV-self testing (HIVST) is a panacea to this stigmatization. It is a simple friendly testing technique. This study assessed issues surrounding the HIVST from the perspectives of the primary health-care workers in Enugu State. **Methods:** A cross-sectional study was carried out using a semi-structured interviewer-administered questionnaire. A convenience sampling of 238 respondents were sampled from the 17 local government areas of the state. Analyses were performed using IBM-SPSS version 23. Ethical approval was obtained from the Enugu State Ministry of Health. **Results:** The majority of the respondents were within the age of 31–50 years 84 (35.3%), predominantly females 203 (85.3%) and mainly married 191 (80.3%). Half of them had practiced for over 10 years and 145 (60.9%) had good knowledge of HIV screening. However, 23.9% understood HIVST as a testing modality approved by the World Health Organization. A handful of them, 25 (10.5%) correctly identified the 5Cs of HIV testing. Only 162 (68.1%) of the health-care workers reported stigma as the most perceived problems of the present testing modality and 146 (61.3%) expressed a preference for HIVST over previous methods. Age was found to be a determinant of good knowledge of HIVST, as being within the age group of 20–40 years has a 1.83 greater odds of good knowledge of HIVST than, 41–60 years age group (Adjusted odds ratios = 1.830; 95% confidence interval 1.081–3.099). **Conclusion:** Most of the Primary health-care workers in Enugu State had poor knowledge of HIVST. These workers could benefit from awareness creation and training on HIVST by public health specialists to improve their knowledge.

Keywords: Enugu state, human immunodeficiency virus self-testing, perspectives, primary health-care workers

Introduction

Human immunodeficiency virus (HIV) testing is very important in achieving the agenda of the United Nations Programme on HIV/acquired immunodeficiency syndrome 90:90:90 targets which aim at ensuring that 90% of people who are infected, know their HIV status and also targets 90% of those who know their status to start receiving antiretroviral therapy (ART) of which 90% of those on ART should have their viral load suppressed.[1] HIV pandemic has remained a source of worry to the human population globally and even more worrisome is the low rate of uptake of testing services.[2] About one-quarter of Nigerian youths were reported to have ever tested for HIV in Nigeria. The following factors have been shown to be barriers to HIV testing and they could be considered at the individual level, structural level, and social level. Anticipated HIV stigma and discrimination, lack of confidentiality, fear of testing outcomes partly explain this low uptake of HIV testing among people in Nigeria.[3] These barriers contribute to reduced uptake of HIV testing services[3] and has led to alternative methods that will enhance the uptake. Several studies have highlighted various modalities of HIV testing and their uptake, but research in HIV-self testing (HIVST) in Enugu is lacking. HIV testing services are the gateway to linkage to HIV treatment and prevention. Various testing

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services have been adopted to ensure that everyone knows his status, yet the gap has subsisted. These testing services include voluntary counseling and testing (VCT) and HIV testing and counseling, (HTC). These testing services leave the client at the mercy of the health-care providers and are carried out within the health facility settings. These have generated a lot of issues bothering on stigma, trust, and confidentiality.[1] HIVST is the current approach to HIV testing services, and it has been shown to offer more benefits[4] than the previous approaches, at least taking the responsibilities off the health-care workers and outside the health-care facilities. Although HIVST was first considered >20 years ago, it had not been widely implemented,[1,4] but the World Health Organization (WHO) in 2016 approved HIVST HIVST as a safe, accurate, and effective way to reach people who may not test otherwise, including people from key populations, men and young people[2] and defined HIVST as the process whereby a person collects his or her specimen (oral fluid or blood) and then performs an HIV test and interprets the result, often in a private setting, either alone or with someone he or she trusts.[5] Lay users have been shown to perform HIVST reliably and accurately and achieve performance comparable to that of trained health-care workers.[4] Countries have been looking for ways to rapidly increase uptake of HIV testing services, especially for populations with low access and those at higher risk that would otherwise not get tested. Nigeria is among the countries where HIVST policies have been established and implemented,[1] but surprisingly, many stakeholders in health-care were yet to know what it entails. In South-East Nigeria, much is not known regarding this approach among these health-care workers. In 2016, the WHO published the first global guidelines on HIVST, in which HIVST was recommended to be offered as an additional approach to HIV testing services.[6] The WHO has identified five key elements to be respected and observed by all HTC services: consent, confidentiality, counseling, correct test results, and connection (linkage to prevention, care, and treatment).[7]

It was estimated that only 79% of people living with HIV knew their HIV status[5] because stigma and discrimination continue to threaten the acceptance of HIV testing services worldwide.[8] Globally, 77 countries, including Nigeria, have adopted HIVST policies while many others were still noted to be developing their own and implementation and acceptance were noted to be growing rapidly.[9] Self-testing is an emerging approach with high acceptability, but little evidence exists on the best strategies for test distribution.[10] Self-testing for HIV has garnered controversy for years.[8] Self-testing for HIV infection may contribute to early diagnosis of HIV, but without necessarily increasing ART initiation.[11] Stigma, discrimination, lack of privacy, and long waiting times partly explained why six out of ten individuals living with HIV did not access facility-based testing.[10,12] By circumventing these barriers, self-testing offers potential for more people to know their serostatus.[12] The level of HIV testing uptake in Africa remains poor despite many testing models being carried out in the region.[13] The HIVST is credited with the reduction of stigma and the embarrassment that usually goes with HIV testing.[1]

HIVST is part of a comprehensive strategy that facilitates usage and linkages to care.[14-15] Self-testing has the potential to increase access to care and regular testing behaviors for key populations globally.[16] However, because self-testing kits can be used at one's convenience, one of the problems with self-testing is that it is difficult to objectively study whether people use the tests.

This study was aimed at assessing the perspectives of the primary health-care (PHC) workers on HIVST since the PHCs are the first contacts to the health system.

Methods

This study was carried out in Enugu State in the South-East geo-political zone of Nigeria. It is bounded in the west by Anambra State, on the South by Abia State, on the North by Kogi State and the East by Benue and Ebonyi States. It is made up of 17 local government areas (LGAs) distributed among three senatorial districts and has a projected population of over 4,881,500 people based on the 2006 census within a total area of 7618 sq. km.[17,18] There are over 500 health facilities, including four tertiary hospitals. The state practices ward-based health system with each LGA having at least one General Hospital as a secondary health-care provider and so many primary health facilities. There are also many private health facilities offering varying health-care services.

The study was a cross-sectional study of the PHC workers, including the nurses, community health officers (CHOs), community health extension workers (CHEWs), environmental health officers and other workers. They work in the various primary health facilities in Enugu State and had acquired different levels of educational training to enable them carry out their duties. The primary health facilities serve as the first point of call for patient presentation and found in almost all the political wards where they carry out several services, including referral services to higher centers. There are 512 PHC facilities and 2013 PHC workers unevenly distributed in the state with a greater number in the urban areas.

All the workers in the primary health facilities in Enugu state were included in this study with the exclusion of those who were too ill to participate in this study and those who were on annual leave or who declined consent. Two hundred and thirty-eight (238) health workers participated in the study, and these eligible respondents were selected by convenience sampling of 14 respondents from each of the 17 LGA of Enugu State recruited at a health care workshop in the state capital. A self-administered semi-structured questionnaire was used to collect these data. The questionnaire was developed by the researchers and was pretested among the health-care workers serving in the state ministry of health. The observed corrections were affected in the questionnaires before administering it

to the respondents. The administration of the questionnaire was supervised by the investigators and the trained research assistants.

The questionnaire had two sections eliciting responses for sociodemographic variables and the different perspectives of HIV self-testing. The data were collected by six research assistants who were vigorously trained on the items of the questionnaire and the objective of the research. The data were collected within 2 days while these workers were invited for a workshop at the state capital.

The independent/predictor variables include sociodemographic variables: age, marital status, educational qualifications, years of experience, and professional cader, whereas the dependent/outcome variables include knowledge of HIVST. The data were coded, entered and analyzed using IBM- SPSS version 23. Data presentation was with tables. Quantitative variables were summarized using means and standard deviations (SDs). Categorical variables were summarized using frequencies and proportions. Pearson's Chi-square test was also used to assess associations of characteristics of respondents with knowledge of HIVST among the PHC workers. Binary logistic regression was then used to determine the predictors of good knowledge. The level of statistical significance was at 0.05. Those who scored correctly 50% and above of all the knowledge variables were regarded as having good knowledge, whereas scores <50% was designated poor.

There were 18 knowledge variables, with correct answer coded as 1 and wrong answer coded as zero. Those who scored correctly 50% and above of all the knowledge variables were regarded as good, whereas <50% was designated poor. This was recoded into two categories <9 as poor and ≥9 as good. These knowledge categories were then used in the testing for associations against socio-democratic characteristics of respondents.

Ethical approval

All study participants were provided with information on the study objective as well as potential benefits and risks before participating in the study. Informed oral and written consent was also obtained from each participant before the study. The privacy of the information was assured after taking permission. Ethical clearance for this study was obtained from the Health Research Ethics Committee of the Enugu State Ministry of Health. The ethical clearance certificate reference number is MH/MSD/REC20/128.

Results

Two hundred and thirty-eight health-care workers participated in this study and their mean age (SD) was 40.95 (9.13) years and the majority of them were within the age of 31–50 years 81 (69.3%) and were predominantly females, 203 (85.3%). The highest educational attainment of most of them 227 (95.4%), was tertiary education. They were mainly married 191 (80.3%) and constituted majorly CHO, senior CHEWs 160 (67.2%). Half of these respondents 119 (50.0%) had practiced for over 10 years with Mean ± SD of the duration of practice of 14.42 (9.29) years [Table 1].

Concerning knowledge of HIV screening modalities, 145 (60.9%) had good knowledge, but only a few of them 57 (23.9%) knew of HIVST as an HIV screening test modality approved by the WHO and Ministry of Health. The majority knew of VCT 63 (26.5%) and HTC 133 (55.9%) as screening modalities. Most of them were able to define the three screening modalities of HIV: HTC 204 (85.7), VCT: 192 (80.7%), and HIVST 183 (76.9%). On the knowledge of the 5Cs of HIV testing, a handful of the respondents 25 (10.5%) could correctly identify them simultaneously [Table 2].

On their perspectives on different issues about HIVST, about 162 (68.1%) of the health-care workers reported stigma as one of the perceived problems of the present testing modality and 146 (61.3%) of them expressed a preference for HIVST over the previous facility-based testing modalities (VCT and HTC). Regarding their perspectives on the reactions assuming a positive outcome of their HIVST, 155 (65.1%) declared that they would disclose their serostatus to their spouse and a few 66 (27.7%) professed that they would inform their pastors of their positive status, whereas 29 (12.2%) asserted they would do nothing about it. Considering possible reasons for the various reactions following testing positive, 111 (46.6%) of these respondents disclosed that stigma was a major reason

Table 1: Sociodemographic characteristics of primary health-care workers in Enugu State, 2019

Sociodemographic variables	Frequency (%)
Age in years	
20-30	36 (15.1)
31-40	84 (35.3)
41-50	81 (34.1)
51-60	37 (15.5)
Sex	
Male	35 (14.7)
Female	203 (85.3)
Educational level	
Secondary and below	11 (4.6)
Tertiary	227 (95.4)
Marital status	
Single	24 (10.0)
Married	191 (80.3)
Others*	23 (9.7)
Professional cader	
Nurse	23 (9.7)
CHO/SCHEW	160 (67.2)
Others	55 (23.1)
Years of practice/experience	
≤10	119 (50)
11-20	65 (27.3)
>20	54 (22.7)

CHO: Community health officers, SCHEW: Senior Community Health Extension Workers

guiding their decisions, whereas 40 (16.8%) claimed that service uptake would be their driving force toward making a decision [Table 3].

None of the association between sociodemographic characteristics of these health-care workers and knowledge of HIV screening modalities were found to be statistically significant; age (χ^2 = 0.725; P = 0.123) sex (χ^2 = 0.569; P = 0.451), educational level (χ^2 = 1.701; P = 0.191), marital status (χ^2 = 2.619; P = 0.270) professional cader (χ^2 = 0.993; P = 0.609) [Table 4].

On the association between knowledge of HIVST and sociodemographic characteristics of the respondents, the association between the age of the respondents and knowledge of HIVST was found to be statistically significant (χ^2 = 4.321; P = 0.038), whereas others were not statistically significant: Sex (χ^2 = 2.036; P = 0.154); educational level (χ^2 = 0.676; P = 0.763), marital status (χ^2 = 1.103; P = 0.576), professional cader (χ^2 = 2.795; P = 0.247) [Table 5].

There was no determinant for overall knowledge of HIV screening modalities, whereas age was found to be a determinant of good knowledge of HIVST, as being within the age group of 20–40 years has a 1.83 greater odds of good knowledge of HIVST than, 41–60 years age group (adjusted odds ratios = 1.830; 95% confidence interval 1.081–3.099) [Tables 6 and 7].

Discussion

HIVST has generated a lot of concerns and issues regarding the acceptability and implementation. Some authors have argued in pros, whereas others have considered the cons. The cases in support of HIVST contended that: the modality would be highly acceptable, especially among the most at-risk individuals; they further claimed that self-testing empowered users, thus helping to normalize testing; arguments against HIVST included: cost limits access to those who need testing most; false-negative results, especially during the window period, might lead to false reassurance and could promote sex between discordant partners at the time of highest infectivity; missed opportunities for counseling, linkage to care, and diagnosis of other sexually transmitted infections might also come up with potentials for coercion between partners and insufficient counseling.[2,8]

Knowledge of HIVST is very important in this regard, and as a newly introduced approach, the need to explore the knowledge level of the PHC workers could not be underscored, especially as front liners. This study revealed that >23.9% of the health workers who took part in the study knew HIVST as a testing modality. These findings were similar in a related study done in the democratic republic of Congo (DRC)[19] but disagreed with the findings from another similar study carried out among Australian gay and bisexual men where more than half (58.4%,) of their respondents reported that they had never heard of HIVST.[20] The similarity

Table 2: Knowledge of Human Immunodeficiency Virus screening among Primary Health Care workers in Enugu State, 2019

Variables	Yes, frequency (%)
Knowledge of HIV screening modalities	
VCT	63 (26.5)
HTC	133 (55.9)
HIVST	57 (23.9)
Definitions	correct
VCT	192 (80.7)
HTC	204 (85.7)
HIVST	183 (76.9)
Knowledge of 5Cs HIV testing	Correct
Consent	148 (62.2)
Coercion	212 (89.1)
Confident	198 (83.2)
Counseling	197 (82.8)
Communication	83 (34.9)
Correct test result	177 (74.4)
Connection	57 (23.9)
Overall knowledge of 5Cs	Correct
Knowledge of 5Cs	25 (10.5)
Knowledge about HIVST	145 (60.9)
Meaning of HIVST	137 (57.6)
Overall Knowledge score about HIVST	
Good	145 (60.9)
Poor	93 (39.1)

HIVST: Human Immuno-deficiency Virus-Self Testing, VCT: Voluntary counseling and testing, HTC: Human immunodeficiency virus testing and counseling

Table 3: Perspectives of the primary health-care workers in Enugu State on the issues surrounding the Human Immunodeficiency Virus-Self Testing, 2019

Variables	Frequency (%)	
	Yes	No
Perceived Problems with present facility testing modalities		
Stigma	162 (68.1)	76 (31.9)
Increased service uptake	38 (16.0)	200 (84.0)
Convenience	36 (15.1)	202 (84.9)
Increased connection	26 (10.9)	212 (89.1)
Preference for HIVST	146 (61.3)	92 (38.7)
Reactions when HIVST is positive		
Disclose status to my spouse	155 (65.1)	83 (34.9)
Disclose status to my pastor	66 (27.7)	172 (72.3)
Change will	38 (16.0)	200 (84.0)
No disclosure to anybody	63 (26.5)	175 (73.5)
I will do nothing	29 (12.2)	209 (87.8)
Possible reasons for the reactions	206 (86.6)	32 (13.4)
Stigma	111 (46.6)	127 (53.4)
Service uptake increase	40 (16.8)	198 (83.2)
Convenience	41 (17.2)	197 (82.8)
Uptake treatment	54 (22.7)	184 (77.3)
Others	230 (96.6)	8 (3.4)

HIVST: Human immunodeficiency Virus-Self Testing

Table 4: Relationship between overall knowledge of human immuno-deficiency virus screening and sociodemographic characteristics of primary health-care workers in Enugu State, 2019

Variable	Overall knowledge		χ^2 test	*P*
	Good	Poor		
Age (years)				
20-40	85 (70.8)	35 (29.2)	0.123	0.725
41-60	86 (72.9)	32 (27.1)		
Sex				
Male	27 (77.1)	8 (22.9)	0.569	0.451
Female	144 (70.9)	59 (29.1)		
Educational level				
Secondary and below	6 (54.5)	5 (45.5)	1.707	0.191
Tertiary	165 (72.7)	62 (27.3)		
Marital status				
Single	25 (34.7)	47 (65.3)	2.619	0.270
Married	51 (24.9)	154 (75.1)		
Others	6 (26.1)	17 (73.9)		
Professional cadre				
Nurse	15 (65.2)	8 (34.8)	0.993	0.609
CHEW/CHO	118 (73.8)	42 (26.3)		
Others	38 (69.1)	17 (30.9)		

CHO: Community health officers, CHEW: Community Health Extension Workers

Table 5: Relationship between definition of human Immuno-deficiency Virus Self-testing and sociodemographic characteristics of Primary Health Care workers in Enugu State, 2019

Variable	HIVST definition		χ^2 test	*P*
	Good	Poor		
Age (years)				
20-40	77 (64.2)	43 (35.8)	4.321	0.038
41-60	60 (50.8)	58 (49.2)		
Sex				
Male	24 (68.6)	11 (31.4)	2.036	0.154
Female	113 (55.7)	90 (44.3)		
Educational level				
Secondary and below	7 (63.6)	4 (36.4)	0.676	0.763
Tertiary	130 (57.3)	97 (742.7)		
Marital status				
Single	16 (66.7)	8 (33.8)	1.103	0.576
Married	107 (56.0)	84 (44.0)		
Others				
Professional cadre				
Nurse	17 (73.9)	6 (26.1)	2.795	0.247
CHEW/CHO	89 (55.6)	71 (44.4)		
Others	31 (56.4)	24 (43.6)		

CHO: Community health officers, CHEW: Community Health Extension Workers, HIVST: Human Immuno-deficiency Virus-Self Testing

and the discrepancy could be attributed, respectively, to the fact the Congolese respondents were not among at-risk individuals, whereas Australian respondents were gay and

Table 6: Determinants of knowledge of human immuno-deficiency virus screening modalities among primary healthcare workers in Enugu State, 2019

	AOR	*P*	95% CI for AOR	
			Lower	Upper
Educational level				
Tertiary	2.218	0.202	0.653	7.528
Secondary and below	1			

CI: Confidence interval, AOR: Adjusted odds ratio

Table 7: Determinants of knowledge of definition of human immuno-deficiency virus-self Testing among primary healthcare workers in Enugu State, 2019

	AOR	*P*	95% CI for AOR	
			Lower	Upper
Age category (years)				
20-40	1.830	0.025	1.081	3. 099
41-60	1			
Sex				
Male	1.931	0.098	0.886	4.209
Female	1			

CI: Confidence interval, AOR: Adjusted odds ratio

bisexual men who were considered among the high-risk group, but this study was on the health-care workers who are stakeholders in the health system. Astonishingly, a greater proportion of the respondents knew the definition of HIVST when compared to the proportion that knew it as a testing modality approved by the WHO and federal ministry of health. This disbelief could be from the fact that these workers were mainly graduates who could give definitions out of deductive reasoning from the name. It is not out of place that one could know the definition of a term without knowing the application as could be deduced from this result. The implication of this could be useful during awareness creation of this new approach among these respondents since the majority of them have known the definition. This study showed that a good proportion of the respondents still had very low knowledge of this new testing modality, unlike what was observed in South Africa, where a related study revealed that the majority of health workers (69.9%) were aware of HIVST in South Africa.[20] The low proportion that has good knowledge of HIVST implies that there was still low awareness of this modality talk less of the application and other technicalities surrounding it.

Stigma is a complicated psychosocial problem that could manifest at different levels: individual or self, interpersonal, community, institutional, and government levels. This study showed that a majority of these PHC workers expressed a preference for HIVST over other facility-based testing modalities and this was much higher than what was observed in another study in the DRC where 40.4% showed a preference for HIVST.[20] The Congolese study population was mainly the

much younger population who would prefer VCT. However, these high figures were in agreement to that revealed by another author as observed among health workers in Ethiopia, Kenya, Malawi, Mozambique, and Zimbabwe where health workers view HIVST as a way for reduce stigma and discrimination around HIV testing and as a way for their family members to get tested.[21] Their preference for HIVST could imply that when they become more fully informed, there would not be much resistance in the application, and sustainability could be achieved. A good proportion of these respondents reported that they would disclose their positive status to either their spouses, pastors to enable them to get help early, enough, and this finding agreed with another study in HIVST where just over half (53.4%) of respondents would keep an HIV-positive test result confidential, and disclose to a sexual partner, family member, trusted others or health-care providers with highly considerable benefits.[21] Disclosure of the positive test status among these respondents will not only ensure early access to cares but also the acceptability of the status and effective management of the arising stigma and possibility of gaining family support and support of trusted others.

It is amazing that being younger was found to have greater odds of having a good knowledge of HIVST among these respondents, even though these modalities were introduced since 2016. One would have expected that age would not be a determinant as the information was at the domain of all and sundry, since the world is designated as a global village, where information new and old are in constant circulation via the internet and other social media platforms. This could explain this fact as younger people are more conversant and abreast of the new information regarding reproductive health, HIV, and sex through these modalities. Hence, the implication is that training and awareness creation should be more useful when directed to older workers.

Conclusion

HIV-ST being an approved novel approach to be adopted and accepted, this study demonstrated the perspectives of the PHC workers on the HIVST with many of them, having a generally poor knowledge of HIVST, but with a proven preference for the modality as a means of reducing stigma. This would ultimately affect the uptake among the clients because one could not give out what one did not have.

Recommendations

Health promotion backed with the targeted training of these health workers by the Public health specialists on this novel modality of HIV testing, will be necessary to increase the uptake of this testing modality.

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Conflicts of interest

There are no conflicts of interest.

References

1. Nigerian Goverment Approves HIV Self-Test Kit. Available from: https://www.premiumtimesng.com/health/health-news/325180-nigerian-govt-approves-hiv-self-test-kit.html. [Last accessed 2020 Apr 06].
2. Hlongwa M, Mashamba-Thompson T, Makhunga S, Murararaneza C, Hlongwana K. Men's perspectives on HIV self-testing in sub-Saharan Africa: A systematic review and meta-synthesis. BMC Public Health 2020;20:66.
3. Nwaozuru U, Iwelumor J, Ong JJ, Salah S, Obiezu-Umeh S, Ezechi O, Tucker JD, Preferences for HIV testing services among young people in Nigerian. BMC Health Serv Res 2019;19:1003-12.
4. WHO. Policy Brief: WHO Recommends HIV Self-Testing – Evidence Update and Considerations for Success; 2019. p. 1. Available from: https://www.who.int/publications-detail/who-recommends-hiv-self-testing-evidence-update. [Last accessed on 2020 Apr 19].
5. WHO. HIV Self-Testing. Available from: https://www.who.int/hiv/topics/self-testing/en/. [Last accessed on 2020 Mar 29].
6. WHO. Latest News and Events. Available from: https://www.who.int/hiv/mediacentre/self-testing/en/. [Last accessed on 2020 Mar 29].
7. Buscher AL. Challenges to community-based voluntary HIV testing and counselling. Lancet Infect Dis 2012;12:10-1.
8. Wood BR, Ballenger C, Stekler JD. Arguments for and against HIV self-testing. HIV/AIDS. Res Palliative Care 2014;6:117-26.
9. World Health Organization. Consolidated Guidelines on HIV Testing Services. Geneva: World Health Organization; 2015. Available from: https://www.ncbi.nlm.nih.gov/books/NBK316021/. [Last accessed on 2020 Mar 29].
10. Thirumurthy H, Masters SH, Mavedzenge SN, Maman S, Omanga E, Agot K. Promoting male partner HIV testing and safer sexual decision making through secondary distribution of self-tests by HIV-negative female sex workers and women receiving antenatal and post-partum care in Kenya: A cohort study. Lancet HIV 2016;3:266-74.
11. MacPherson P, Lalloo DG, Webb EL, Maheswaran H, Choko AT, Makombe SD, *et al*. Effect of optional home initiation of HIV care following HIV self-testing on antiretroviral therapy initiation among adults in Malawi: A randomized clinical trial. JAMA-J Am Med Assoc 2014;312:372-9.
12. Pant-Pai N, Sharma J, Shivkumar S, Pillay S, Vadnais C, Joseph L, *et al*. Supervised and unsupervised self-testing for HIV in high- and low-risk populations: A systematic review.PLoSMed 2013;10:100144.
13. Njau B, Damian DJ, Abdullahi L, Boulle A, Mathews C. The effects of HIV self-testing on the uptake of HIV testing and linkage to antiretroviral treatment among adults in Africa: A systematic review protocol. Syst Rev 2016;5:52.
14. Mavedzenge SN, Baggaley R, Corbett EL. Review of self-testing for HIV: Research and policy priorities in a new era of HIV prevention. Clin Infect Dis 2013;57:126-38.
15. Dean J, Lui C, Mutch A, Scott M, Howard C, Lemoire J, *et al*. Knowledge and Awareness of HIV Self-Testing among Australian Gay and Bisexual Men: A Comparison of Never, Sub-Optimal and Optimal Testers Willingne. AIDS Care 2019;31:224-9.
16. Rogers KS. National Academies of Sciences, Engineering, and Medicine. Improving Diagnosis in Health Care. Washington, DC: The National Academies Press; 2012. Available from: https://doi.org/10.17226/21794. [Last accessed on 2020 Mar 29].
17. National Population Commission (NPC) [Nigeria] and ICF International. Nigeria Demographic and Health Survey 2013. Abuja, Nigeria, and Rockville, Maryland, USA: NPC and ICF International; 2014. Availavle from: https://dhsprogram.com/pubs/pdf/FR293/FR293.pdf. [Last accessed on 2020 Apr 06].
18. National Population Commission (NPC) [Nigeria] and ICF. Nigeria Demographic and Health Survey 2018. Abuja, Nigeria, and Rockville, Maryland, USA: NPC and ICF; 2019. Available from: https://www.dhsprogram.com/pubs/pdf/FR359/FR359.pdf. [Last accessed on 2020 Apr 06].
19. Tonen Wolyec S, Mbopi Keau F, Batina Agasa S, kaula Ginette CM, Noubon M, Bousa RS, *et al*. Acceptability of HIV self testing in African students: A cross sectional survey in democratic republic of congo. Pan Afr Med J 2019;33:83-9.

20. Dean J, Lui CW, Mutch A, Scott M, Howard C, Lemoire J, *et al*. Knowledge and awareness of HIV self-testing among Australian gay and bisexual men: A comparison of never, sub-optimal and optimal testers willingness to use. AIDS Care. Psychol Soc Med Asp AIDS/HIV 2019;31:224-9.
21. HIV Self-Testing Guidelines on HIV Self-Testing and Partner Notification: Supplement to Consolidated Guidelines on HIV Testing Services NCBI Bookshelf. Available from: https://www.ncbi.nlm.nih.gov/books/NBK401675/. [Last accessed on 2020 Apr 19].