Outcomes of A Community-Led Web-Based HIV Self-Testing Demonstration Among Cisgender Men Who have Sex with Men and Transgender Women in the Philippines During the COVID-19 Pandemic: A Retrospective Cohort Study

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Research Article

Keywords: HIV self-testing, cisgender men who have sex with men, transgender women, community-based interventions, digital health, differentiated service delivery, Philippines, low- and middle-income countries

Posted Date: October 12th, 2021

DOI: https://doi.org/10.21203/rs.3.rs-952643/v1

Abstract

Introduction:

The Philippines, experiencing the fastest rising HIV epidemic globally, has limited options of HIV testing that its uptake remains low among cisgender men who have sex with men (cis-MSM) and transgender women (TGW), especially amid the COVID-19 pandemic. As HIV self-testing (HIVST) and web-based approaches could synergize efforts to expand its uptake, we aimed to evaluate the outcomes of a community-led web-based HIVST demonstration and to explore factors associated with HIVST-related behaviours and outcomes.

Methods

We did a secondary data analysis of routinely collected data in a community-led web-based HIVST demonstration among cis-MSM and TGW in Western Visayas, Philippines. We reviewed data on demographics, sexuality-, and context-related variables and explored associations with opting directly-assisted HIVST (DAH) and willingness to distribute, using multivariable logistic regression.

Results

HIVST kits were distributed to 706 individuals (648 cis-MSM, 58 TGW), 52.1% were first-time testers, 12.5% opted DAH, and 48.2% were willing to distribute. Reporting rate was high (97.5%) with 8.4% reactivity rate. While linkage to prevention (100%) and care (87.9%) were high, pre-exposure prophylaxis (PrEP) (0.3%) and antiretroviral therapy (ART) (60.4%) initiation were limited. There were no reports of adverse events. Those who opted for DAH, not willing to distribute, employed, and those who recently had anal intercourse had significantly higher proportions of testing reactive. Those who opted web-based approaches (adjusted odds ratio, aOR=0.28 [confidence interval, CI 0.14-0.57]) were less likely to opt DAH. Those living in urban areas (aOR=1.60 [CI 1.13-2.26]) and with no history of HIV test (aOR=0.45 [CI 0.32-0.61]) were associated with lower likelihood of secondary distribution than their counterparts. Maximal quarantine restrictions were associated with higher likelihood of DAH (aOR = 4.07 [CI 2.42-6.90]) and willingness to distribute (aOR=3.51 [CI 2.45-5.07]) relative to minimal restrictions.

Conclusions

HIVST could reach those who were never tested for HIV. While there is demand in accessing unassisted and web-based approaches, DAH should still be offered. Uptake of PrEP and same-day ART should be upscaled by decentralizing these services to community-based organizations. Differentiated service delivery is key to respond to preferences and values of key populations amid the dynamic geographical and sociocultural contexts they are in.

Introduction

The limited demand for HIV testing from the key population (KP) groups, especially amid the COVID-19 pandemic, has challenged the Philippines to reverse their HIV epidemic, where annual incidence of new infections and AIDS-related death increased by 237% and 315%, respectively, for the past decade [1]. Although estimated national prevalence is only less than 1%, the epidemic is concentrated among KP, with approximately 4 and 5 in a 100 cisgender men who have sex with men (cis-MSM) and transgender women (TGW), respectively, living with HIV [2]. While slowly having improvements in the first 90% of the UNAIDS 90-90-90 targets, the COVID-19 pandemic has decreased HIV tests done by 61%, ultimately leading to 68% of estimated people living with HIV (PLHIV) knowing their status in 2021 [3], similar to the proportion estimates 5 years ago [2]. The diagnosis gap is a known driver of the epidemic [4] and HIV testing remains to be barely accessed by KP, with less than half of cis-MSM and TGW accessed HIV testing in 2018 [5].

As current HIV testing options are limited to facility and community-based testing [6], expanding options may be key to upscaling access and uptake. World Health Organization (WHO) has recommended HIV self-testing (HIVST), which involves the use of rapid diagnostic test kits for individuals to perform and interpret on their own [7]. This may remove barriers in traditional HIV testing approaches, including geographical distance, lack of confidentiality or privacy, conflicting schedules, and stigma [5, 8–12]. Among cis-MSM and transgender people elsewhere, it was shown to be safe and effective at increasing uptake and frequency of HIV testing without compromising condom use, social safety, and enrollment to treatment [13]. In the Philippines, studies on self-testing have been very limited. Nevertheless, these show acceptability and preference of blood-based over fluid-based tests among cis-MSM and TGW [6, 14].

Equally important is the use of virtual interventions. Online-based interventions seem to synergistically remove barriers in HIV testing alongside HIVST, as it increased uptake of among cis-MSM especially among first-time testers [15]. Even though the proportion of Filipinos accessing internet (67.0%) and using social media (80.7%) are higher than the global average [16, 17], virtual interventions have not been maximized, not until the unprecedented time of COVID-19 pandemic [18].

We aimed to describe the outcomes of a community-led web-based HIVST demonstration project done in Western Visayas, Philippines, and the demographic and sexuality-related factors associated with HIVST-related behavior and outcomes.

Methods

Study Design, Setting, and Participants

We did a multiple-center, retrospective cohort analysis of HIVST demonstration project conducted in Western Visayas, Philippines, implemented from March to November 2020. The STROBE statement checklist of items was used to guide the development of this research article [19].

Western Visayas is in the center of the Philippines and is composed of 6 provinces separated in 3 different islands. Its two highly urbanized cities (Bacolod City and Iloilo City) are HIV high burden areas [1]. HIVST was demonstrated in the region by the Department of Health (DOH)–Western Visayas Center for Health Development office for a couple of reasons. Firstly, 2 in 3 of new HIV cases in the Philippines are detected outside the National Capital Region and that Western Visayas is among the area with highest HIV incidence, contributing 6.2% of newly diagnosed cases in 2019 [20]. Secondly, there is a regional testing gap of 23.9%, or 1193 left undiagnosed out of 5000 estimated PLHIV, in 2019 [20].

The demonstration project was implemented by different CBOs in the region, led by the Family Planning Organization of the Philippines-Iloilo (FPOP-Iloilo)-Rajah Community Center. Using a community-led web-based service delivery model, they offered HIVST as an additional option in their current HIV testing services. On March 2020, the CBOs distributed INSTI® HIV Self-Test (BioLytical Laboratories, Richmond, British Columbia, Canada) kits among those who registered in an online sign-up sheet. While extreme lockdowns were implemented due to the unprecedented COVID-19 pandemic, the web-based nature of the program allowed continuity of provision of HIVST.

Using convenience sampling, we performed a secondary analysis of data from those who opted and consented for the HIVST program enrolled from March to November 2020, who fit into the inclusion criteria as follow: (1) self-identified as cis-MSM or TGW and (2) 18 years old and above. Those who were (1) assigned female at birth, (2) assigned male at birth but identified as heterosexual, (3) those who eventually disclosed that they are already diagnosed with HIV were excluded.

Procedures

Participants were provided pre-test and programmatic information, including the objectives and conduct of the demonstration project. Upon providing their electronically recorded consent, data on the demographics, sexual risk and behavior, and HIV testing related behavior and preference were elicited. Participants chose between two modes of access: (1) off-line, where participants walked-in and did the HIVST on-site at community-based facilities, and (2) online, where they performed HIVST off-site, e.g., in their homes. Participants received the HIVST package, containing the kit itself, video and printed instructional materials (containing information on HIV, on how to use, interpret, and dispose the kit, support hotline, and linkage to appropriate services, including information on free HIV treatment) and condoms and lubricants, through courier delivery or pick-up for online and given in-person for off-line. For online, participants were followed-up within two days upon access to determine the outcomes, to provide post-test counseling, and to link them to appropriate services. In rare cases when the result turned out as invalid (n=4), they were offered retesting using a different HIVST kit with the same strategy they preferred (ie., offline remains offline). Follow-up at 2 weeks and 4 weeks was conducted to determine linkage to further HIV-related services.

The outcomes measured were (1) HIVST result (reactive or non-reactive), (2) whether they opted for directly assisted HIVST (DAH) (i.e., in-person demonstration and supervision by a provider) or unassisted

HIVST [7], (3) whether they were willing to distribute the HIVST kits to their sexual or social network (i.e., secondary distribution of HIVST kits) or not [7], (4) linkage to appropriate HIV services depending on the result, enrollment to care (confirmatory testing and treatment) among those reactive, and prevention services, e.g., behavioral risk reduction counseling, condoms and lubricants, or pre-exposure prophylaxis (PrEP), among those non-reactive, and (5) reports of adverse events such as suicidal attempts, coercion, and social harm [7, 21, 22]. Predictors explored were (1) demographics (age, gender identity, and employment), (2) sexuality-related variables, including (a) sexual risk and behavior (anal sex within the past 3 months and number of male partners for the past 12 months) and (b) HIV testing-related variables (history of HIV testing, i.e., first-time tester or not [23], mode of access of HIVST, i.e., off-line or online, and source of information regarding the HIVST program), and (3) context in terms of (a) time, characterized by the extent of COVID-19 community quarantine protocols, ie., maximal limitation of movement during enhanced community quarantine or minimal limitation of movement during generalized community quarantine, and (b) place (urban or rural status of their residence). Some of these have been used as potential predictors in previous studies [23, 24].

Statistical analysis

Descriptive statistics were done to summarize demographic characteristics and sexuality-related variables. We performed Chi-square and Fisher exact tests test to compare baseline characteristics, stratified into reported HIV test result. To describe the outcomes of the HIVST demonstration project, we determined the prevalence at each component of the testing cascade among those who reported their HIVST outcome.

We performed multivariate logistic regression using complete case analyses and backward elimination to determine predictors associated with our outcomes of interest: (1) opting for DAH and (2) willingness to do secondary distribution. Predictors found to be statistically associated with in the initial bivariate analyses using $p < 0.25$ were included in the final multivariate analyses. Chi-square tests were used to assess collinearity of potential predictors. To assess predictive power and goodness-of-fit of the models, we used c statistics and Hosmer-Lemeshow statistics. We used $p < 0.05$ to determine significant Chi-square and Fisher exact estimates and crude (cOR) and adjusted odds ratio (aOR). We performed all the analyses using R version 4.0.3.

Ethical Approval

The study adhered to the principles of the Declaration of Helsinki and the ethical approval (NEC Code: 2021-004) was provided by the National Ethics Commission of the Philippine Council on Health Research and Development, Department of Science and Technology, Republic of the Philippines.

Results

From March to November 2020, 768 kits were distributed (Figure 1). Due to missing documentation, 33 were not assessed for eligibility. Among those assessed, 29 were excluded based on the inclusion criteria.

Eventually, 706 were recruited, whose data were available for analysis.

Median age of the participants is 26 (interquartile range 23 - 30) years old. Majority self-identified as cis-MSM (91.8%), and most were employed (77.2%) and residing in an urban area (68.6%) (Table 1). Many (70.8%) had 3 or more sexual partners in the past 12 months and 50.9% had an anal sexual intercourse in the past 3 months.

Among those distributed with HIVST kits, more than half (53.1%) were never tested previously for HIV, most (85.4%) preferred unassisted HIVST, and almost half (48.1%) were willing to distribute kits to their sexual partners and peers. Only a few (6.2%) opted for offline approach. Furthermore, reporting rate was high at 97.5%. Among those who reported, proportions of testing reactive were significantly higher among employed ($p = 0.018$), those who had anal intercourse in the past 3 months ($p = 0.021$), those who opted for DAH ($p < 0.000$), not willing to distribute the HIVST kits ($p < 0.000$), and opted for offline approaches ($p = 0.008$), compared to their corresponding counterparts. There is no significant difference in the proportion of those tested reactive among first-time tester and those who were not ($p = 0.896$) and minimum and maximum community restrictions ($p = 0.303$).

Of the 688 who reported their HIVST outcomes, 58 (8.4%) tested reactive. Among these, 51 (87.9%) were eventually linked to care and 35 (60.3%) were initiated on ART during the study period (Table 2). Among those non-reactive, all the 630 participants (100%) were provided prevention services through behavioral risk reduction counseling and provision of condoms and lubricants but with only 2 (0.3%) were successfully linked to PrEP services. Lastly, there were no reports of adverse events in the program.

Almost half (48.2%) were willing to distribute the HIVST kits to their partners and peers (Table 3). Those in the urban area were more likely willing to share compared to those in rural (aOR = 1.60 [CI 1.13-2.26], $p = 0.008$). Increased likelihood of sharing was noted in maximal quarantine restrictions as opposed to minimal one (aOR = 3.51 [CI 2.45-5.07], $p < 0.001$). Moreover, being a first-time tester (aOR = 0.45 [CI 0.32-0.61], $p <0.001$) was significantly less likely to distribute compared to those ever-tested for HIV.

Only a few (12.46%) opted DAH (Table 4). Those who chose online approach were less likely to opt for DAH (aOR = 0.28 [CI 0.14-0.57], $p < 0.001$). There was an increased likelihood of opting for DAH noted during maximal quarantine restrictions as opposed to minimal (aOR = 4.07 [CI 2.42-6.90], $p < 0.001$).

Discussion

In this study, we found that web-based HIVST have reached many first-time testers similar with previous studies among cis-MSM and TGW [25-29]. Reporting and linkage to care and prevention rates were high but ART and PrEP initiation were sub-optimal. While a minority (12.5%) asked for assistance, a higher proportion of testing reactive for HIV among those who opted for DAH. Choosing online approach was associated with lower odds of DAH. Almost half (48.16%) were willing to share kits, more likely among those ever tested and residing in urban area. Stricter community quarantine measures did not affect

reactivity rate, but it was associated with increased likelihood of opting for DAH and willingness to distribute.

It is interesting that there seems to be no difference in reactivity rate between first-time and ever testers, which disagrees with a previous study among individuals at high risk for HIV, only 34.2% of whom were from KP, in Senegal [23]. In the Philippines, all of those who come for HIV testing are required to undergo risk reduction counselling [30, 31]. Our finding suggests that current intervention may have had marginal impact on reducing risk as those who had history of HIV test are as likely to test reactive as first-time testers. Testing is a good avenue to educate and previous studies have shown that higher HIV knowledge is associated with being ever tested among cis-MSM and TGW [32-35]. Amidst the tendency for counselling and education to be more self-driven with HIVST, risk reduction messaging could be strengthened.

Some implementers have argued to maximize the unassisted nature of HIVST [6], especially as studies have shown that unassisted HIVST appears to be acceptable and feasible [36, 37]. However, a minority in our cohort (12.5%) opted for DAH. Our study shows two interesting findings. Firstly, reactivity proportion among those who opted DAH was significantly higher than those who did not, similar to a study among TGW in Thailand [38], albeit not consistent with cis-MSM in the same study [38] and with a study done among people at high risk for HIV, 60.4% were females, in Congo [37]. Despite the inconsistencies, the anxiety regarding linkage to care and the desire for assistance have been reported among cis-MSM and TGW in the country [6], and other KP elsewhere [39]. Additionally, some transgender people have been documented to be needing some form of support during HIVST, mostly from social networks [29]. Secondly, while it may be intuitive that testing for the first-time is associated with higher odds DAH, similar with previous studies [6, 23, 40], it was the opposite in our bivariate model. It may be possible that participants were enticed with the privacy and independence HIVST offers. Upon controlling for other variables, however, the association appears to be insignificant, although trending towards lower odds of DAH, similar with previous studies among TGW [40], partners of female sex workers, and adolescents [41-43]. Taken both altogether with DAH's association with better retention rate [37] and higher ART initiation rates [44], there is benefit in offering DAH albeit an unpopular choice. As foresight, as the Philippines might roll-out oral fluid-based test, assistance may be warranted as Filipino KPs are accustomed to blood-based tests and may raise unfamiliarity.

Participants in the online approach being less likely to ask for DAH may be explained by the cis-MSM and TGW's preference for privacy, confidentiality, and convenience in HIVST [6]. Although web-based HIVST approaches provide the aforementioned [45], offering DAH may deal with issues of perceived lack of assistance or support in virtual platforms [46, 47]. Conversely, our findings suggest that choosing off-line approach was associated with higher odds of DAH. This may be explained by the implementers being KP-friendly CBOs, which may have alleviated the unfriendly nature of some HIV testing sites known to lead MSM to opt for otherwise, especially among those unaware of their status [48]. KP-friendly community-based interventions have been previously evaluated to facilitate uptake of services across the HIV care cascade in the Philippines [8, 49] and elsewhere [50-52].

Secondary distribution have been shown to increase the reach, positivity yield, and cost-efficiency of HIV testing among cis-MSM [53, 54], including those unsure of their gender identity [24]. Peer involvement could synergize with other facilitators known to HIVST [55]. Similar to previous studies which showed decreased distribution [24, 56], we found that being never tested were associated with lower likelihood of wiliness to distribute. This may be explained by the relatively young cohort, with median age of 26 years old being not too far away from the median age for first HIV test among cis-MSM and TGW based on the national biobehavioral serologic survey in 2018 [5]. Moreover, being younger (<24 years old) was found to be associated with lower likelihood of willingness to distribute in the bivariate analysis, although non-significant upon adjusting for other variables. This may be due to the prevailing sociocultural factors leading to concepts like sex, especially non-conforming sexual acts, as taboo, and is only for adults [57-62], making sexually transmitted infection and HIV prevention interventions elusive to young people, especially among sexual and gender minorities [63].

To our knowledge, this is among the first study on HIVST to control for both location and time. In terms of location, residing in urban areas was associated with increased odds of willingness to distribute and this may be explained by the dense clustering of KP [64], higher access to queer culture [65] and HIV education [66], and higher acceptability to HIV interventions [64] compared to rural areas. In terms of time, characterized by the extent of community quarantine protocols, it is expected that willingness to distribute was higher during maximal restrictions. This may be explained by the Filipino value of *"bayanihan",* communal effort, which have been shown to be important for resiliency in disasters [66-68]. However, the actual incidence of secondary distribution decreased in other countries amid the COVID-19 pandemic [69]. Furthermore, surprisingly, stricter restrictions were associated with higher likelihood of DAH in our study. Studies on the impact of COVID-19 on the HIV service delivery in the Philippines have been limited and we could only speculate that the perceived limited access to healthcare services amid a time of public health crisis may have reinforced dependence with health providers. It was also suggested that DAH during the COVID-19 reinforces ensuring support, linkage, and retention [70]. Both factors considered, however, emphasize the fact that to fully provide differentiated service delivery, context must be considered [7].

Our study contributes to the growing body of evidence on the feasibility, acceptability, safety, and impact of web-based interventions to improve HIVST uptake and linkage to appropriate services. Likewise with one systematic review [71], the intervention increased uptake of HIV testing, even among populations difficult to reach and first-time testers. However, unlike the said review [71], there were issues with linkage to appropriate services. In terms of ART initiation among those who tested reactive, as with a previous trial of web-based HIVST among cis-MSM and TGW in Thailand, ART initiation has been limited, which was attributed inability of some CBOs in Thailand to initiate ART [44]. This is opposite with a study with Vietnam where CBO-led HIVST and treatment services, some with aided with online intervention, led to high confirmatory and ART initiation rates at 90% [72]. In our study, only one CBO was capable of starting ART among their clients. Although linkage to confirmatory testing is high (87.9%), its considerable difference with ART initiation (60.3%) may be explained by logistical issues brought by the COVID-19 restrictions. This reinforces the idea of decentralization of HIV services to KP-friendly CBOs. In terms of

PrEP initiation among those who tested non-reactive, while previous studies found improved PrEP uptake in web-based HIVST interventions [71, 73], PrEP initiation in our cohort was minimal at 0.3%. PrEP was only nationally rolled-out in 2020 and, unlike ART, it is neither free nor covered by any health insurance. Cost has been consistently determined as a significant barrier to PrEP uptake [74]. Moreover, likewise with ART, this is a biomedical intervention that may have had logistical challenges to deliver during amid the COVID-19 pandemic. Nevertheless, upscaling uptake of prevention is crucial especially that it was found that cis-MSM and TGW sustained some high risk sexual behavior even during the COVID-19 pandemic [3].

The primary strength of this study is the high reporting rate partly due to its web-based delivery (97.5%), similar with other web-based HIVST interventions [71], which allowed many data points to be used to explore associations and ensured precision on how the data were collected. Furthermore, to our knowledge, this is the first association study to consider the potential influence of quarantine restrictions on HIV service delivery in the Philippines.

Meanwhile, it is important to acknowledge some study limitations. Firstly, although we have reassured confidentiality, the highly sensitive nature of the data collected may have been influenced by social desirability. Moreover, likewise with a previous study [51], the willingness to distribute HIVST kits were collected at baseline and, hence, may be influenced by the uncertainty of their HIV status. Secondly, the risk of web-based convenience sampling may have led to self-selection. Although some have been invited offline and the models controlled for this variable to balance this risk, both techniques still have inherent disadvantages. Generalizing the findings of our study must be done with caution. Lastly, there are limitations of in the use of stepwise backward elimination. Although it prevents overfitting and allow different combinations of variables [75-78], there are considerable variance when different samples are used [78] and there is potential for inappropriate variables to be included in the model [75, 76, 78]. We dealt with these by ensuring there is considerable number of events per variable [76, 79] and exploring a priori predictors, respectively. Thus, we are confident that are models predict our outcomes within the context of our study.

Although we have established in our study the efficacy and safety of web-based HIVST in terms of reaching and testing, there remains to be gaps in terms of improving its linkage to appropriate services. Amid the inherent challenges of online-to-offline transition, further studies may explore online strategies for linkage and retention.

Conclusion

We have shown that a web-based HIVST intervention is safe and has the potential to increase uptake of HIVST and linkage to appropriate service among cis-MSM and TGW. The study emphasized the importance of providing different options to for HIVST which suite their values and preferences. Geographical and sociocultural contexts are important considerations in ensuring differentiated services are provided.

Abbreviations

AIDS: Acquired immune deficiency syndrome

aOR: Adjusted odds ratio

ART: antiretroviral therapy

CBO: Community-based organization

CI: Confidence interval

cis-MSM: Cisgender men who have sex with men

cOR: Crude odds ratio

COVID-19: Coronavirus disease in 2019

DAH: Directly-assisted HIV self-testing

DOH: Department of Health

FPOP: Family Planning Organization of the Philippines

HIV: Human immunodeficiency virus

HIVST : HIV self-testing

KP: Key population

PLHIV: People living with human immunodeficiency virus

PrEP: Pre-exposure prophylaxis

STROBE: Strengthening the reporting of observational studies

TGW: Transgender women

UNAIDS: Joint United Nations Programme on HIV/AIDS

WHO: World Health Organization

Declarations

Ethical approval and consent to participate

In accordance with the international standards and national guidelines, the study adhered to the principles of the Declaration of Helsinki and the research protocol received ethics approval from the National Ethics Commission of the Philippine Council on Health Research and Development, Department of Science and Technology, Republic of the Philippines (NEC Code: 2021-004). Data collection, processing, and management strictly adhered to the Republic Act 10173 Philippines Data Privacy Act of 2012 and the Republic Act 11166 HIV/AIDS Control Act. All participants voluntarily gave their electronically recorded informed consent to participate in the study.

Consent for publication

Not applicable.

Competing interests

The authors declare that they have no competing interests.

Availability of data and materials

Due to ethical reasons, the dataset created and analyzed is not publicly available as it contains potentially sensitive information. For further inquiries, email may be sent to the corresponding author, Dr. Patrick C. Eustaquio via patrick@loveyourself.ph.

Funding information

The funding for ethics application and publication were provided by the Joint United Nations Programme on HIV/AIDS Unified Budget, Results and Accountability Framework 2020. The funders of the study had no role in study design, data collection, data analysis, data interpretation, or writing of the report.

Authors' contributions

All authors conceived and designed the research question and analysis and provided technical inputs in the draft. RFJ and MD collected the data. PCE performed the statistical analysis while all other others contributed to the data analysis. PCE and RFJ wrote the first draft of the manuscript and all other authors provided technical inputs and contributed for the revisions. All authors have agreed on the final version of the manuscript.

Acknowledgments

Data used were collected from participants in the HIVST demonstration project (iScreen) in Western Visayas, Philippines. We would like to acknowledge the vital role of different CBOs who made the HIVST demonstration project possible: Rajah Community Center, Montecarlo Clan, Cabatuan LGBT Association, La Villa Pride, GBT Janiuay, LGBTQ PAVIA Chapter, Red Seahorse, Bagani Community Center, Ogtonganon Mask Stewards, Kamini Community Center, and Red Lace Boracay. The investigating team would also like to acknowledge the following: Adrian Hort Ramos, DOH-CHD Region 6 HIV program coordinator, for

providing his technical inputs in the demonstration project and Vincent Misterio, FPOP-Iloilo iScreen project coordinator, and other members of the iScreen implementation team for organizing the implementation of the HIVST demonstration project.

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Tables

Table 1. Sociodemographic factors, sexual risk and behavior, and HIV testing-related behavior and preferences of the HIVST demonstration project participants, disaggregated into reported HIV testing result

	Distributed	Reported results (N = 688)		
	n (% of total of 706)	Non-reactive n (%)†	Reactive n (%)†	p-value
Age group				0.465
18 - 24	268 (38.0%)	243 (92.7%)	19 (7.3%)	
25 and over	438 (62.0%)	387 (90.8%)	39 (9.2%)	
Gender identity				0.216 ‡
Cis-MSM	648 (91.8%)	574 (91.1%)	56 (8.9%)	
Transgender woman	58 (8.2%)	56 (96.6%)	2 (3.4%)	
Employment				0.018 *
Unemployed	155 (22.0%)	147 (96.7%)	5 (3.3%)	
Employed	545 (77.2%)	483 (90.3%)	52 (9.7%)	
Missing	6 (0.8%)			
Location				0.592
Urban	484 (68.6%)	440 (90.5%)	38 (9.5%)	
Rural	222 (31.4%)	190 (92.0%)	20 (8.0%)	
Number of male sex partners in the past 12 months				0.386
Less than 3	201 (28.5%)	187 (93.5%)	13 (6.5%)	
3 or more	499 (70.8%)	443 (91.2%)	43 (8.8%)	
Missing	6 (0.8%)			
Anal course in the past 3 months				0.021

				*
No	341 (48.3%)	316 (94.3%)	19 (5.7%)	
Yes	359 (50.8%)	313 (89.2%)	38 (10.8%)	
Missing	6 (0.8%)			
First-time tester				0.896
No	320 (45.3%)	294 (91.9%)	26 (8.1%)	
Yes	368 (52.1%)	336 (91.3%)	32 (8.7%)	
Missing	18 (2.55%)			
Preference for assistance				<0.00 *
Unassisted	599 (84.8%)	562 (93.8%)	37 (6.2%)	
Directly-assisted	88 (12.5%)	67 (76.1%)	21 (23.9%)	
Missing	19 (2.7%)			
Willingness to distribute HIVST kits to sexual and social network				<0.00 *
No	365 (51.7%)	320 (98.9%)	44 (12.1%)	
Yes	340 (48.2%)	309 (95.7%)	14 (4.3%)	
Missing	1 (0.1%)			
Mode of access				0.008 * ‡
Offline	44 (6.2%)	35 (79.5%)	9 (20.5%)	
Online	647 (91.6%)	594 (92.4%)	49 (7.6%)	
Missing	15 (2.1%)			
Source of information about HIVST				0.536 ‡
Social network	669 (94.8%)	597 (91.7%)	54 (8.3%)	

Partner notification	30 (4.2%)	27 (90.0%)	3 (10.0%)	
Provider-initiated	7 (1.0%)	6 (85.7%)	1 (14.3%)	
Community quarantine restrictions				0.303
Minimal	503 (71.2%)	454 (90.8%)	46 (9.2%)	
Maximum	197 (28.8%)	176 (93.6%)	12 (6.4%)	

† Denominator is number of individuals reported HIVST result disaggregated based on baseline characteristic

‡ Fisher exact test. All other comparison of proportions were done using Chi-square test

* significant at $p < 0.05$

HIVST – HIV self-testing

Table 2. HIV self-testing demonstration study outcomes

	n / N (%)
Distributed	706
Reported results	688 / 706 (97.5%)
Reactive	58 / 688 (8.4%)
Linked to care†	51 / 58 (87.9%)
Initiated on antiretroviral therapy	35 / 58 (60.3%)
Non-reactive	630 / 688 (91.6%)
Linked to prevention services‡	630 / 630 (100%)
Initiated on pre-exposure prophylaxis	2 / 630 (0.32%)

† Defined as being enrolled into a treatment facility

‡ Includes condoms and lubricants and behavioral risk reduction counseling

Table 3. Predictors of willingness to distribute HIVST to sexual partners and peers

	Willing to distribute n / N (% among distributed)	**Crude OR** **(95% CI)**	**p-value**	**Adjusted OR (95% CI)**	**p-value**
Age group					
18 - 24	115 / 267 (43.07%)	1.00		1.00	
25 and over	225 / 438 (51.37%)	1.40 (1.03-1.90)	0.033*	1.33 (0.96-1.85)	0.085
Missing	1 / 706 (0.14%)				
Gender identity					
Cis-MSM	321 / 647 (49.61%)	1.00		-	
Transgender woman	10 / 58 (32.76%)	0.49 (0.27-0.86)	0.016*	-	-
Missing	1 / 706 (0.1%)				
Employment					
Unemployed	70 / 155 (45.2%)	1.00			
Employed	266 / 544 (48.9%)	1.16 (0.81-1.67)	0.412		
Missing	1 / 706 (0.1%)				
Location					
Rural	90 / 222 (40.5%)	1.00		1.00	
Urban	250 / 484 (51.7%)	1.56 (1.13-2.15)	0.007*	1.60 (1.13-2.26)	0.008**
Missing	0				
Number of male sexual partners in the past 12 months					
Less than 3	91 / 200 (45.5%)	1.00			
3 or more	246 / 499 (49.3%)	1.16 (0.84-1.62)	0.364		
Missing	7 / 706 (1.0%)				
First-time tester					

No	201 / 331 (60.7%)	1.00		1.00	
Yes	139 / 374 (37.2%)	0.38 (0.28-0.52)	<0.001*	0.45 (0.32-0.61)	<0.00**
Missing	1 / 706 (0.1%)				
Mode of access					
Offline	28 / 44 (63.6%)	1.00		-	
Online	298 / 646 (46.1%)	0.49 (0.25-0.91)	0.0270*	-	-
Missing	16 / 706 (2.7%)				
Source of information about HIVST					
Social network	318 / 669 (47.5%)	1.00		-	
Partner notification	18 / 29 (62.1%)	1.81 (0.85-4.00)	0.130*	-	-
Provider-initiated	4 / 7 (57.1%)	1.47 (0.32-7.52)	0.615	-	-
Missing	1 / 706 (0.1%)				
Community quarantine restrictions					
Minimum	195 / 502 (38.8%)	1.00		1.00	
Maximum	145 / 203 (71.4%)	3.94 (2.78-5.64)	<0.00*	3.51 (2.45-5.07)	<0.00**
Missing	1 / 706 (0.1%)				

c statistic = 0.71; Hosmer-Lemeshow χ^2 = 6.41, df = 8, p-value = 0.601

***** significant at < 0.25 for crude odds ratio (cOR); ****** significant at <0.05 for adjusted odds ratio (aOR)

Table 4. Predictors of opting directly assisted HIVST

	Directly-assisted n / N (% among distributed)	Crude OR (95% CI)	p-value	Adjusted OR (95% CI)	p-value
Age group					
18 - 24	32 / 262 (12.2%)	1.00		-	
25 - 34	56 / 429 (13.1%)	0.79 (0.58-1.07)	0.134*	-	-
Missing	15 / 706 (2.1%)				
Gender identity					
Cis-MSM	84 / 633 (13.3%)	1.00		-	
Transgender woman	4 / 58 (6.9%)	0.48 (0.14-1.22)	0.172*	-	-
Missing	15 / 706 (2.1%)				
Employment					
Unemployed	17 / 151 (11.3%)	1.00			
Employed	70 / 538 (13.1%)	1.18 (0.69-2.13)	0.567		
Missing	17 / 706 (2.4%)				
Location					
Rural	29 / 210 (13.8%)	1.00			
Urban	59 / 481 (12.3%)	0.87 (0.55-1.42)	0.576		
Missing	15 / 706 (2.1%)				
Number of sexual partners for the past 12 months					
Less than 3	14 / 199 (7.0%)	1.00		-	
3 or more	73 / 489 (14.9%)	2.32 (1.31-4.38)	0.006*	-	-
Missing	18 / 706 (2.6%)				
First-time tester					
No	54 / 324 (16.67%)	1.00		1.00	
Yes	34 / 367 (9.26%)	0.51 (0.32-0.80)	0.004*	0.71 (0.43-1.15)	0.166

Missing	15 / 706 (2.1%)				
Mode of access					
Offline	21 / 43 (48.84%)	1.00		1.00	
Virtual	67 / 647 (10.36%)	0.12 (0.06-0.23)	<0.00*	0.28 (0.14-0.57)	<0.00**
Missing	16 / 706 (2.3%)				
Source of information about HIVST					
Social network	80 / 655 (12.2%)	1.00			
Partner notification	7 / 29 (24.1%)	2.29 (0.88-5.28)	0.061*	-	
Provider-initiated	1 / 7 (14.3%)	1.20 (0.06-7.14)	0.868	-	-
Missing	15 / 706 (2.1%)				
Community quarantine restrictions					
Minimal	33 / 500 (6.6%)	1.00		1.00	
Maximal	55 / 191 (28.8%)	5.72 (3.59-9.25)	<0.00*	4.07 (2.42-6.90)	<0.00**
Missing	15 / 706 (2.1%)				
c statistic = 0.74; Hosmer-Lemeshow χ^2 = 0.57, df = 8, p-value = 0.999 ***** significant at < 0.25 for crude odds ratio (cOR); ****** significant at <0.05 for adjusted odds ratio (aOR)					

Figures

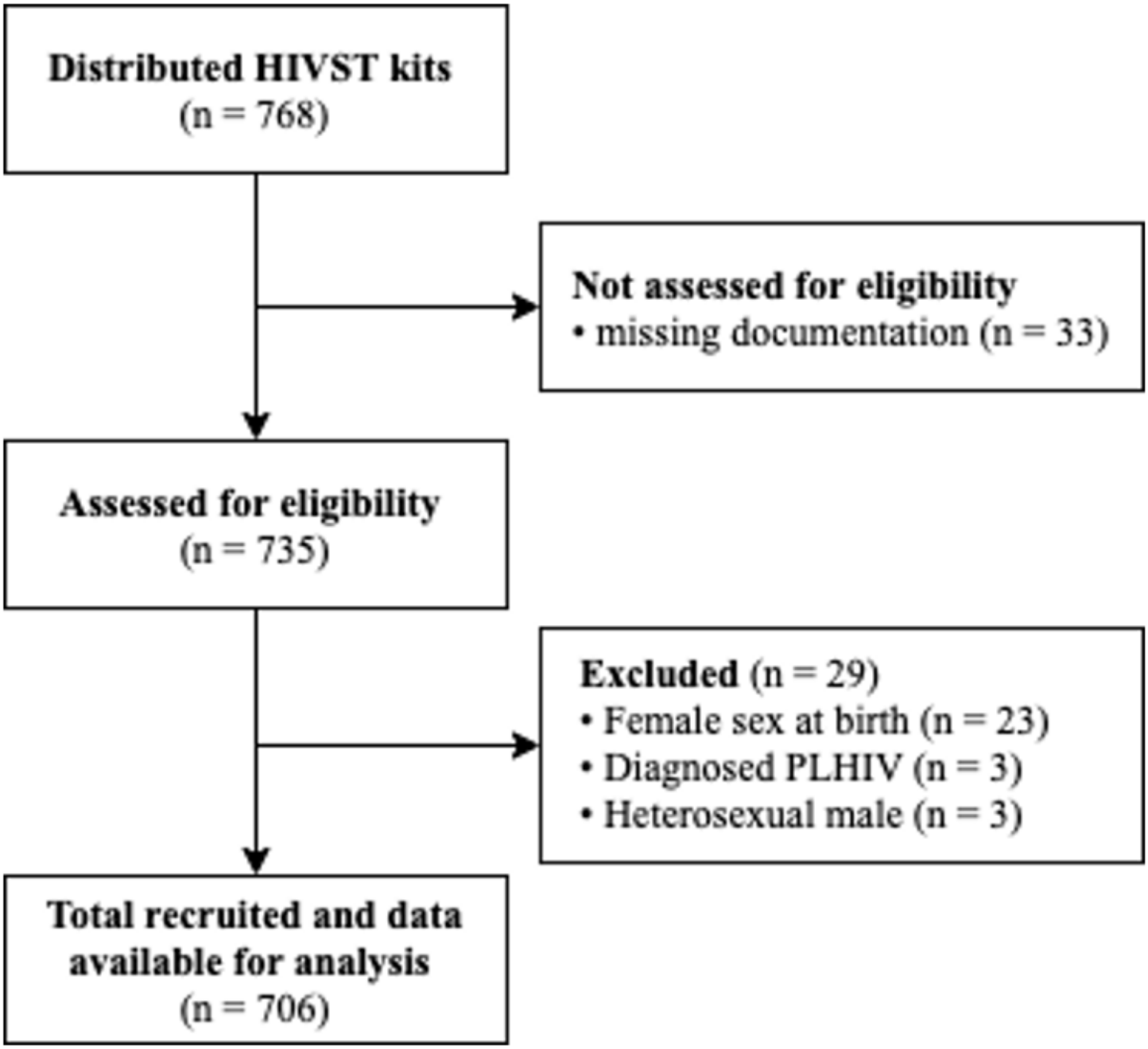

Figure 1

Flow diagram of the retrospective cohort study HIVST – HIV self-testing, PLHIV – people living with HIV