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Integrated Biological and Behavioral Survey among Transgender Women in Cambodia, 2016

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ACRONYMS

AIDS	Acquired immune deficiency syndrome
AOR	Adjusted odds ratio
ART	Antiretroviral therapy
ATS	Amphetamine-type stimulants
B-CoPCT	Boosted continuum of prevention, care and treatment
CASI	Computerized assisted survey instrument
CI	Confidence interval
CWPD	Cambodian Women for Peace and Development
FEW	Female entertainment workers
HIV	Human immunodeficiency virus
IQR	Interquartile range
MDG	Millennium development goal
MSM	Men who have sex with men
NCHADS	National Center for HIV/AIDS, Dermatology and STD
NECHR	National Ethics Committee for Human Research
NGO	Non-governmental organization
OD	Operational district
OW	Outreach workers
PASP	Provincial AIDS and STI Program
PEPFAR	President's Emergency Plan for AIDS Relief
PIN	Personal identification number
PLHIV	People living with HIV
PWID	People who inject drugs
PrEP	Pre-exposure prophylaxis
RDS	Respondent driven sampling
SIT	Save Incapacity Teenagers
SMS	Short message service
SOP	Standard operating procedure
STD	Sexually transmitted diseases
STI	Sexually transmitted infections
VCCT	Volunteer confidential and counseling testing
TG	Transgender
TG-IBBS	Integrated Biological and Behavioral Surveillance
USD	United States Dollar
USAID	United States Agency for International Development
WHO	World Health Organization

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EXECUTIVE SUMMARY

Background

While the overall prevalence of new HIV infections and mortality rate among people living with HIV (PLHIV) continue to decline in Cambodia, risky sexual behaviors and subsequent new HIV infections among transgender (TG) women continue to be of great concerns. To reduce HIV prevalence among TG women, it is crucial to track the changes in prevalence, risk behaviors, and factors associated with HIV infection to devise more responsive and tailor-made interventions. This Integrated Biological and Behavioral Survey (TG-IBBS 2016) investigates the current HIV prevalence, risky sexual behaviors, and factors associated with HIV infection among TG women in Cambodia. Where allowable, the results of this study are compared with those of the first one conducted in 2012. This study provides further evidence to confirm whether Cambodia is on track towards meeting the goals in the fight against HIV and whether the country's "3.0" (Three Zeros) goal will be realized by 2020.

Methods

The TG-IBBS 2016 was conducted in December 2015 to February 2016. Both behavioral and biological data were collected from 1,375 TG women living in 13 major sites (1 capital city and 12 provinces) with the highest concentration of TG women. These 13 Sites were inclusive of the six previous provinces which had been included in the 2012 study. The study used a Respondent Driven Sampling (RDS) method to recruit the participants. Eligible participants were indivrduals who were biologically male at birth but self-identified as a woman, Khmer-speaking, aged at least 18 years at the time of screening, and able and willing to provide written informed consent. They must also be reported ever having sex with at least one man in the past 12 months. Data were collected through a questionnaire survey by well-trained interviewers and selected outreach workers (OW) using Android tablets. Finger-prick HIV screening was performed with the participants prior to the interview using the Determine® test in accordance with the national algorithm. Pre-test counseling was offered before the HIV screening, and post-test counseling was provided after the interview. Participants with a reactive result were referred to the nearest public clinic or hospital for a confirmatory test. Newly-identified HIV reactive participants were ensured support and follow-up services if so desired. Bivariate and multivariate analyses were conducted using STATA (Version 12.0 for Windows: Stata Corp, TX, USA).

Results

HIV prevalence among TG women in this study was 5.9%. Banteay Meanchey (11.7%) and Siem Reap (11.3%) provinces had the highest prevalence rates, trailed by the capital city of Phnom Penh (6.5%) and Battambang province (5.3%). TG women in urban areas (6.5%) and the age group of 35-44 years old (13.13%) had a significantly higher prevalence than their comparison groups.

On sexual behaviors, 86.0% of the respondents reported having anal sex with a man in the past three months, with a median number of male sex partners of 3 [interquartile range (IQR) = 1-7]. Apoximately two-thirds (61.9%) of them reported not using a condom in their last sex, with 62.1% and 40.0% reported inconsistently using condoms with commercial and non-commercial partners, respectively in the past three months. Their reasons for inconsistent condom use comprised: being in relationship (32.6% for commercial partners; 62.8% for non-commercial partners), partners not being HIV/STI infected (13.8% for commercial partners; 31% for non-commercial partners), condoms being unavailable (39.8% for commercial partners; 27.1% for non-commercial partners), feeling better without condoms (21.6% for commercial partners; 20.9% for non-commercial partners), and partners refusing to use condoms (29.8% for commercial partners; 17.1% for non-commercial partners). The most commonly-reported sources of condoms and lubricant were

friends/outreach workers (71.8% and 70.6% for condoms and lubricant, respectively), followed by pharmacies/drug stores/clinics (43.9% and 39% for condoms and lubricant, respectively).

Regarding HIV testing, 80.4% reported having been tested for HIV at least once in their lifetime, and 44.3% reported having been tested for HIV in the past six months. Among respondents who reported having at least one symptom of sexually transmitted infections (STI) in the past 12 months (14.0%), 29.2% did not seek treatment for the most recent symptoms. For substance use, 75.9% reported drinking at least one can of beer or glass of wine; 11.0% reported using any form of illicit drugs; and 1.5% reported having injected illicit drugs in the in the past three months. Nearly half of the participants (45.0%) reported ever using hormone or other beauty-related substances. When asked about experience of discrimination, 39.2% reported having been sexually abused; 24.3% encountered job-related discrimination; and 23.6% reported having been physically abused. In this study, HIV programs had reached only 45.0% of the respondnts in the past three months, and just about 10% accessed the Facebook pages and websites of Mstyle and Srey Sros in the past six months.

Concerning factors associated with HIV infection, multivariate analysis depicts that HIV infection remained significantly associated with living in urban areas (AOR=2.8, 95% CI=1.2-6.8), being in the age group of 25-34 years (AOR=2.1, 95% CI=1.2-3.6) or ≥35 years (AOR=2.6, 95% CI=1.3-5.4), having primary education (AOR=1.7, 95% CI=1.0-2.9), expressing/dressing up as a woman all the time (AOR=2.4, 95% CI=1.4-4.1), self-injecting hormones (AOR=4.6, 95% CI=1.3-16.5), ever injecting drugs (AOR=5.4, 95% CI=0.9-31.8), having cut or sores in the genital area in the past 12 months (AOR=3.7, 95% CI=1.5-9.2), and ever using online services developed for TG women/MSM (AOR=1.9, 95% CI=1.2-3.2).

Conclusions

This study surmises that TG women, particularly older and urban ones, in Cambodia remain at an increased risk of HIV transmission despite the country's overall decline in HIV prevalence. This is mirrored in the rise in HIV prevalence over time among this populace. Compared to the 2012 study, the results of the present study imply that the less coverage by HIV program outreach workers, meaning less education and awareness raising, may have caused the less condom use and HIV testing rate and thus the increased HIV prevalence. Risky sexual behaviors, notably inconsistent condom use and substance use, may have exacerbated their vulnerability. This study found that besides condom unavailability, romantic relationships with commercial and non-commercial partners, feeling better without condoms, and refusal by partners were the prime reasons for not using condoms during sex. Further to being older and living in urban areas, other chief predictors of HIV infection encompassed low educational level, physical appearance, hormone self-injection, drug injection, cut or sores in the genital area, and use of online services.

Recommendations

To reduce HIV prevalence among TG women, priorities should be geared towards older and urban ones. First, to increase testing uptake, information about testing centers and related services should be made more accessible to the target group. Second, it is important to reach those individuals who are least likely to seek testing in a public setting on their own by making HIV self-tests available to them. Third, efforts towards condom distribution to TG women by OW should be increased. More education about harmful effects of multiple, concurrent relationships and inconsistent condom should be conducted with TG women. Fourth, more education on sexual risk factors for HIV infection, a variety of possible STI symptoms, and detrimental effects of hormone self-injection and drug injection should be provided. Fifth, interventions and education should focus on other methods of reaching this population, such as phone calls, SMS texts, and use of OW, in addition to efforts to increase the use of online services. Finally, more awareness and education for the general population and authorities about social discrimination and stigma against the TG population should be raised.

Keywords

HIV; AIDS; Integrated Biological and Behavioral Survey; Transgender women; Cambodia

1. INTRODUCTION

Although in the mid-1990s Cambodia faced one of the fastest growing HIV epidemics in Asia, due to the combined efforts of the Royal Government of Cambodia, development partners, and civil society, including key members of affected populations, within five years it became one of the few countries that have reversed this trend. In global recognition of the country's success in combating HIV, in 2010, Cambodia received a Millennium Development Goal (MDG) award from the United Nations. This success is evident in the decline in HIV prevalence among adults aged 15-49 from an estimated 2% in 1998 to 0.6% in 2013 [1,2], and the realization of the universal-access target goal for treatment, with approximately 80% of adults and children in need receiving antiretroviral therapy (ART) services.

Despite these great achievements, challenges to eliminate new HIV infections remain. Infection rates are now concentrated in key populations at higher risk, including female entertainment workers (FEW), men who have sex with men (MSM), transgender (TG) women, and people who inject drugs (PWID). The prevalence of HIV among FEW went down from 20.8% in 2003 to 14.0% in 2010 [3]. Additionally, the prevalence of HIV among MSM was 2.2% in 2010 [4], and that among PWID was 24.4% in 2012 [5].

According to the World Health Organization (WHO), "TG people" is an umbrella term for all people whose internal sense of their gender (their gender identity) is different from the sex they were assigned at birth [6]. TG people choose different terms to describe themselves. There are some TG people who do not identify themselves as either male or female, but rather outside of a gender binary. In some cultures specific indigenous terms, such as hijra (India), kathoey (Thailand), muxe (Mexico), travesti (Argentina, Brazil), and waria (Indonesia), are used more commonly to describe TG or those who identify as a third sex [6].

Globally, TG women are recognized as a key high-risk group for HIV transmission [7,8,9]. A large meta-analysis suggested that the pool HIV prevalence among TG women was 19% worldwide and 18% in low and middle-income countries in 2013 [7]. The probability of being infected with HIV among TG women was approximately 49 times higher than among the general adult population [7]. The same study suggested that these groups are in urgent need of HIV prevention, treatment, and care services [9].

TG women in Cambodia are at an increased risk of HIV transmission and demonstrating their urgent need for HIV prevention and access to care and treatment services [10].The most recent study in 2012 suggested that HIV prevalence among TG women in Cambodia remained high at 4.2%, or about six times higher than that among the general adult population aged 15-45 in the same year [11]. In this same study, the following factors among TG women were independently associated with HIV infection: older age (>35 years), residence in Siem Reap, having sex during or after drug use, inconsistent condom use during last anal sex, and low perceived self-esteem [12].

In Cambodia, no national size estimation of TG women has been conducted. But, according to an estimate in 2012, there were about 3,000 TG women in Phnom Penh, Battambang, Banteay Meanchey, Siem Reap, Kampong Cham, and Preah Sihanouk provinces. Although relatively little is known about TG population in Cambodia, including their national size, they appear to be at an increased risk of contracting HIV. Until 2013, TG people were included in prevention programs targeting MSM, and as a result their unique needs were not reflected in the programs' goals. There was a lack of TG-specific data to quantify the number of TG reached by outreach programming, the number of TG who accessed HIV testing, and the number of TG who accessed other

relevant HIV services. Further, because there was no specific program targeting TG women, there was no clear structure or appropriate mechanism that ensured TG were reached with quality outreach and referral to services (both health and non-health). The lack of a formal network for ensuring that TG meaningfully participate in program design, monitoring, and coordination at local, provincial, and national levels, has also gone grossly unaddressed.

Previous studies found that HIV prevalence among TG women was consistently higher than among MSM: 9.8% vs. 2.6% in 2005 [13] and 2.6% vs. 1.9% in 2010 [14]. TG women also have additional risks, such as depression, illicit substance use, hormone and silicon injections, social exclusion, limited economic opportunities, and limited access to health services [10]. Recognizing the importance of the different needs between TG and MSM, the National Center for HIV/AIDS, Dermatology and STD (NCHADS) separated these two populations in its 2013 revised Standard Operating Procedure (SOP) known as Boosted Continuum of Prevention, Care and Treatment (B-CoPCT) [15]. TG women have since been specifically considered a distinct at-risk group in HIV surveillance. Interventions are intended to (1) increase uptake of HTC and other HIV-related services among TG, (2) ensure quality of outreach for TG, and (3) strengthen service delivery to meet TG's specific HIV-related needs. This B-CoPCT contributes to the global effort and Cambodia's 3.0 goal of "Three Zeros" [16], i.e. zero new HIV infection, zero discrimination, and zero AIDS related deaths by 2020 [17].

1.1. Overall goal

Risky sexual behaviors and subsequent new HIV infections among TG women continue to be of great concerns for HIV prevention in Cambodia. HIV care for People Living with HIV (PLHIV) and HIV prevention interventions are widely recognized as very successful in Cambodia; and the mortality rate among PLHIV has declined dramatically [18]. From this perspective, we hypothesize that HIV prevalence among this vulnerable population, TG women, has gradually decreased compared to the finding from the most recent survey conducted in 2012.

This study investigates the current HIV prevalence among TG women to be compared with the 2012 data. This three-year interval is aligned with the recommendations in the WHO/UNAIDS's second generation HIV surveillance guideline [19]. If our hypothesis is true, this study will provide further evidence to confirm that Cambodia is on track towards meeting the target goals in the fight against HIV, and that Cambodia's "3.0" (Three Zeros) goal will be realized by 2020. If this HIV prevalence hypothesis is rejected, HIV programs targeting TG women will need to review and improve their intervention activities.

The goal of this study is thus to track the change in HIV prevalence among TG women in Cambodia since 2012.

1.2. Specific objectives

The specific objectives of this study are:

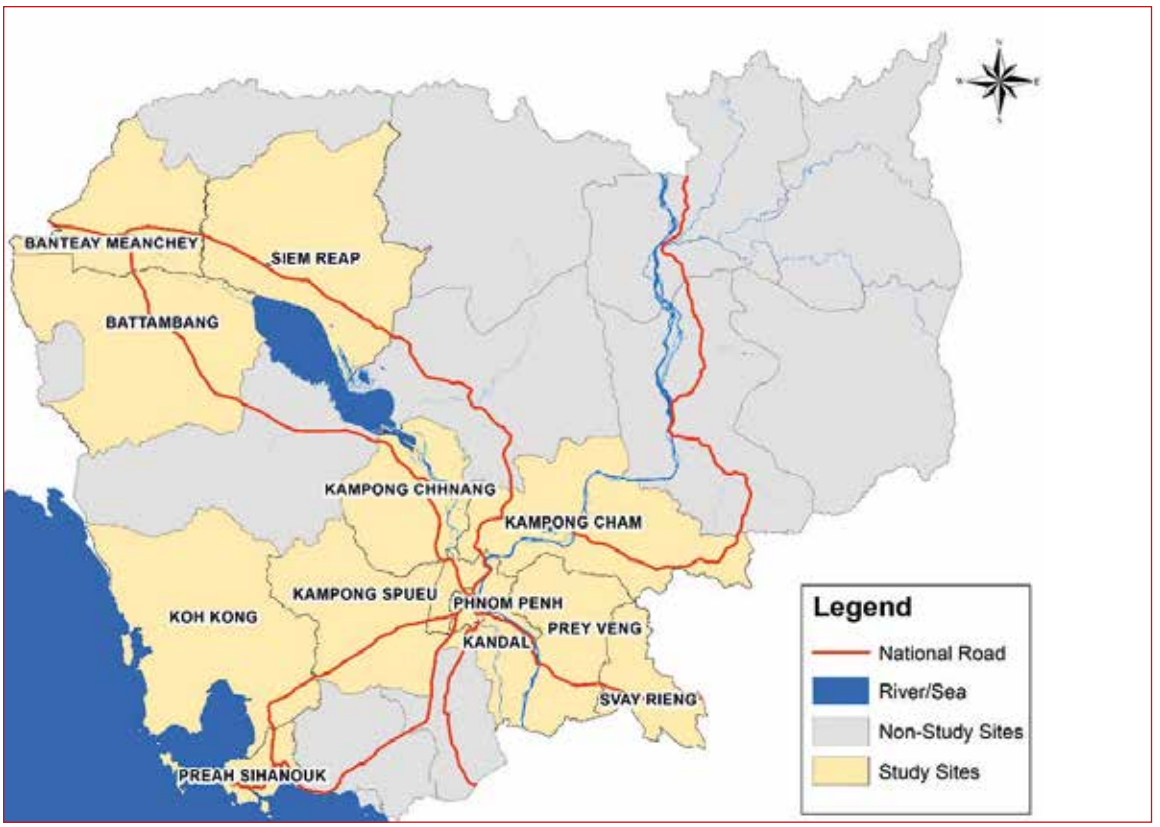
1. To track the change in HIV prevalence among TG women in Cambodia.
2. To track the change in HIV risk behaviors among TG women in Cambodia.
3. To examine associated factors of HIV infection, including key socio-demographic characteristics, risky sexual behaviors, and exposure to HIV program interventions among TG women in Cambodia.

2. METHODS

This Integrated Biological and Behavioral Survey of Transgender Women in Cambodia (TG-IBBS 2016) is a cross-sectional surveillance study to detect HIV prevalence among TG women and the changes in the prevalence and HIV risk behaviors since the 2012 TG-IBBS study. The methodology of this study is detailed below.

2.1. Study setting

Figure 1: Map of the study sites



This study was conducted in 13 sites (one capital city and 12 provinces) in Cambodia over the course of six months from the date of receiving an approval from the National Ethics Committee for Human Research (NECHR Nº : 420 NECHR). Of these 13 sites, six, marked *, were the sites of the 2012 TG-IBBS study. These six provinces are presumed to have a larger TG women population than the other provinces based on geographical areas and program data, and thus were selected for the present study. Seven additional provinces were included due to the concern of an insufficient sample, with an assumption that HIV prevalence among TG women will have decreased by 1.5% since the 2012 survey. According to NCHADS, these 13 sites contain all 23 high-burden HIV Operational Districts (ODs).

2.2. Study population

Population in this study are TG women who by definition are biologically male at birth and self-identify themselves as a female [6]. This entails dressing up and expressing characteristics, attitudes, and behaviors of a woman.

Eligibility criteria for participation were:

- Biologically male at birth and self-identified as a woman
- Khmer-speaking
- Aged at least 18 years old at the time of screening
- Ever had sex with at least one man in the past 12 months
- Able and willing to provide written informed consent

An assessment to determine whether the participants were under alcohol or drug influence was conducted via a verbal test during the screening. If potential participants could understand all questions in the screening form, we did not consider them under such influence.

2.3. Study design

A cross-sectional design was used to collect biological and behavioral data from the participants. In the 13 sites under the study, rapid HIV testing and face-to-face interviews using a structured questionnaire formatted for an Android tablet were conducted in drop-in centers, private houses, and offices of KHANA's implementing partners (i.e. MHC, KHEMARA, MHSS, SIT, and CWPD) depending on the participants' convenience.

2.4. Sampling procedures

Among the 13 sites, participant recruitment for the study was conducted in 20 locations (6 locations in Phnom Penh and 14 locations in the provinces). The number of the selected locations was determined based on the proportion of the required sample size in each study site. Participants were recruited through a Respondent Driven Sampling (RDS) method. First, four "seeds" (two seeds aged 18 or older and the other two seeds aged 25 or older) who were well connected to other TG women in each location were selected by the implementing partners' outreach workers (OW). These seeds had to meet the eligibility criteria for participation and have an established and large social network comprising about 10 or more other TG women in their given location. Eligibility to participate as a seed was determined by the leader of data collection team using a paper-based eligibility form (CRF#1) (see Appendix 1). Eligible seeds were invited to participate in the study and informed consent was obtained from them.

Second, each seed was given a Personal Identification Number (PIN) and enrolled as one of the 1,380 participants needed for this study. Third, each seed was given three coupons and asked to refer three additional TG women. US$2 was given to each seed for a successful referral. Each seed was expected to extend to 3-6 "recruitment waves" in each site. If the initial seeds did not recruit participants or if enrollment was halted because all recruitment chains had "dried up" (i.e. stopped recruiting), additional seeds were selected based on the above criteria.

Finally, 80 seeds were selected by the implementing partners' OW during the first wave. In total, 1,375 TG women were enrolled in the study. Referred participants were screened once more during the opening discussion about the participation eligibility with the data collectors.

2.5. Sample size calculation

The sample size estimate was determined for the purpose of surveillance to track the change in the epidemic over time. The minimum sample size required for this study was 1,380, with sufficient power to detect significant differences between the following null and alternative hypotheses. The hypothesis test was that of one-sample proportion in comparison to the null hypothesis.

The null hypothesis (H0): HIV prevalence among TG women is 4.2%.

The alternative hypothesis (Ha): HIV prevalence among TG women will decrease by 1.5%.

The sample size was calculated using the following

formula and assumptions:

$$n = \frac{p_0 q_0 \left(z_{1-\alpha)} + z_{1-\beta} \sqrt{p_1 q_1 / p_o q_o} \right)^2}{(p_1 - p_o)^2}$$

- P0 = estimated proportion in H0 (In the most recent survey, HIV prevalence among TG women was 4.2% in 2012.)
- P1 = estimated proportion in Ha (The expected HIV prevalence among TG women in the current study is about 2.7 %)
- significance level at 5% in response to one-sided test (Z score = 1.645)
- Z(1- β) = power level of 80% (Z score = 0.83)
- Refusal rate of 10%
- Design effect is assumed to be one.

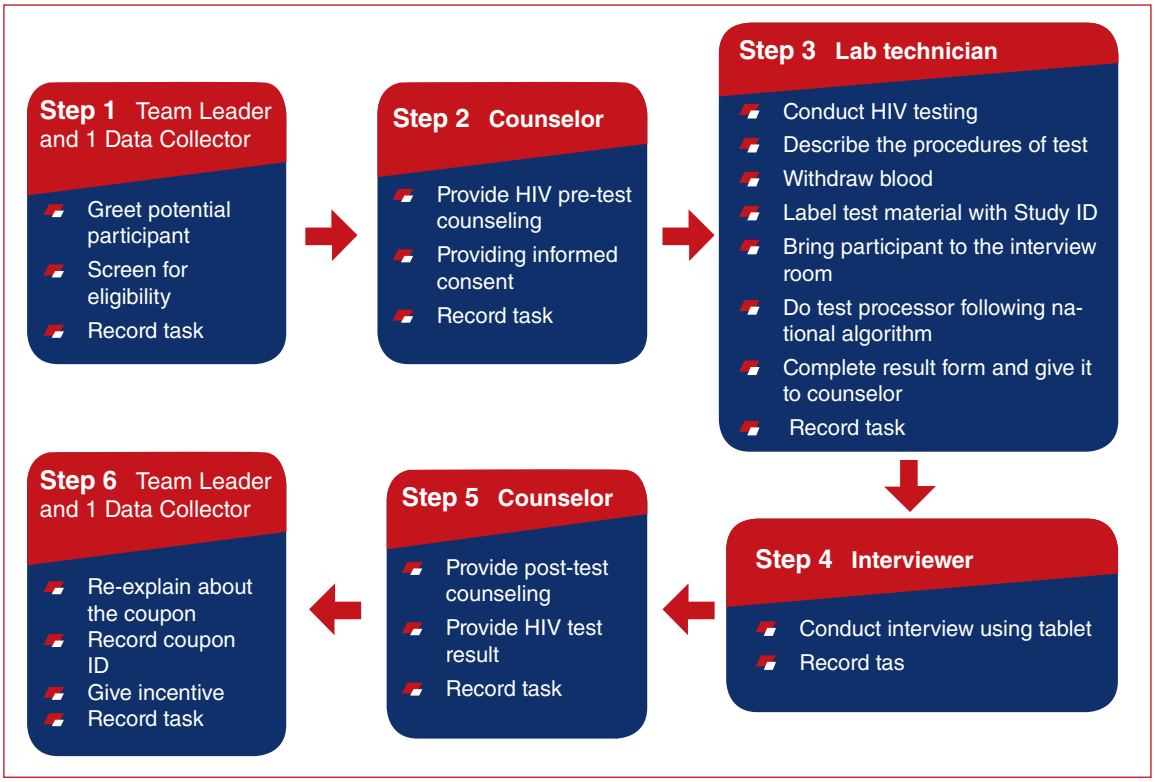
Table 1 demonstrates the estimated TG women in each site, the anticipated sample size, and the actual number of participants recruited for the study. In five sites with the estimated number of TG women smaller than 100, all TG women were recruited. The total estimated sample size was 1,519.

Table 1: Number and proportion of the study participants in each study site

Sites	Estimated number (n)	Required sample size (n)	Interviewed participants (n, %)
Battambang	403	160	151 (11.0)
Banteay Meanchey (Serei Sophoan, Piopet)	265	110	111 (8.1)
Kampong Cham	50	50	34 (2.5)
Kandal	114	50	132 (9.6)
Koh Kong	50	50	27 (2.0)
Kampong Chhnang	159	60	43 (3.1)
Kampong Speu	127	50	47 (3.4)
Phnom Penh	1474	590	541 (39.3)
Prey Veng	89	89	54 (3.9)
Preah Sihanouk	59	59	56 (4.1)
Siem Reap	297	120	124 (9.0)
Svay Rieng	50	50	31 (2.3)
Tbong Khmum	31	31	24 (1.7)
Total	**2871**	**1349**	**1375 (100.0)**

2.6. Data collection procedures

Figure 2: Overall flow chart of data collection



Two teams were responsible for the data collection. Each team included one field supervisor, five interviewers, one lab technician, and one counselor from the Provincial AIDS and STI Program (PASP). The data collection procedure was performed as shown in Figure 2 above.

2.6.1. Personal identification number (PIN)

TG women who agreed to participate in the study were assigned a PIN. This PIN was used to link all data collected from this individual in each of the research steps. The PIN was not linked with any identity that may allow people to identify an individual participant. It was a 5-digit number (e.g. 010001, 020001), where the first digit denoted referral status (e.g. 01=seed, 02=recruiter/recruit), and the last four digits denoted the sequence in study participants of the respondent (from 0001 to 1380).

2.6.2. Informed consent

Pre-test counseling was provided, during which a qualified, trained counselor working for one of the volunteer confidential and counseling testing (VCCT) centers, introduced the informed consent process. The counselor explained the research study in details, including the process of HIV testing, potential risks and benefits of participation, and obtained written informed consent from the participants before any research study procedures are performed. The consent form was signed by both consent providers and consent receivers. The signed consent forms were kept securely in a locked metal box in the study van during the field data collection and then transferred to the office of FHI 360 in Phnom Penh.

2.6.3. Specimen collection

Trained lab technicians as collaborators from government health facilities obtained a blood sample from the participants by finger-prick following the national protocol [20].

2.6.4. Interviews

Participants were interviewed by trained interviewers using a computer assisted survey instrument (CASI). Details about the questionnaire are described in

Section 3.9. The questionnaire was set up in a web-based application and run on an Android tablet.

2.6.5. HIV test results and post-test counseling

Respondents were given an option to receive their results verbally after the interview. This screening test result, referred to as the "Determine test", was delivered in a private area at the data collection site to ensure confidentiality. Post-test counseling was provided for each respondent regardless of their HIV test result by the same counselor in accordance with all applicable NCHADS guidelines.

In the case of a positive, reactive result from the Determine test, the participant was told, "Your result suggests that you could be HIV positive. To be sure, please go to a VCCT center for a confirmatory test." For a negative, non-reactive result from the Determine test, the participant was told, "Your test result is HIV negative. If you practice behaviors that place you at risk for HIV, I encourage you to repeat this test again in 3-6 months."

Participants screened HIV positive at the study sites were then referred by the counselor for confirmatory testing at the nearest VCCT site. All referred participants were not required to pursue further confirmatory testing; however, they were given the appropriate resources and information to do so. Each referral was followed-up by a counselor to determine if confirmatory testing was pursued.

2.6.6. Incentive

After the survey and the HIV test were completed, each participant received up to US$4 in cash to compensate for their time, and a package of three condoms. This amount of incentive was determined reasonable and equivalent to a typical meal for one person and the cost of transportation within five kilometers.

2.7. Referral mechanism

In the case of a positive, reactive result by Determine test, the participant was given phone numbers of the VCCT focal person and related NGO staff for a confirmatory test at the VCCT. The reactive case was also confidentially asked by the counselor to give their phone number for follow-up and support. The reactive case was not required to go to a VCCT for a confirmatory test, but was advised to do so by the counselor. They were also advised to seek support for transportation from an NGO working in the area if they would go to a VCCT.

2.8. HIV testing procedures

Individuals who performed the HIV screening tests received refresher training prior to the beginning of the study, and tests were monitored for performance using quality control samples. Discordant results between screening and confirmatory tests have been investigated to elucidate potential causes and minimize potential erroneous results. In this situation, study participants were retested. In the case of human error, individuals performing screening tests were retrained before resuming activities in the study.

After a written informed consent was obtained, the lab technician performed an HIV screening by Determine™ test, while participants were interviewed. A non-reactive result establishes that an individual is not HIV-infected. A reactive result requires subsequent confirmatory tests, and participants were recommended to follow up at a VCCT center or local clinic for this testing. If screened reactive, participants were then asked if they have been previously diagnosed as HIV positive. In this study, participants screened reactive, with a previous diagnosis of HIV were referred to as "known HIV status". If screened reactive, without a previously known diagnosis, participants were referred to as "unknown HIV status". Since subsequent confirmatory testing for reactive participants was recommended, but not obligatory, follow up on these newly reactive participants was pursued more closely. The VCCT staff and confirmatory testing at local clinics were not managed by the study team.

2.9. Data collection training

Before the data collection, all interviewers and field supervisors were trained for three days on data collection methods and tool pretesting and reflection. The main objective of the training was to ensure all interviewers and field supervisors understood the procedures and were able to follow the standardized guidelines in the same manner, to ensure quality of the data. The training covered skills such as interview techniques, confidentiality, and privacy, as well as provided the study team the opportunity to

practice the questionnaire administration. Facilitators also reviewed the study protocol during the training sessions, so that all team members would be thoroughly familiar with it. Regular review sessions with interviewers were conducted during the survey period to review progress and communicate any problems or issues which occurred during the data collection.

2.10. Questionnaire development

The questionnaire was developed using standardized and validated tools adapted from previous studies to measure key variables related to the objectives of the study. It was initially developed in English and then translated into Khmer, the national language of Cambodia. Another translator then back-translated it into English to ensure that the "content and spirit" of every original item was maintained. Clear instructions and explanations were included to avoid any confusion during the interviews.

Consultative meetings were held with representatives of TG women, community people, and NGOs working with TG women, as well as researchers and practitioners working on HIV and AIDS in Cambodia. Prior to data collection and constructing the final questionnaire, the team conducted a pilot study to ensure that the wording and contents of the questionnaire were culturally suitable, acceptable, and clearly understood by the study participants. In the pilot study, we conducted face-to-face interviews with 20 TG women recruited from Phnom Penh to assess the contents, format, length, language, and appropriateness of the questionnaire. Necessary modifications were made based upon feedbacks from the pilot study and from consultative meetings. The final version of the questionnaire was used for the main data collection.

The questionnaire collected information on the following aspects:

1. Socio-economic characteristics
2. Transgender identity and related experiences
3. Sexual behaviors and condom use in different relationships
4. Accessibility to condoms and lubricant
5. HIV/STI screening and care seeking behaviors
6. Substance use (alcohol, illicit drugs)
7. Experiences of stigma and discrimination in communities and health facilities
8. Mental health conditions
9. Exposure to HIV programs.

These items were adapted from previous literature, the most recent Cambodia Demographic and Health Survey, and other studies among key populations in Cambodia.

2.11. Data management

The investigators of this study ensured that the research field teams were trained on data collection techniques and ethical concerns in research. All study team members were required to demonstrate completion of an approved curriculum in human subject research ethics. A workshop provided a standardized approach with all research field workers and ensured the quality of data processing and management.

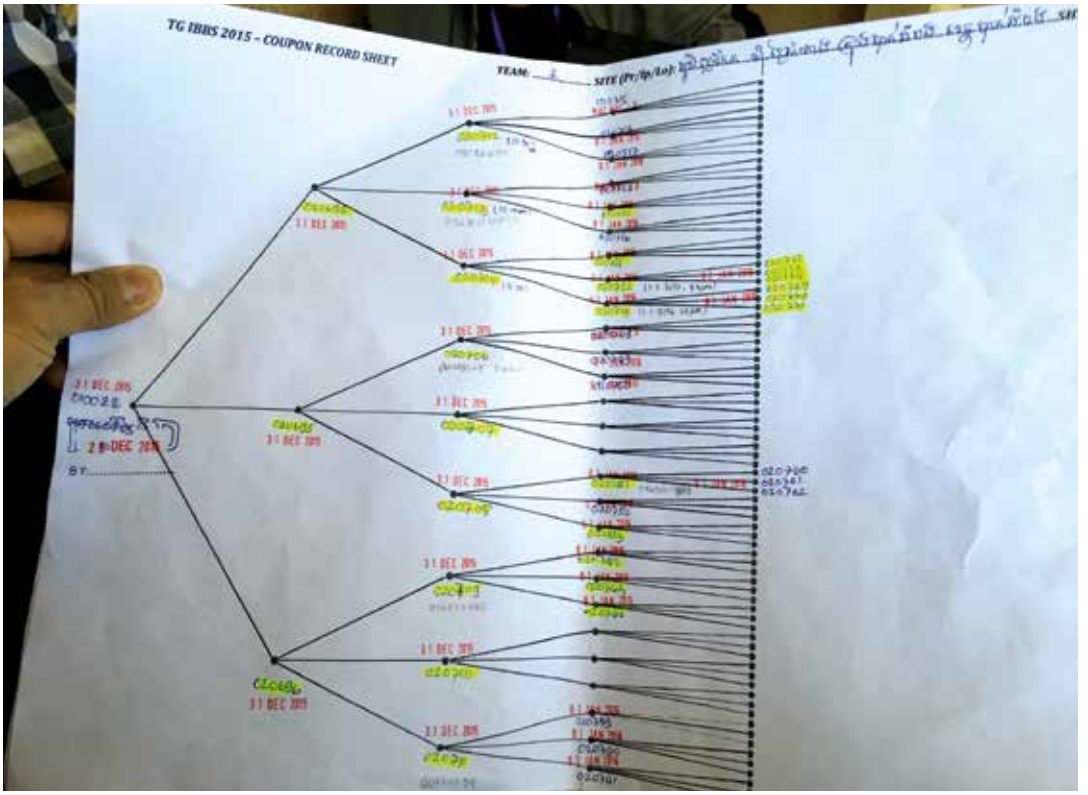
Data from the questionnaires were collected via Android tablets and saved on the tablet. At the conclusion of each day, the tablet was connected to the internet to synchronize data onto a secure server. This process was performed every day to avoid losing data. After synchronization, the data were cleared from the tablet. The data were collected over a two-month period. At the conclusion of the collection period, the data were downloaded from the secure server, tabulated, and transcribed into a Microsoft Excel format.

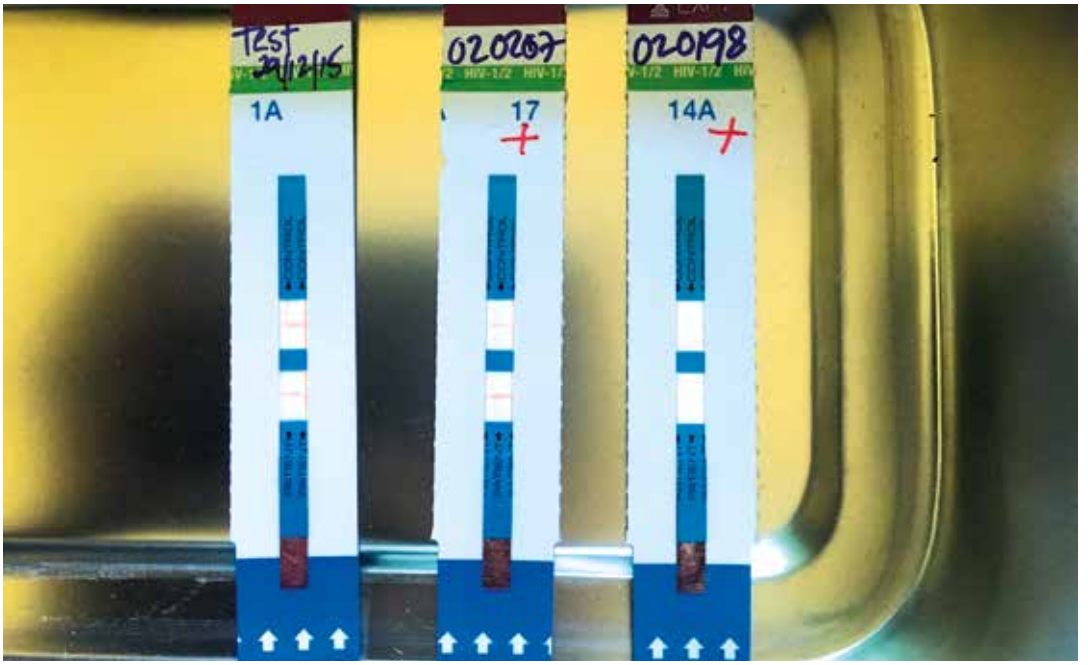
2.12. Data analyses

To track the change in HIV prevalence of TG women, we compared the prevalence rate with that of the 2012 study. The HIV prevalence (from the biological testing) was calculated by dividing the total number of HIV reactive cases with the total sample.

To examine the associated factors of HIV infection, we conducted both bivariate and multivariate analyses. In the bivariate analysis, the HIV reactive cases were stratified by socio-demographic characteristics, gender identities, hormone use, medical injection, sexual risk behaviors, STI experience, substance use, and discrimination. Chi-square test or Fisher's exact test (for an expected value ≤ 5) was used to identify the categorical variables with statistical significance.

We used multivariate logistic regression analysis to examine the independent factors associated with HIV infection. Variables with a significance level of 0.05 in the bivariate analysis were included in the multivariate model. In this multivariate analysis, backward elimination method was used to drop the variables with high p-values. The variable with the highest p-value was eliminated one by one from the model. Variables with a significance level of <0.05, variables found associated with HIV infection in previous studies (age, education, hormone, STI, and substance use), and variables theorized as risk factors of HIV infection (sharing syringe and needle for hormone injection, and illicit drug injection) were kept in the final model. STATA (Version 12.0 for Windows: Stata Corp, TX, U.S.) was used to conduct the data analyses.

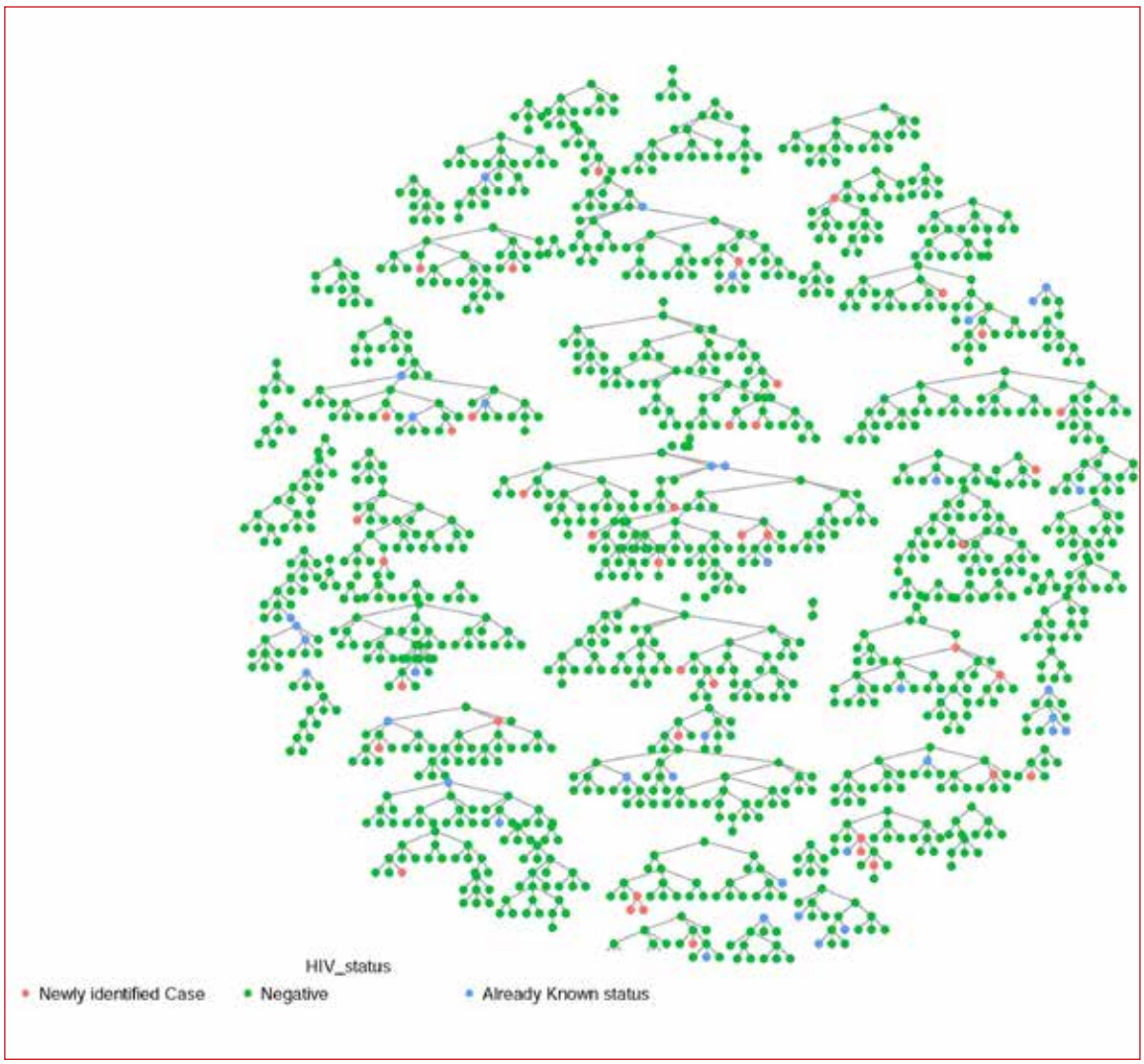




3. RESULTS

3.1. Respondent Driven Sampling (RDS)

Figure 3: Overview of Respondent Driven Sampling recruitment of the study participants



Note: One node represents a TG woman participant. Each line connecting node represents one 'wave' of recruitment. Of each network, the top node represents the initial seed.

Figure 3 shows the overview of RDS recruitment of TG women in the study sites. In this Figure, there are 1,375 nodes, representing 1,375 TG women, derived from 80 initial seeds plus 1,295 recruits. The recruitment was started with 80 initial seeds. Of these 80 seeds, 76 had referred at least one of their peers. During recruitment, 3,267 coupons were distributed (three coupons per initial seed and recruiter), and a total of 1,371 coupons were returned, giving the coupon return rate of 42.0%. Of people returned with the coupons, 1,295 (94.0%) completely participated in the study.

The longest wave of the recruitment was 10, with a median wave of 3 (IQR 2-5). The median number of 'personal networks' (the number of TG women each participant had a social relationship with) was 10 (IQR 5-20). Of the successful 76 seeds above, the median number of recruited participants per initial seed was 11 (IQR 5-25).

3.2. HIV prevalence

Figure 4 demonstrates the prevalence of HIV among TG women stratified by study site, in which they lived or worked. The overall prevalence of HIV was 5.9%. The highest prevalence of HIV was found among TG women in Banteay Meanchey (11.7%) and Siem Reap (11.3%), followed by Phnom Penh (6.5%) and Battambang (5.3%). Similar HIV prevalence rates were found in Kampong Speu (4.3%), Tbong Khmum (4.2%), and Kandal (4.2%). No HIV-positive case was detected in Koh Kong, Prey Veng, and Svay Rieng.

Figure 4: Prevalence of HIV among the study participants by study site

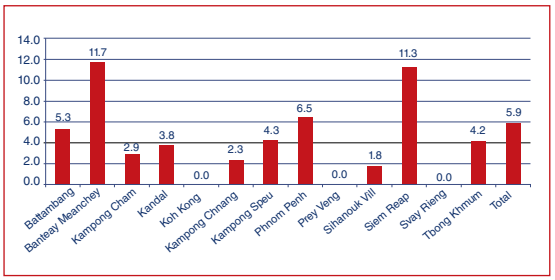
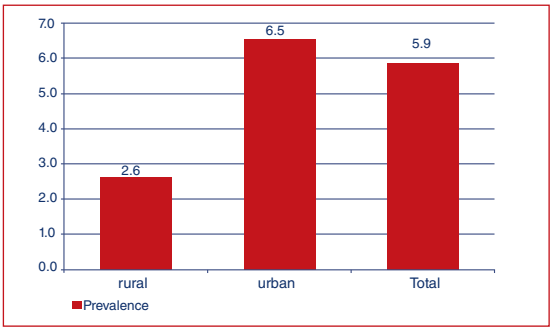


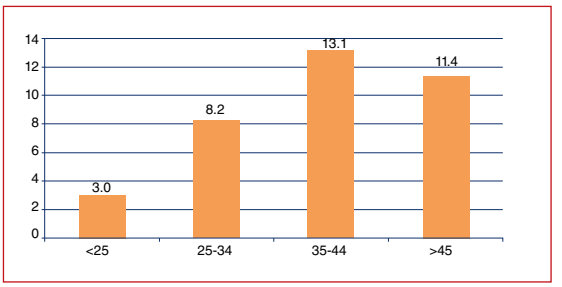
Figure 5 shows that the prevalence of HIV was significantly higher among TG women living in urban communities than among those living in rural communities (6.5% vs. 2.6%, p=0.02).

Figure 5: Prevalence of HIV among the study participants by type of community



As shown in Figure 6, the highest prevalence of HIV was found among TG women in the age group of 35-44 years old (13.1%), followed by those in the age group of >45 years old (11.4%). TG women in the age group of younger than 25 years old had the lowest HIV prevalence rate at 3.0%.

Figure 6: Prevalence of HIV among the study participants by age groups



3.3. Characteristics of the study participants

3.3.1. Socio-demographic information

Table 2 shows socio-demographic characteristics of 1,375 participants included in this study. The majority of the participants (83.4%) were recruited from urban communities; 53.0% were younger than 25 years old; and 97.2% were never married. More than two-thirds of the participants (68.6%) completed high school, and 9.1% had higher education. The most common main occupations reported by the participants were hair dressers/beauticians (35.1%), laborers/farmers (17.5%), and entertainment workers (14.8%). More than one-third of the participants (38.6%) reported their average monthly income in the past six months of US$ 100-199, while 16.5% reported it to be more than US$ 300.

Table 2: Descriptive characteristics of the study participants

Variables	n (%)
Community Type	
Urban	1146 (83.4)
Rural	229 (16.6)
Age	
18- 25	729 (53.0)
25-34	503 (36.6)
35-44	99 (7.2)
≥45	44 (3.2)
Current marital status	
Married	7 (0.5)
Widowed/divorced/separated	18 (1.3)
Never married	1334 (97.2)
Refuse to answer	16 (1.2)
Education [in years, median (IQR)]	9 (7-12)
Primary (0-6)	307 (22.3)
High school (7-12)	943 (68.6)
Higher education (>12)	125 (9.1)
Main occupation	
Unemployed	64 (4.7)
Hair dresser/beautician	482 (35.1)
Office worker (government/private company staff)	50 (3.6)
Labor/farmer	241 (17.5)
Seller	149 (10.8)
Entertainment Worker	203 (14.8)
Student	108 (7.9)
NGO staff	34 (2.5)
Other	44 (3.2)
Average monthly income in past 6 months (USD, median (IQR))	150 (90-200)
< 100	351 (25.6)
100-199	530 (38.6)
200-299	266 (19.3)
≥300	226 (16.5)

Abbreviations: *NGO, non-governmental organization; USD, United States dollar; IQR, interquartile range.*

3.3.2. Gender identity and hormone use experiences

Table 3 shows that 42.2% of the participants identified themselves as female, while 57.2% identified as third gender. About half of them (48.0%) reported dressing up as a woman all the time. Of total, 45.0% reported ever used hormone or other substances for beauty purposes such as pills (45.0%), injection (18.3%), and skin patches (14.0%). The injections were mostly reported to be performed by skilled personnel (12.9%), followed by non-skilled personnel (4.9%), and self-injection (1.2%). Of those who have injected the substances, 1.5% reported ever sharing needles while injecting the substances, and 9.2% had ever had an operation to change any part of their body to become more feminine. Lifetime injection for medical purposes was reported at 70.3% and performed at a public facility (23.2%), private facility (50.0%), NGO (5.7%), community health provider (19.9%), and other places (1.2%).

Table 3: Gender identity and hormone use experiences of the study participants

Variables	n (%)
Self-identified	
Female	580 (42.2)
Third gender	786 (57.2)
Uncertain	8 (0.6)
Frequency of dressing up as a woman	
All the time	660 (48.0)
Not all the time	715 (52.0)
Ever used hormone/non-hormone substances	618 (45.0)
Pill	561 (40.8)
Injection	252 (18.3)
Skin patches	192 (14.0)
How hormone/non-hormone substance hormone were injected	
Self-injection	17 (1.2)
Injected by skilled personnel	177 (12.9)
Injected by non-skilled personnel	67 (4.9)
Ever shared needles when injecting beauty substances	20 (3.2)
Ever had operation to change any parts of your body to become a woman	127 (9.2)
Ever injected for medical purposes	966 (70.3)
Place of last medical injection	
Public facility	224 (23.2)
Private facility	483 (50)
NGO	55 (5.7)
Community health provider	192 (19.9)
Other	12 (1.2)

Abbreviation: *NGO, non-governmental organization.*

3.3.3. Sexual behaviors

Table 4 shows information about the participants' sexual experiences with women. Of total, 8.5% reported ever had sex with a woman in their lifetime, and 2.2% reported ever had sex with a woman in the past 12 months. Of those who engaged in intercourse with a woman in the past 12 months, 66.7% reported having sex not in exchange for money, and 33.3% reported both in exchange and not in exchange for money.

Table 4: Sexual behaviors of the study participants with biological women

Variables	n (%)
Ever had sex with a woman (lifetime)	117 (8.5)
Ever had sex with a woman in the past 12 months	30 (25.6)
Type of female sexual partners in the past 12 months	
Female commercial partners	0 (0.0)
Female non-commercial partners	20 (66.7)
Both (commercial/non-commercial)	10 (33.3)

Table 5 shows information about participants' sexual experiences with men. Nearly all respondents (97.9%) have had sexual intercourse with a man. The majority (87.5%) reported a receptive role, while only 2.2% reported an insertive role, and 10.3% reported both roles. In the past three months, 86.0% had anal sex with a man, of which 61.9% used condom in their last sex. Among all participants, 81.6% had sex not in exchange for money/gifts, of which 62.1% reported not always using condoms in the past three months by giving the reasons that they were in relationship (62.8%); their partners were not HIV/STI infected (31.0%); no condom was available (27.1%); they felt better without condom (20.9%); and their partners refused to use it (17.1%). Among all participants, 29.8% had sex in exchange for money/gifts, of which 40.0% reported not always using condoms in the past three months by giving the reasons that no condom was available (39.8%); they were in relationship (32.6%); their partners refused to use it (29.8%); and they felt better without condom (21.6%).

Table 5: Sexual behaviors of the study participants with biological men

Variables	n (%)
Had sex with a man in the past 12 months	1309 (97.3)
Role in anal sex with a man	
Insertive	29 (2.2)
Receptive	1145 (87.5)
Both	135 (10.3)
Had anal sex with a man, past 3 months	**1183 (86.0)**
Number of male partners in past 3 months [median (IQR)]	**3 (1-7)**
Used condom at last anal sex	**732 (61.9)**
Anal sex with male non-commercial partners in past 3 months	**1122 (85.7)**

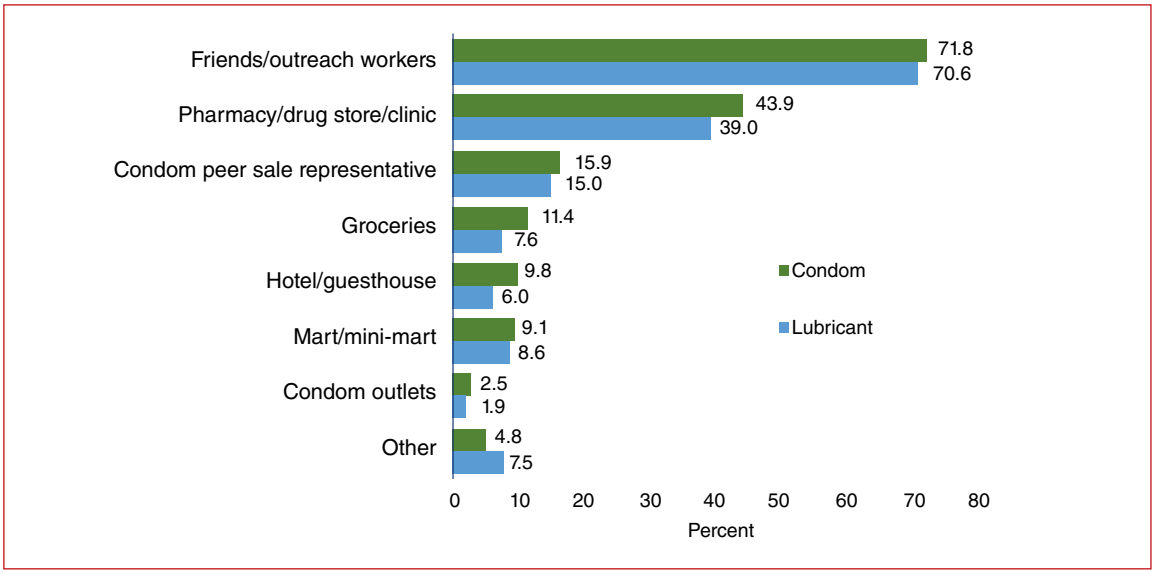
Number of male non-commercial partners in past 3 months (median (IQR))	3 (1-5)
Condom use in anal sex with male non-commercial partner in past 3 months	
Not always	697 (62.1)
Always	425 (37.9)
Reason for not using condoms with male non-commercial partner in the past 3 months	
We are in a relationship	438 (62.8)
He/she is not HIV/STI infected	216 (31.0)
Too high to use condom	37 (5.3)
No condom available	189 (27.1)
Feel better without condom	146 (20.9)
I am HIV-infected	2 (0.3)
I penetrated, so I am not at risk	4 (0.6)
Partner refused	119 (17.1)
Other	11 (1.6)
Had sex with a male commercial partner in the past 12 months	**410 (29.8)**
Number of male commercial partners in the past 3 months	**7.6 (15.8)**
Condom use with male commercial partners in the past 3 months	
Not always	164 (40.0)
Always	246 (60.0)
Reasons for not using condoms with male commercial partners	
We are in a relationship	59 (32.6)
She is not HIV/STI infected	25 (13.8)
Too high to use condom	17 (9.4)
No condom available	72 (39.8)
Feel better without condom	39 (21.6)
I penetrated, so I am not at risk	1 (0.6)
Partner refused	54 (29.8)
Other	7 (2.2)

Abbreviations: *HIV, human immunodeficiency virus; IQR, interquartile range; STI, sexually transmitted infection.*

3.3.4. Access to condoms and lubricant

Figure 7 shows the access to condoms and lubricant in the past 12 months. The most commonly reported sources of condoms and lubricant were friends/ outreach workers (71.8% and 70.6% for condoms and lubricant, respectively), followed by pharmacies/ drug stores/clinics (43.9% and 39.0% for condoms and lubricant, respectively).

Figure 7: Access to condoms and lubricant by type of facility in the past 12 months



3.3.5. STI symptoms and treatment

Table 6 shows the experiences of STI symptoms and treatment seeking behaviors among TG women in this study. Of the total survey sample, 14.0% reported that they had experienced at least one STI symptom in the past 12 months. The most commonly reported symptoms were symptoms on the anus (6.1%). Of those with the symptoms, 138 (71.1%) reported seeking treatment for their most recent symptom from an NGO facility (21.5%), private pharmacy (16.4%), public facility (16.4%), and private facility (14.9%).

Table 6: STI symptoms and treatment experiences of the study participants

Variables	n (%)
STI symptoms experienced in the past 12 months	193 (14.0)
Cut or sores in the genital area	46 (3.4)
Swelling in the genital area	16 (1.2)
Abnormal urethral discharge	36 (2.6)
Symptoms on the anus	84 (6.1)
Symptom in the mouth/throat	39 (2.8)
Facility where treatment for the most recent STI symptoms was received	
Did not seek treatment	57 (29.2)
Private pharmacy	32 (16.4)
Private facility	29 (14.9)
Public facility	32 (16.4)
NGO facility	42 (21.5)
Traditional healer	3 (1.5)

Abbreviations: *NGO, non-governmental organization; STI, sexually transmitted infection.*

3.3.6. HIV testing experiences and status awareness

Table 7 shows HIV testing experience and status. Of total, 19.6% had never been tested for HIV before, while 44.3% had been tested within the past six months. Of those who had been tested and received results, 3.6% reported being HIV positive. Among those who reported being HIV positive, 94.9% were currently on ART. Majority of the testing (69.7%) were done at an NGO facility. Many participants (82.9%) said they were willing to use the HIV self-test if it were available. When asked if they had ever heard of pre-exposure prophylaxis (PrEP), 37.6% participants answered 'Yes.' Regarding the likeliness of using PrEP, 88.9% said they would likely use it and that they would prefer to access the PrEP at a local NGO (53.5%) over other locations.

Table 7: HIV testing experience and status awareness of the study participants

Variables	n (%)
Ever been tested for HIV	
Never	269 (19.6)
1-3 months	431 (31.4)
4-6 months	178 (12.9)
7-12 months	346 (25.1)
> 12 months ago	151 (11.0)
Received results from the last HIV test	**1079 (97.5)**
Self-reported HIV positive	**39 (3.6)**
Currently on ART	**37 (94.9)**
Place of the most recent HIV test	
Private facilities	119 (10.8)
Public facilities	208 (18.8)
NGO facilities/community based HIV testing	771 (69.7)
Other	9 (0.8)
Willingness to use HIV self-test if it were available	**842 (82.9)**
Ever heard of Pre-exposure prophylaxis (PrEP)	**359 (37.6)**
Likeliness of using PrEP	
Unlikely	79 (8.3)
Likely	849 (88.9)
Not sure	27 (2.8)
Preferred place to access PrEP if available	
Local NGOs	511 (53.5)
ART clinic	148 (15.5)
Pharmacy	270 (28.3)
Other	26 (2.7)

Abbreviations: *ART, antiretroviral therapy; HIV, human immunodeficiency virus; NGO, non-governmental organization; PrEP, pre-exposure prophylaxis.*

3.3.7. Substance use

Table 8 depicts the reported alcohol and illicit drug use among TG women in this study. Of total, 75.9% reported drinking at least one can of beer or a glass of wine in the past three months. More than half (56.1%) responded that this occurred less than once a month, while 8.1% responded four or more times a week. Of total, 10.1% reported having used some form of ATS-amphetamine-type stimulant (Yama, Crystal Ice, Ecstasy), while 0.9% reported having used other drugs (Marijuana, Heroin, etc.). Of total, 1.5% reported having injected some form of illicit drugs in the past three months, and 6.5% reported having sex during or after using illicit drugs.

Table 8: Substance use among the study participants

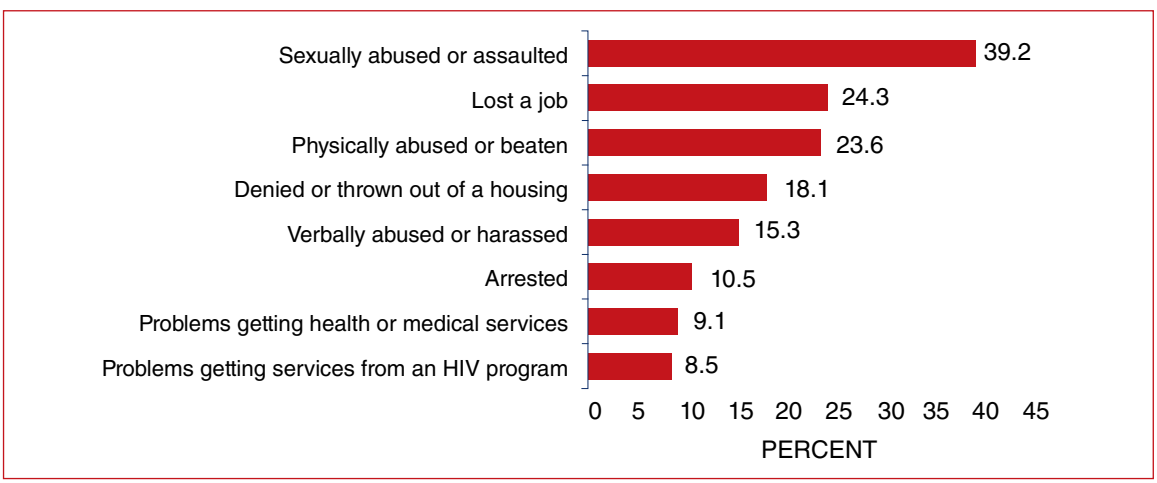
Variables	n (%)
Drank at least one can of beer or glass of wine in the past 3 months	1042 (75.9)
Frequency of having more than 5 drinks in one day in the past 3 months	
Never more than five drinks	336 (24.4)
Less than once a month	771 (56.1)
1-3 times a week	157 (11.4)
4 or more times a week	111 (8.1)
Ever used illicit drugs in the past 12 months	
Never	1224 (89.0)
Yes, ATS (Yama, crystal ice, ecstasy)	139 (10.1)
Other drugs (Marijuana, Heroin, etc.)	12 (0.9)
Ever injected any illicit drugs in the past 3 months	**20 (1.5)**
Ever had sex during/after using illicit drugs in the past 3 months	**89 (6.5)**

Abbreviation: *ATS, Amphetamine-type stimulants.*

3.3.8. Discrimination

Figure 8 shows the discrimination experienced by TG women in this study because of their transgender identity or gender presentation. Of total, 42.1%experienced problems getting a job, whereas 24.3% experienced problems losing a job. The next most common discrimination experienced was sexual abuse or assault (39.2%), while the least common form of discrimination reported in this study were problems getting services from an HIV prevention program (8.5%) and had problems getting health or medical services (9.1%).

Figure 8: Discrimination experiences of the study participants



3.3.9. Exposure to HIV programs

Exposure to HIV services and interventions among TG women in this study is presented in Table 9. In the past three months, 45.0% of the participants reported being reached by HIV programs. Regarding types of service received, 38.0% of the participants received condoms; 35.6% received HIV or other health education; 31.2% received lubricant; 26.9% received HIV/STI testing; 8% received other health services; and 3.4% received law support services. In the past six months, 64.9% of participants claimed that they had used online services, but only 9.2% had accessed the MStyle Facebook; 6.1% had accessed the Mstyle website; 10.8% had accessed Srey Sros Facebook; and 6.9% had accessed the Srey Sros website.

Table 9: Exposure to intervention programs among the study participants

Variables	n (%)
Reached by HIV programs in the past 3 months	619 (45.0)
Types of services received in the past 3 months	
HIV/health education	490 (35.6)
Condoms	522 (38.0)
lubricants	429 (31.2)
HIV/STI testing	370 (26.9)
Law support services	47 (3.4)
Ever had UIC card	**109 (7.9)**
Visited Mstyle clubs in the past 12 months	**390 (28.4)**
Visited Srey Sros clubs in the past 12 months	**314 (22.8)**
Ever used online services (e.g. Facebook, website) developed for MSM/TG	**892 (64.9)**
Accessed MStyle Facebook page in the past 6 months	**127 (9.2)**
Accessed MStyle Website in the past 6 months	**84 (6.1)**
Accessed Srey Sros Facebook page in the past 6 months	**149 (10.8)**
Accessed Srey Sros website in the past 6 months	**95 (6.9)**
Ever received a voice message from Voice4U	**117 (8.5)**

Abbreviations: *HIV, human immunodeficiency virus; NGO, non-governmental organization; STI, sexually transmitted infection; UIC, unique identifying number.*

3.4. Comparisons between HIV reactive and non-reactive participants

3.4.1. HIV prevalence by socio-demographic characteristics

Table 10 shows the comparisons of socio-demographic characteristics among HIV reactive and non-reactive TG women in this study. Participants who were from urban areas were significantly more likely to be HIV reactive (6.5%) compared to those from rural areas (2.6%). HIV reactive cases were significantly more likely to be found among participants who were in the age group of 35-44 years (13.1%), followed by those in the age group of 45 years and older (11.4%), 25-34 years (8.2%), and 18-25 years (3.0%). Those who had primary education were significantly more likely to be HIV reactive (10.4%) compared to those who had higher education (8.0%). HIV reactive cases were also significantly more likely to be detected among NGO staff (20.6%), compared to those who were unemployed (9.4%) and entertainment workers (4.9%).

Table 10: Comparisons of socio-demographic characteristics among HIV reactive and non-reactive participants

Variables	HIV reactive n (%)	HIV non-reactive n (%)	P-value
Community type			0.02
Urban	75 (6.5)	1071 (93.5)	
Rural	6 (2.6)	223 (97.4)	
Age			<0.001
18-25	22 (3.0)	707 (97.0)	
25-34	41 (8.2)	462 (91.8)	
35-44	13 (13.1)	86 (86.8)	
≥45	5 (11.4)	39 (88.6)	
Current marital status			0.47
Married	0 (0.0)	7 (100)	
Widowed/divorced/separated	1 (5.6)	17 (94.4)	
Not married	78 (5.9)	1256 (94.1)	
Other	2 (15.4)	11 (84.6)	
Monthly income in past 6 months (in USD)			0.70
< 100	22 (6.3)	329 (93.7)	
100-199	29 (5.5)	501 (94.5)	
200-299	19 (7.1)	247 (92.9)	
> 300	11 (4.9)	215 (95.1)	
Education			<0.001
Primary (0-6)	32 (10.4)	275 (89.6)	
High school (7-12)	39 (4.1)	904 (95.9)	
Higher education (>12)	10 (8.0)	115 (92.0)	
Main occupation			0.03
Unemployed	6 (9.4)	58 (90.6)	
Hair dresser/beautician	24 (5.0)	458 (95.0)	
Office worker	3 (6.0)	47 (94.0)	
Labor/farmer	15 (6.2)	226 (93.8)	
Seller	10 (6.7)	139 (93.3)	
Entertainment worker	10 (4.9)	193 (95.1)	
Student	1 (0.9)	107 (99.1)	
NGO staff	7 (20.6)	27 (79.4)	
Other	5 (11.4)	39 (88.6)	

Abbreviations: *HIV, human immunodeficiency virus; NGO, non-governmental organization; USD, United State Dollar.*

3.4.2. HIV prevalence by gender identity and hormone use experience

As shown in Table 11, TG women who reported dressing up as a woman all the time were significantly more likely to be HIV reactive (8.5%) compared to those who reported not dressing up as a woman all the time (3.5%). Those who had more than 10 TG women friends were more likely to be HIV reactive (7.0%) compared to those who had less than 10 TG women friends (3.7%). TG women who reported ever using female hormones, pill hormones, injected hormones, and skin patch hormones were significantly more likely to be HIV reactive (8.1%, 7.7%, 9.1%, and 6.8%, respectively) compared to those who never used them. TG women who reported injecting hormones by themselves and by non-skilled providers were significantly more likely to be HIV reactive (23.5% and 13.4%, respectively) than those who had not used them (5.7% and 5.5%, respectively).

Table 11: Comparisons of gender identity and hormone use experience among HIV reactive and non-reactive participants

Variables	HIV reactive n (%)	HIV non-reactive n (%)	P-value
Gender identity (self-identified)			0.35
Female	29 (5.0)	551 (95.0)	
Third gender	52 (6.6)	734 (93.4)	
Uncertain	0 (0.0)	8 (100.0)	
Frequency of dressing up as a woman			0.001
All the time	56 (8.5)	604 (91.5)	
Not all the time	25 (3.5)	689 (96.5)	
Number of transgender friends			0.02
< 10	17 (3.7)	440 (96.3)	
≥ 10	64 (7.0)	852 (93.0)	
Ever used female hormones			0.002
No	31 (4.1)	725 (95.9)	
Yes	50 (8.1)	568 (91.9)	
Ever used pill hormones			0.02
No	38 (4.7)	776 (95.3)	
Yes	43 (7.7)	518 (92.3)	
Ever injected hormones			0.02
No	58 (5.2)	1065 (94.8)	
Yes	23 (9.1)	229 (90.9)	
Ever used skin patch hormone			0.58
No	68 (5.8)	1115 (94.2)	
Yes	13 (6.8)	179 (93.2)	
Ever self-injected hormones	0.002		0.002
No	77 (5.7)	1281 (94.3)	
Yes	4 (25.5)	13 (76.5)	
Ever had hormones injected by skilled providers			0.59
No	69 (5.8)	1129 (94.2)	
Yes	12 (6.8)	165 (93.2)	
Ever had hormones injected by non-skilled providers			0.007

No	72 (5.5)	1236 (94.5)	
Yes	9 (13.4)	58 (86.6)	
Ever shared needles or syringes during injecting hormones/beauty substances			0.33
No	78 (5.8)	550 (94.2)	
Yes	2 (10.0)	18 (90.0)	
Ever had injections for medical purpose			0.13
No	18 (4.4)	390 (95.6)	
Yes	63 (6.5)	903 (93.5)	
Place where last medical injection was received			0.74
Public facility	18 (8.0)	206 (92.0)	
Private facility	31 (6.4)	452 (93.6)	
NGO facility	3 (5.5)	52 (94.6)	
Community health provider	11 (5.7)	181 (94.3)	
Other	0 (0.0)	12 (100.0)	

Abbreviations: *HIV, human immunodeficiency virus; NGO, non-governmental organization.*

3.4.3. HIV prevalence by sexual behavior

Table 12 presents the comparisons of sexual behaviors with different types of sexual partners among HIV-reactive and non-reactive TG women. TG women who reported having more than three sexual partners in the past three months were significantly more likely to be HIV reactive (7.9%) compared to those who had one partner (5.4%). In case of having sex in exchange for money, TG who had more than three partners were still more likely to be HIV reactive (10.3%) compared to those who had one partner (7.9%).

Table 12: Comparisons of sexual experience among HIV reactive and non-reactive participants

Variables	HIV reactive n (%)	HIV non-reactive n (%)	P-value
Role in anal sex with a man in past 12 months			0.73
Insertive	1 (3.5)	28 (96.5)	
Receptive	72 (6.3)	1073 (93.7)	
Both	7 (5.2)	128 (94.8)	
Number of male sexual partners in past 3 months			0.06
0	11 (4.0)	261 (96.0)	
1	13 (5.4)	227 (94.6)	
2-3	11 (4.0)	264 (96.0)	
>3	46 (7.9)	540 (92.1)	
Condom use with male non-commercial sexual partners in past 3 months			0.19
Not always	50 (7.2)	647 (92.8)	
Always	22 (5.2)	403 (94.8)	
Number of male commercial sexual partners past 3 months			0.02
0	47 (5.0)	981(95.0)	
1	6 (7.9)	70 (92.1)	

2-3	7 (5.4)	123 (94.6)	
>3	21 (10.3)	183 (89.7)	
Condom use with male commercial sexual partners in past 3 months			0.56
Not always	12 (7.3)	152 (92.7)	
Always	22 (8.9)	224 (91.1)	

Abbreviation: *HIV, human immunodeficiency virus.*

3.4.4. HIV prevalence by self-reported STI symptom

The comparisons of self-reported STI symptoms among HIV-reactive and non-reactive TG women in this study are shown in Table 13. TG women who reported having any STI symptom in the past 12 months were significantly more likely to be HIV reactive (11.4%) compared to those who reported having no symptom (5.0%). Regarding the symptoms, TG women who reported having cut or sores in the genital area in the past 12 months were significantly more likely to be HIV reactive (15.2%) compared to those who did not experience the symptom (5.6%).

Table 13: Comparisons of self-reported STI symptoms among HIV reactive and non-reactive participants

Variables	HIV reactive n (%)	HIV non-reactive n (%)	P-value
Have experienced any STI symptom in the past 12 months			<0.001
No	59 (5.0)	1123 (95.0)	
Yes	22 (11.4)	171 (88.6)	
Cut or sores in the genital area in the past 12 months			<0.001
No	74 (5.6)	1255 (94.4)	
Yes	7 (15.2)	39 (84.8)	
Swelling in the genital area in the past 12 months			0.95
No	80 (5.9)	1279 (94.1)	
Yes	1 (6.3)	15 (93.8)	
Abnormal urethral discharge in the past 12 months			0.18
No	77 (5.8)	1262(94.2)	
Yes	4 (11.1)	32 (88.9)	
Symptoms on the anus			0.14
No	73 (5.6)	1218 (94.4)	
Yes	8 (9.5)	76 (90.5)	
Symptom in the mouth/throat			0.06
No	76 (5.7)	1260 (94.3)	
Yes	5 (12.8)	34 (87.2)	

Abbreviations: *HIV, human immunodeficiency virus; STI, sexually transmitted infection.*

3.4.5. HIV prevalence by HIV testing experience

Table 14 shows the comparisons of HIV testing experience among HIV-reactive and non-reactive TG women in this study. TG women who reported having been tested for HIV more than 12 months ago were significantly more likely to be HIV reactive (11.3%) compared to that among those who reported having been tested for HIV in the past 6 to 12 months ago (6.4%), those who reported having been tested for HIV less than 6 months ago (4.9%), and those who had never been tested (4.5%).

Table 14: Comparisons of HIV testing experience among HIV reactive and non-reactive participants

Variables	HIV reactive n (%)	HIV non-reactive n (%)	P-value
Ever been tested for HIV			0.02
Never	12 (4.5)	257 (95.5)	
Yes, < 6 months	30 (4.9)	579 (95.1)	
Yes, 6-12 months ago	22 (6.4)	324 (93.6)	
Yes, >12 months ago	17 (11.3)	134 (88.7)	

Abbreviation: HIV, human immunodeficiency virus.

3.4.6. HIV prevalence by substance use

Table 15 depicts the comparisons of substance use among HIV-reactive and non-reactive TG women in this study. The results show that TG women who reported having at least one can of beer or a glass of wine in the past three months were significantly less likely to be HIV reactive (5.1%) compared to those reported not having drunk any alcoholic drink (5.1%).

Table 15: Comparisons of substance use among HIV reactive and non-reactive participants

Variables	HIV reactive n (%)	HIV Non-reactive n (%)	P-value
Drank at least one can of beer or glass of wine in the past 3 months			0.02
No	28 (8.5)	303 (91.5)	
Yes	53 (5.1)	989 (94.9)	
Frequency of having more than 5 drinks in one day in the past 3 months			0.17
Never more than five drinks	28 (8.3)	308 (91.7)	
Less than once a month	40 (5.2)	731 (94.8)	
1-3 times a week	9 (5.7)	148 (94.3)	
4 or more times a week	4 (3.6)	107 (96.4)	
Ever used/tried drugs in the past 12 months			0.74
Never	72 (5.9)	1152 (94.1)	
Yes, ATS (Yama, crystal ice, ecstasy)	8 (5.8)	131 (94.2)	
Other drugs (marijuana, heroin, etc.)	1 (8.3)	11 (91.7)	
Ever injected any illicit drugs in the past 3 months			0.08
No	78 (5.8)	1277 (94.2)	
Yes	3(15.0)	17 (85.0)	

Ever had sex during/after using illicit drugs in the past 3 months			1.00
No	76 (5.9)	1210 (94.1)	
Yes	5 (5.6)	84 (94.4)	

Abbreviation: *ATS, amphetamine-type stimulants.*

3.4.7. HIV prevalence by discrimination experience

Comparisons of discrimination experience among HIV-reactive and non-reactive TG women in this study are shown in Table 16. TG women who reported having lost a job, having been denied or thrown out of a housing, and having been arrested because of their transgender identity were significantly more likely to be HIV reactive (8.1%, 8.4%, and 11.1%, respectively) compared to those who reported having no such experience (5.1%, 5.2%, and 6.0%, respectively).

Table 16: Comparisons of discrimination experience among HIV reactive and non-reactive participants

Variables	HIV reactive n (%)	HIV Non-reactive n (%)	P-value
Have experienced the following problems because of TG identity or gender presentation			
Problems getting a job			0.43
No	43 (5.6)	729 (94.4)	
Yes	37 (6.4)	541 (93.6)	
Had lost a job			0.04
No	53 (5.1)	987 (94.9)	
Yes	27 (8.1)	307 (91.9)	
Denied or thrown out of a housing			0.05
No	59 (5.2)	1,066 (94.8)	
Yes	21 (8.4)	228 (91.5)	
Problems getting services from an HIV prevention program			0.94
No	59 (5.2)	1,066 (94.8)	
Yes	7 (6.0)	110 (94.0)	
Problems getting health or medical services			0.61
No	73 (5.8)	1,184 (94.2)	
Yes	6 (4.8)	119 (95.2)	
Physically abused or beaten			0.27
No	57 (5.4)	992 (94.6)	
Yes	23 (7.1)	302 (92.9)	
Verbally abused or harassed			0.48

No	74 (5.9)	1,175 (94.1)	
Yes	10 (4.76)	200 (95.24)	
Sexually abused or assaulted			0.20
No	57 (5.4)	992 (94.6)	
Yes	37 (6.88)	501 (93.12)	
Had been arrested			<0.001
No	70 (6.0)	1,094 (94.0)	
Yes	16 (11.11)	128 (88.89)	

Abbreviations: *HIV, human immunodeficiency virus; TG, transgender.*

3.4.8. HIV prevalence by exposure to HIV programs

Table 17 compares the exposure to HIV programs among HIV-reactive and non-reactive TG women in this study. TG women who reported having used online services developed for MSM/TG were significantly less likely to be HIV reactive (3.9%) compared to those who reported never using the services (9.5%).

Table 17: Comparisons of exposure to HIV programs among HIV reactive and non-reactive participants

Variables	HIV reactive n (%)	HIV non-reactive n (%)	P-value
Reached by NGO in the past 3 months			0.42
No	41 (5.4)	715 (94.6)	
Yes	40 (6.5)	579 (93.5)	
Received HIV/Health education in the past 3 months			0.22
No	47 (5.3)	838 (94.7)	
Yes	34 (6.9)	456 (93.1)	
Received condom in the past 3 months			0.14
No	44 (5.2)	809 (94.8)	
Yes	37 (7.1)	485 (92.9)	
Received lubricant in the past 3 months			0.06
No	48 (5.1)	898 (94.9)	
Yes	33 (7.7)	396 (92.3)	
Received VCCT/STI testing in the past 3 months			0.33
No	63 (6.3)	942 (93.7)	
Yes	18 (4.9)	352 (95.1)	
Received law support services in the past 3 months			0.16

No	76 (5.7)	1252 (94.3)	
Yes	5 (10.6)	42 (89.4)	
Ever had UIC card			0.81
No	74 (5.8)	1192 (94.2)	
Yes	7 (6.4)	102 (93.6)	
Visit Mstyle clubs, past 12 months			0.61
No	56 (5.7)	929 (94.3)	
Yes	25 (6.4)	365 (93.6)	
Visit Srey Sros clubs past 12 months			0.68
No	64 (6.0)	997 (94.0)	
Yes	17 (5.4)	297 (94.6)	
Ever used online services (e.g. Facebook, website) developed for MSM/TG			<0.001
No	46 (9.5)	437 (90.5)	
Yes	35 (3.9)	857 (96.1)	
Accessed MStyle Facebook page in the past 6 months			0.85
No	74 (5.9)	1174 (94.1)	
Yes	7 (5.5)	120 (94.5)	
Accessed MStyle website, past 6 months			0.98
No	77 (5.9)	1215 (94.1)	
Yes	5 (5.9)	79 (94.1)	
Accessed Srey Sros Facebook page in the past 6 months			0.51
No	74 (6.0)	1152 (94.0)	
Yes	7 (4.7)	142 (95.3)	
Access Srey Sros website, past 6 months			0.47
No	77 (6.0)	1203 (94.0)	
Yes	4 (4.2)	91 (95.8)	
Ever received a voice message from Voice4U			0.65
No	73 (5.8)	1185 (94.2)	
Yes	6 (8.0)	70 (92.0)	

Abbreviations: *HIV, human immunodeficiency virus; STI, sexually transmitted infection; UIC: unique identifying code; VCCT, voluntary confidential counseling and testing.*

3.5. Factors associated with HIV infection

Table 18 illustrates independent factors associated with HIV infection based on the multivariate analysis. After adjustment, HIV infection remained significantly associated with living in urban areas (AOR= 2.8, 95% CI= 1.2-6.8), being in the age group of 25-34 years old (AOR= 2.1, 95% CI= 1.2-3.6) or ≥35 years old (AOR= 2.6, 95% CI= 1.3-5.4), having primary education (AOR= 1.7, 95% CI= 1.0-2.9), expressing/dressing up as a woman all the time (AOR=2.4, 95% CI=1.4-4.1), self-injecting hormones or other substances for beauty purposes (AOR= 4.6, 95% CI= 1.3-16.5), ever injecting illicit drugs (AOR= 5.4, 95% CI= 0.9-31.8), having cut or sores in the genital area in the past 12 months (AOR= 3.7, 95% CI= 1.5-9.2), and ever using online services developed for TG women/MSM (AOR= 1.9, 95% CI= 1.2-3.2).

Table 18: Independent factors associated with HIV infection among the study participants

Variables in the final model	Adjusted OR	95% CI	P-value
Community type			
Rural	Ref.		
Urban	2.7	1.1, 6.5	0.03
Age in years			
<25	Ref.		
25-34	2.1	1.2, 3.6	0.01
≥35	2.6	1.3, 5.4	0.01
Frequency of express/dressing up as a woman			
All the time	2.1	1.2, 3.8	0.01
Not all the time	Ref.		
Ever self-injected beauty hormone			
No	Ref.		
Yes	4.4	1.1, 17.3	0.03
STI Symptom, cut or sores in the genital area, past 12 months			
No	Ref.		
Yes	3.0	1.2, 7.8	0.02
Ever used online services developed for MSM/TG women (e.g. Facebook, website)			
No	Ref.		
Yes	1.9	1.2, 3.2	0.01

Abbreviations: *HIV, human immunodeficiency virus; MSM, men who have sex with men; STI, sexually transmitted infection; TG, transgender.*

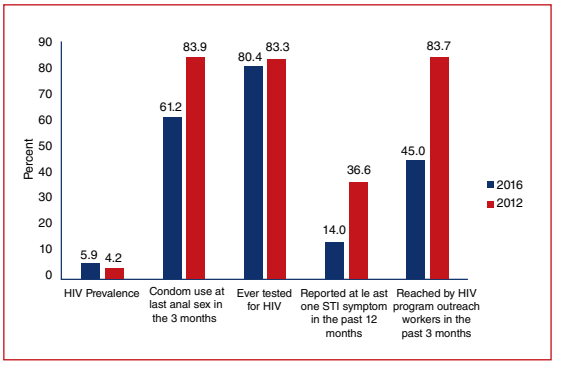
4. DISCUSSION

This study elucidates a number of findings concerning sexual behaviors and HIV infection among TG women, which may be of note for program implementers and policy makers. First, HIV prevalence among TG women was high (5.9%), with Banteay Meanchey and Siem Reap provinces having the highest rates, trailed by Phnom Penh city and Battambang province. Second, TG women were sexually active, with virtually all having intercourse with men, mostly anal sex. Moreover, about 40% of them did not use condoms in their last sex, with over 60% inconsistently using condoms with non-commercial partners in the past three months. Third, about half of TG women used hormone/non-hormone beauty substances, while some (11%) consumed illicit drugs. Fourth, about 20% of TG women had never been tested for HIV in their life, and 14.0% had a STI symptom in the past 12 months. Fifth, notably, a considerable number (about 40%) of TG women encountered job-related discrimination (difficulties in seeking employment and losing a job) and sexual abuse. Finally, not many TG women utilized services provided by NGO staff and customized online services. Only 45.0% were reached by NGO staff for services in the past three months, and just about 10% accessed the Facebook pages and websites of Mstyle and Srey Sros in the past six months.

Some results of this study warrant comparisons with those of the 2012 research in the similar TG women population. Figure 9 displays comparisons of key variables between the 2012 and 2016 studies. HIV prevalence of TG women increased from 4.2% in 2012 to 5.9% in 2015. The condom use at the last anal sex in the past three months declined from 83.9% to 61.2%. Also, there were decreases in lifetime HIV testing rate (from 83.3%to 80.4%), STI symptoms in the past 12 months (from 36.6% to 14%), and coverage by HIV program outreach workers in the past three months (from 83.7% to 45%).

Despite the similarities of the tools, these comparisons should be interpreted in light of the differences in the sample sizes and the cross-sectional nature of the present study. While the 2012 study covered six high-burden sites, the current study extended to 13 high-burden sites. Moreover, some of the participants in the same six sites may not be those included in the 2012 study.

Figure 9: Comparisons of key variables between TGIBBS 2012 and TGIBBS 2016



Nonetheless, these comparison results imply that the less coverage by HIV program outreach workers, meaning less education and awareness raising, may have caused the less condom use and HIV testing rate and thus the increased HIV prevalence. As shown above, outreach workers provided the most condoms and lubricant to TG women (with the access rates of 71.8% and 70.6% for condoms and lubricant, respectively). Therefore, increasing the coverage by outreach workers may boost up condom use and consequently lessen HIV prevalence among TG women.

Equally important, tackling the reasons for not using condoms during sex may also mitigate the HIV prevalence among TG women. We found that besides condom unavailability, romantic relationships with non-commercial partners (sweethearts) and

commercial partners, feeling better without a condom, and refusal by partners were the prime reasons for not using condoms during sex with both commercial and non-commercial partners. Thus, education about harmful effects of multiple, concurrent relationships and inconsistent condom use may raise up condom use among TG women. Further, improving negotiation skills of TG women may increase the likelihood of empowering them to insist their partners (both commercial and non-commercial) to use condoms during sex.

Notwithstanding, the results of the multivariate analysis signify a number of independent factors associated with HIV infection: TG women in urban areas, older adult TG women (≥35 years old), low educational level, physical appearance, hormone self-injection, drug injection, cut or sores in the genital area, and use of online services. Albeit these factors not exhibiting causal relationships with HIV infection, HIV prevention programs may pay more attention to TG women urbanites and those within older adult cohorts. Also, interventions may address detrimental effects of hormone self-injection, drug injection, and genital-related diseases among TG women. Since the utilization of TG women-targeting online services was minimal, efforts to shore up the access to the services may enlarge TG women's awareness and knowledge about prevention of HIV infection.

5. LIMITATIONS OF THE STUDY

This study contained some limitations. First, it covered only 13 sites with the most numbers of TG women, leaving out the other venues with less target participants. Thus, the findings may not be generalized at a national level. Second, the initial seeds of participants were identified and recruited by outreach workers working for implementing partners, which could be biased towards TG women under their programs. This problem could be exacerbated by outreach workers interviewing some participants who had received services from their NGO, which could induce the participants' responses. Third, this study employed a self-reporting questionnaire on health and sexual behaviors, which may have encountered over- and under-reporting biases and impacted on the results. Finally, albeit minimal, the monetary incentive given to the participants to recruit seeds may to certain extent have affected their genuine motivation to partake in the study, which could influence their responses. Nevertheless, we believe that we took sufficient due measures in our data collection procedures to minimize these potential effects.

6. CONCLUSIONS AND PROGRAM RECOMMENDATIONS

The findings from this study need to be further understood and applied for program design and improvement. Due to the huge information in the study, only key findings will be highlighted for program recommendations. The prioritization of the key findings has been discussed with the community of TG women, programmers and the Strategic Information Technical Working Group (SI-TWG).

This study surmises that TG women, particularly older and urban ones, in Cambodia remain at an increased risk of HIV transmission despite the country's overall decline in HIV prevalence. This is mirrored in the rise in HIV prevalence over time among this populace. Risky sexual behaviors, notably inconsistent condom use and substance use, may have exacerbated their vulnerability. This study found that besides condom unavailability, romantic relationships with commercial and non-commercial partners, feeling better without condoms, and refusal by partners were the prime reasons for not using condoms during sex. Further to being older and living in urban areas, other chief predictors of HIV infection encompassed low educational level, physical appearance, hormone self-injection, drug injection, cut or sores in the genital area, and use of online services.

Premised on the findings of this study, to reduce the risky behavior and the HIV prevalence among TG women, the following suggestions might be useful for bolstering the impact of program interventions.

TG women in urban areas were at greater risk of HIV infection. More attention should be paid to this group of higher risk.

Older TG women faced a higher risk of HIV infection. Interventions tailor-made to this cohort should be explored.

HIV testing among TG women was limited. To increase HIV testing uptake, information about testing centers, particularly NGO facilities and outreach workers, and related services should be made more accessible in terms of physical reach and TG-friendly contents to the target group. It is important to reach those individuals who are least likely to seek testing in a public setting on their own by making HIVST available to them. Since it is private and convenient, self-testing may encourage TG women to do regular tests to determine their status, prevent transmission, and seek related services. The participants were highly willing to use HIVST. Moreover, promotion of mHealth or Uhealth may be introduced to increase testing uptake among this population.

Consistent condom use was low among TG women. To enhance condom use, efforts towards condom distribution to TG women by OWs should be increased since this was reported as the most frequent way for obtaining condoms. To increase condom accessibility, peer sale and social condom marketing may be introduced.

Inconsistent condom use and multiple sexual relationships were prevalent among TG women. More education about harmful effects of multiple, concurrent relationships, and inconsistent condom should be conducted with TG women. Educational materials and methods should be revamped to make them more accessible, comprehensible, attractive, and punchy. For those who continue to be at high risk, there should be funding for providing PrEP to them since there was a high willingness to use it; and distribution of PrEP should begin at local NGO centers.

Hormone self-injection, drug injection, and STI symptoms were associated with HIV infection. More education on sexual risk factors for HIV infection, a variety of possible STI symptoms, and detrimental effects of hormone self-injection and drug injection should be provided.

The use of online services by TG women was low. Interventions and education should focus on other methods of reaching this population, such as phone calls, SMS texts, and use of OWs, in addition to increasing efforts to lure them to utilize these online services.

A substantial number of TG women encountered discrimination and gender-based violence. To enhance the enabling environment for interventions, more awareness and education for the general population and authorities about social discrimination and stigma against the TG population should be raised.

Recommendations for Further Research

Further research should delve into reasons for not taking HIV testing. Also, the demand, feasibility, and affordability of HIVST and PrEP among this population should be examined. Reasons for limited reach by the online services (Mstyle and SreySros websites and Facebook pages) should be explored from the users' standpoints.

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APPENDICES

1. Eligibility screening tool

CRF - 01	Screening Script & Eligibility Criteria	
	Province:	Study ID#:
Survey Round: Capture (R1)_	Recapture round (R2)_	Visit Date:

Under HIV Flagship Project, FHI360, KHANA, and PSK in collaboration with National Centre for HIV/AIDS, Dermatology, and STD (NCHADS) of "The Ministry of Health" are conducting an integrated biological and behavioral survey (IBBS) among transgender (TG) in 12 provinces across Cambodia – Phnom Penh, Kampong Cham, Battambang, Siem Reap, Banteay Meanchey, Preah Sihanuk, Prey Veng, Svay Rieng, Kampong Speu, Kampong Chhnang, Koh Kong and Kandal. We will Interview and do HIV test about 1,730 TG women in this survey. This process will last about 60 minutes. You will have self-interview using tablet. It will help you to feel comfortable because no one can hear your answer. We will try our best to keep confidentiality for you. Your participation is completely voluntarily. Before we start talking more, I would like to know whether or not you are eligible via asking you few questions.

Do you allow me to ask those questions? [Yes] [No]

	YES	NO
Hi, how old are you? **If he/she is more >= 18 years**	☐	☐
Are you a biological male?	☐	☐
How do you self-identify your gender identity? **If female or third gender**	☐	☐
Do you dress as women? **If sometimes or always**	☐	☐
Is he/ she able to understand the previous khmer questions above? *(All the above questions are also tested whether the person is under alcohol and drug mental effects)*	☐	☐
Do you agree to participate in the study after consent?	☐	☐ If not, provide reason? _____

NOTE: the potential participants will be enrolled if all ABOVE ANSWERS are "YES".

Name of person filling out this form:	Initials:

Eligibiliy sreening form, IRBNet Project, #, Integrated Biological and Behavioral Survey of Transgender Population in Cambodia, 2014, Version 1.0, 11 February 2015

2. Survey questionnaire

Participant ID Code: .....

Date of interview: day.....month.....year.....

Province/City:

1. Phnom Pehn	6. Preah Sihanouk	11. Kandal
2. Kampong Cham	7. Prey Veng	12. Koh Kong
3. Battambang	8. Svay Rieng	13. Thbong Khmum
4. Siem Reap	9. Kampong Spue	
5. Banteay Meanchey	10. Kampong Chhnang	

Interview Location (City/NGOs): .....

Name of administrative districts (current residence): .....

Status of administrative districts:

1. Urban
2. Rural

SECTION 1: SOCIODEMOGRAPHIC CHARACTERISTICS			
No.	**Questions and filters**	**Coding categories**	**Skip to**
Now I would like to ask you some questions related to your personal information.			
Q001	How old are you?	Age in completed years:	
Q002	What is your current marital status? (only one response)	Married and living together 1 Married ,but not living together 2 Widowed, Divorced or separated 3 Not married, not living with any partner 4 Not married, living with sweetheart (female) 5 Not married but living with male lover 6 Other (Specify.....) 7	
Q003	For how long have you been living in the current city?	.....Years Record 0 if not living in this city Record 1 if living in this city 1 year or less Refuse to answer 99	
Q004	In the past 6 months, on average, how much money did you make per month? (exchange rate: 4000 riel per 1 US$)	Amount of money (in US$): ..... Refuse to answer 99	
Q005	How many years of formal education have you completed?	Number of years: ..... Record 0 if never attending school. Refuse to answer 99	
Q006	What is your current job (main source of income)? (only one response) Note: If you are both studying and having a paid job, report your main source of income.	Unemployed 0 Hair dresser/Beautician 1 Government officer 2 Laborer (factory, construction work) 3 Seller 4 Entertainment Worker (bar, karaoke, etc.) 5 Sex worker 6 Student 7 NGO staff 8 Private company staff 9 Farmer/fisherman 10 Artist 11 Other (Specify.....) 12	

SECTION 2. TRANSGENDER IDENTITY & EXPERIENCES			
Q007	What gender do you consider yourself?	Female 1 Male 2 Third gender 3 Uncertain 4 Refuse to answer 99	
Q008	How often do you express or dress yourself as a woman?	All the time 1 Often 2 Sometimes 3 Rarely 4 Refuse to answer 99	
Q009	How many friends in your social network are also transgender?	Number:	
Q010	Have you ever taken hormones or any substances for beauty purposes?	No 1 Yes 2 Refuse to answer 99	2→ Q014
Q011	What are the methods you have used to take hormones or any substances for beauty purposes? [multiple answer]	Pills 1 Injections 2 Skin patches 3 Other (Specify……) 4 Refuse to answer 99	
Q012	If you have taken hormones or any substances for beauty purposes by injection, how have you received it?	Never injected 0 Injected by myself 1 Injected by skilled personnel (beauty clinic) 2 Injected by non-skilled personnel 3 Other (Specify…… 4	
Q013	If you have injected hormones or any substances for beauty purposes, have you shared needle?	Never injected 0 No 1 Yes 2 Refuse to answer 99	
Q014	Have you ever had any operation to change any parts of your body to become a woman?	No 1 Yes 2 Refuse to answer 99	

Section 3. SEXUAL PARTNERS AND SEXUAL HISTORY			
No.	**Questions and filters**	**Coding categories**	**Skip to**
	Now I would like to ask questions about your recent sexual relationship with various kinds of sexual partners.		
Q016	How likely do you think you are infected with HIV?	Very Likely 1 Likely 2 Unlikely 3 Very Unlikely 4 Refuse to answer 99	
	Sex with women		
Q017	Have you ever had sex with a woman? [Including vaginal or anal sex]	No 0 Yes 1 Refuse to answer 99	0, 99 → Q028

Q018	In the past 12 months, have you had sex with a woman? [Including vaginal or anal sex]	No 0 Yes 1 Refuse to answer 99	0, 99 → Q028
Q019	In the past 12 months, have you had sex with a woman not in exchange for money or gifts? [Including vaginal or anal sex]	No 0 Yes 1 Refuse to answer 99	0 → Q022
Q020	In the past 3 month, how many women did you have sex with not in exchange for money or gifts?	Number of women: ..... Refuse to answer 99	
Q021	In the past 3 month, how often did you use a condom when you had vaginal or anal sex with women not in exchange for money or gifts?	Never had sex with a woman 0 Always 1 Often 2 Sometimes 3 Never 4 Refuse to answer 99	0, 1 → Q024
Q022	In the past 3 month, if you did not always use a condom when you had sex with women not in exchange for money or gifts? What were the reasons? [Multiple Answers]	We are in a relationship 1 She is not HIV/STI infected 2 Too high to use a condom 3 No condom available 4 Feel better without a condom 5 I am HIV-infected 6 I penetrated, so I am not at risk 7 Partner refused 8 Other (Specify……) 9 Refuse to answer 99	
Q023	In the past 12 months, have you had sex with a woman in exchange for money or gifts? [Including vaginal or anal sex]	No 0 Yes 1 Refuse to answer 99	0 → Q028
Q024	In the past 3 months, how many women did you have sex with in exchange for money or gifts? [Including vaginal or anal sex]	Number of women: ..... Refuse to answer 99	
Q025	In the past 3 months , where did you meet women with whom you had sex with in exchange for money or gifts?	Park 1 Street 2 Bar/discotheque/cafe 3 Beer Garden/Restaurant 4 Massage Parlor 5 Karaoke 6 Online (Facebook, Line, Website) 7 Guesthouse/hotel 8 Workplace/school 9 Other (Specify……) 10	
Q026	In the past 3 months, how often did you use a condom when you had vaginal or anal sex with women in exchange for money or gifts?	Never had sex 0 Always 1 Often 2 Sometimes 3 Never 4 Refuse to answer 99	

Q027	In the past 3 months, if you did not always use a condom when you had sex with women not in exchange for money or gifts? What were the reasons? [Multiple Answers]	We are in a relationship 1 She is not HIV/STI infected 2 Too high to use a condom 3 No condom available 4 Feel better without a condom 5 I am HIV-infected 6 I penetrated, so I am not at risk 7 Partner refused 8 Other (Specify……) 9 Refuse to answer 99	
Sex with men			
Q028	Have you ever had anal sex with a man?	No 0 Yes 1 Refuse to answer 99	0, 99 → Q042
Q029	In the past 12 months, have you had anal sex with a man?	No 0 Yes 1 Refuse to answer 99	0, 99 → Q042
Q030	In the past 12 months, what was your usual role in anal sex with a man?	Insertive 1 Receptive 2 Both 3 Refuse to answer 99	
Q031	In the past 3 months, have you had sex with men not in exchange for money or gifts?	No 0 Yes 1 Refuse to answer 99	0 → Q033
Q032	In the past 3 months, how many men you had sex with not in exchange for money or gifts?	Number of men: ..... Refuse to answer 99	
Q033	In the past 3months, how often did you use a condom when you had anal sex with men not in exchange for money or gifts?	Never had sex 0 Always 1 Often 2 Sometimes 3 Never 4 Refuse to answer 99	0, 1 → Q035
Q034	If not always, why not? [Multiple Answers]	We are in a relationship 1 He is not HIV/STI infected 2 I was too drunk or too high with drugs 3 No condom available 4 Feel better without a condom 5 I am HIV-infected 6 I penetrated, so I am not at risk 7 Partner refused 8 Other (Specify……) 9 Refuse to answer 99	
Q035	In the past 12 months, have you had sex with men in exchange for money or gifts?	No 0 Yes 1 Refuse to answer 99	0 → Q040
Q036	In the past 3 month, how many men you had sex with in exchange for money or gifts?	Number of men: ..... Refuse to answer 99	

Q037	In the past 3 month, where did you meet the men you had sex with in exchange for money or gifts?	Park 1 Street 2 Bar/discotheque/café 3 Beer Garden/Restaurant 4 Massage Parlor 5 Karaoke 6 Online (Facebook, Line, Website) 7 Guesthouse/hotel 8 Workplace/School 9 Other (Specify……) 10	
Q038	In the past 3 months, how often did you use a condom when you had anal sex with men you paid for sex?	Never had anal sex 0 Always 1 Often 2 Sometimes 3 Never 4 Refuse to answer 99	0, 1 → Q615
Q039	If not always, why not? [Multiple Answers]	We are in a relationship 1 He is not HIV/STI infected 2 I was drunk or too high with drugs 3 No condom available 4 Feel better without a condom 5 I am HIV-infected 6 I penetrated, so I am not at risk 7 Partner refused 8 Other (Specify……) 10 Refuse to answer 99	
Q040	Did you use condom when you had last sex with a man?	Yes 1 No 0 Refuse to answer 99	

Access to condoms and lubricant			
No.	**Questions and filters**	**Coding categories**	**Skip to**
Q041	In this last 12 months, where did you get condoms? [Multiple Answers]	Friends/outreach workers 1 Condom peer sale representative 2 Pharmacy/drug store/clinic 3 Condom outlets 4 Mart/mini-mart 5 Groceries 6 Hotel/guesthouse 7 Other (Specify……) 8 Refuse to answer 99	
Q042	In this last 12 months, where did you get lubricant? [Multiple Answers]	Friends/outreach workers 1 Condom peer sale representative 2 Pharmacy/drug store/clinic 3 Condom outlets 4 Mart/mini-mart 5 Groceries 6 Hotel/guesthouse 7 Other (Specify……) 8 Refuse to answer 99	

SECTION 4. STI AND HIV TESTING			
No.	**Questions and filters**	**Coding categories**	**Skip to**
Q044	In the past 12 months, have you experienced the following symptoms? [Multiple Answers]	Cuts or sores in the genital area 1 Swelling in the genital area 2 Abnormal urethral discharge 3 Symptoms on the anus 4 Symptom in the mouth/throat 5 Refuse to answer 99	
Q045	Where did you first go for treatment the last time you had any above-mentioned symptoms? (Only one response)	Never had any symptoms 0 Pharmacy 1 Private clinic/hospital 2 Public Hospital/STD clinic 3 NGO Clinic/hospital 4 Traditional doctor 5 Didn't get care 6 Other (Specify……) 7 Refuse to answer 99	
Q046	Have you ever been tested for HIV?	No 0 Yes 1 Refuse to answer 99	0 → Q049
Q047	In past 6 months, have you been tested for HIV?	No 0 Yes 1 Refuse to answer 99	
Q047	How long has it been since you received the last HIV test?	Number of months……	
Q049	If a rapid self-test kit for HIV was available and you could get the result within 20 minutes at home, would you use it?	No 0 Yes 1 Refuse to answer 99	
Q050	Where did you have your most recent HIV test?	Private facilities 1 Public facilities 2 NGO facilities 3 NGO outreach workers at community or HTC 4 Other (Specify……) 5 Refuse to answer 99	
Q051	The last time you got tested for HIV, did you receive the result of the test?	No 0 Yes 1 Refuse to answer 99	
Q052	What is your current HIV status? (You could choose not to answer)	Positive 1 Negative 2 I don't know my status 3 Refuse to answer 99	2, 3 → Q057
Q053	Are you currently on ART?	No 0 Yes 1 I was but discontinued 2 I am on treatment for opportunistic infections 3 Refuse to answer 99	0 → Q056
Q054	Do you take ARV regularly as prescribed?	Regularly 1 Not regularly 2 Refuse to answer 99	

Q055	Where do you get ART services?	Public facilities 1 Private facilities 2 NGO facilities 3 Pharmacy 4 Other (Specify……) 5 Refuse to answer 99	
Q056	If not, why are you not on ART?	Not needed 1 Not sure where to go 2 I am ashamed to go to health facility 3 I am afraid of being discriminated 4 I was treated badly in the past 5 Other (Specify……) 6 Refuse to answer 99	
Q057	Have you ever head of pre-exposure prophylaxis (PrEP)?	No 0 Yes 1 Refuse to answer 99	
Q058	If PrEP were mad available in Cambodia, how likely do you think you will use it?	Very unlikely 0 Unlikely 1 Not sure 2 Likely 3 Very likely 4 Refuse to answer 99	
Q059	If PrEP were mad available in Cambodia, where would you prefer to access it?	Local NGOs 1 ART clinic 2 Pharmacy 3 Other (specify……) 4	

SECTION 5. ALCOHOL AND DRUG USE

Measurement of alcohol drinking

One standard measurement:

- A can/glass of beer, fermented palm juice (285 ml)
- A glass of wine (120 ml)
- A glass of whisky (30 ml)

No.	Questions and filters	Coding categories	Skip to
Q060	In the past 3 months, how often did you drink at least one can of beer or one glass of any types of wine?	Never 1 Once a month or less 2 2-4 times a month 3 2-3 times a week 4 4 or more times a week 5 Don't know 98 Refuse to answer 99	1 → Q064
Q061	In the past 3 months, how many standard drinks containing alcohol (a can of beer or a glass of any types of wine) did you have on a typical day on which you drank alcohol?	1 – 2 1 3 – 4 2 5 - 6 3 7 - 9 4 10 or more 5 Don't know 98 Refuse to answer 99	
Q062	In the past 3 months, how often did you have more than 5 drinks in one day or night?	Never 1 Less than once a month 2 Once a month 3 1, 2, or 3 times a week 4 4 or more times a week 5 Don't know 98 Refuse to answer 99	

Q063	In the past 3 months, how often have you got drunk from alcohol?	Never 1 Less than once a month 2 Once a month 3 Every week (1-3 times/week) 4 Every day/almost every day(4 or more times a week) 5 Don't know 98 Refuse to answer 99	

Q064 In the past 12 months, have you tried any of the following drugs? (Ask one by one – CIRCLE YES OR NO) [Multiple answers]

	Types of drug	Yes	No
1	Marijuana	1	0
2	Heroin/Opium	1	0
3	Yama (amphetamine)	1	0
4	Crystal, Ice (Methamphetamine)	1	0
5	Ecstasy	1	0
6	Inhalants (glue, paint, petrol, spray can)	1	0
7	Other	1	0

Q065 In the past 3 months, did you inject any illicit drugs?

Heroin 1
Yama 2
Crystal, Ice (Methamphetamine) 3
Never injected any drug 4
Refuse to answer 99

Q066 In the past 3 months, did you have sex during/after using illicit drugs?

Heroin 1
Yama 2
Ice, Amphetamine 3
Never used drug before having sex 4
Refuse to answer 99

SECTION 6. DISCRIMINATION SCALE

No.	Questions and filters	Coding categories	Skip to
Q067	How supportive do you feel your co-workers or classmates are regarding your transgender identity?	Very much supportive 1 Supportive 2 Not supportive 3 Not at all supportive 4 Refuse to answer 99	
Q068	Have you ever experienced problems getting a job and thought it was because of your transgender identity or gender presentation?	No 0 Yes 1 Don't know 98 Refuse to answer 99	
Q069	Have you ever lost a job and thought it was because of your transgender identity or gender presentation?	No 0 Yes 1 Don't know 98 Refuse to answer 99	

Q070	Have you ever been denied or thrown out of a housing situation and thought it was because of your transgender identity or gender presentation?	No 0 Yes 1 Don't know 98 Refuse to answer 99	
Q071	Have you ever had any problems getting services from an HIV prevention program and thought it was because of your transgender identity or gender presentation?	No 0 Yes 1 Don't know 98 Refuse to answer 99	
Q072	Have you ever had any problems getting health or medical services and thought it was because of your transgender identity or gender presentation?	No 0 Yes 1 Don't know 98 Refuse to answer 99	
Q073	Have you ever been physically abused or beaten and thought it was because of your transgender identity or gender presentation?	No 0 Yes 1 Don't know 98 Refuse to answer 99	
Q074	Have you ever been physically abused or beaten, but it was not because of your transgender identity or gender presentation?	No 0 Yes 1 Don't know 98 Refuse to answer 99	
Q075	Have you ever been sexually abused or assaulted and thought it was because of your transgender identity or gender presentation?	No 0 Yes 1 Don't know 98 Refuse to answer 99	
Q076	Have you ever been arrested and thought it was because of your transgender identity or gender presentation?	No 0 Yes 1 Don't know 98 Refuse to answer 99	
Q077	Have you ever been arrested, but it was not because of your transgender identity or gender presentation?	No 0 Yes 1 Don't know 98 Refuse to answer 99	
Q078a	Have you ever left school because of your transgender identity or gender presentation?	No 0 Yes 1 Don't know 98 Refuse to answer 99	
Q078b	Have you ever been forced to have sex (oral, anal…)?	No 0 Yes 1 Don't know 98 Refuse to answer 99	

SECTION 7. DEPRESSION SCALE			
No.	**Questions and filters**	**Coding categories**	**Skip to**
Q079	In the past 7 days, I was bothered by things that usually don't bother me.	Never 1 Occasionally (1-2 days) 2 Sometime (3-4 days) 3 Almost all the time (5-7 days) 4	
Q080	In the past 7 days, I did not feel like eating; my appetite was poor.	Never 1 Occasionally (1-2 days) 2 Sometime (3-4 days) 3 Almost all the time (5-7 days) 4	
Q081	In the past 7 days, I felt that I could not shake off the blues even with help from my family.	Never 1 Occasionally (1-2 days) 2 Sometime (3-4 days) 3 Almost all the time (5-7 days) 4	
Q082	In the past 7 days, I felt that I was just as good as other people.	Never 1 Occasionally (1-2 days) 2 Sometime (3-4 days) 3 Almost all the time (5-7 days) 4	
Q083	In the past 7 days, I had trouble keeping my mind on what I was doing.	Never 1 Occasionally (1-2 days) 2 Sometime (3-4 days) 3 Almost all the time (5-7 days) 4	
Q084	In the past 7 days, I felt stressed.	Never 1 Occasionally (1-2 days) 2 Sometime (3-4 days) 3 Almost all the time (5-7 days) 4	
Q085	In the past 7 days, I felt that everything I did was an effort.	Never 1 Occasionally (1-2 days) 2 Sometime (3-4 days) 3 Almost all the time (5-7 days) 4	
Q086	In the past 7 days, I felt hopeful about the future.	Never 1 Occasionally (1-2 days) 2 Sometime (3-4 days) 3 Almost all the time (5-7 days) 4	
Q087	In the past 7 days, I thought my life had been a failure.	Never 1 Occasionally (1-2 days) 2 Sometime (3-4 days) 3 Almost all the time (5-7 days) 4	
Q088	In the past 7 days, I felt fearful.	Never 1 Occasionally (1-2 days) 2 Sometime (3-4 days) 3 Almost all the time (5-7 days) 4	
Q089	In the past 7 days, my sleep was restless.	Never 1 Occasionally (1-2 days) 2 Sometime (3-4 days) 3 Almost all the time (5-7 days) 4	
Q090	In the past 7 days, I was happy.	Never 1 Occasionally (1-2 days) 2 Sometime (3-4 days) 3 Almost all the time (5-7 days) 4	
Q091	In the past 7 days, I talked less than usual.	Never 1 Occasionally (1-2 days) 2 Sometime (3-4 days) 3 Almost all the time (5-7 days) 4	

Q092	In the past 7 days, I felt lonely.	Never 1 Occasionally (1-2 days) 2 Sometime (3-4 days) 3 Almost all the time (5-7 days) 4	
Q093	In the past 7 days, people were unfriendly.	Never 1 Occasionally (1-2 days) 2 Sometime (3-4 days) 3 Almost all the time (5-7 days) 4	
Q094	In the past 7 days, I enjoyed life.	Never 1 Occasionally (1-2 days) 2 Sometime (3-4 days) 3 Almost all the time (5-7 days) 4	
Q095	In the past 7 days, I had crying spells.	Never 1 Occasionally (1-2 days) 2 Sometime (3-4 days) 3 Almost all the time (5-7 days) 4	
Q096	In the past 7 days, I felt sad.	Never 1 Occasionally (1-2 days) 2 Sometime (3-4 days) 3 Almost all the time (5-7 days) 4	
Q097	In the past 7 days, I felt that people disliked me.	Never 1 Occasionally (1-2 days) 2 Sometime (3-4 days) 3 Almost all the time (5-7 days) 4	
Q098	In the past 7 days, I could not "get going."	Never 1 Occasionally (1-2 days) 2 Sometime (3-4 days) 3 Almost all the time (5-7 days) 4	

SECTION 8. ADVERSE CHILDHOOD EXPERIENCES (ACEs)

No.	Questions and filters	Coding categories	Skip to
	When I was growing up…		
Q099	I have been hit, slapped, kicked or received physical punishment from a parent or other adult guardian.	No 0 Yes 1 Refuse to answer 99	
Q100	People in my family have said hurtful or insulting things to me.	No 0 Yes 1 Refuse to answer 99	
Q101	Someone has tried to touch me or make me touch them in a sexual way, make me do or watch sexual things, or actually did something sexual with me.	No 0 Yes 1 Refuse to answer 99	
Q102	There has been someone to take care of me, protect me, and take me to medical care when I get sick.	No 0 Yes 1 Refuse to answer 99	
Q103	There has been someone in my family who helped me feel that I was loved and important.	No 0 Yes 1 Refuse to answer 99	

SECTION 9. EXPOSURE TO INTERVENTION PROGRAMS			
No.	**Questions and filters**	**Coding categories**	**Skip to**
Q104	In the past 3 months, have you been reached by NGO staff delivering HIV services?	No 0 Yes 1 4Don't know 98 Refuse to answer 99	
Q105	In the past 3 months, what kind of services have you received (Check all that apply).	HIV/health education and/or materials 1 Condoms 2 Lubricants 3 VCCT/STI testing 4 Law support services 5 Other health services 6 Other (Specify……) 7 Refuse to answer 99	
Q106	Do you have UIC card?	Yes 1 No 0 Refuse to answer 99	
Q107	In the past 12 months, how often did you visit MStyle club(s)?	Number of time …… Refuse to answer 99	
Q108	In the past 12 months, how often did you visit Srey Sros club(s)?	Number of time …… Refuse to answer 99	
Q109	Have you used online services developed for people like you (e.g. Facebook, website)?	Yes 1 No 0 Refuse to answer 99	0 -> Q110
Q110	Have you accessed MStyle Facebook in the past 6 months? (Attach the picture of MStyle facebook)	Never 0 Yes, always 1 Yes, sometimes 2 Yes, occasionally 3 Refuse to answer 99	
Q111	Have you accessed MStyle Website in the past 6 months? (Attach the picture of MStyle webpage)	Never 0 Yes, always 1 Yes, sometimes 2 Yes, occasionally 3 Refuse to answer 99	
Q112	Have you accessed Srey Sros Facebook in the past 6 months? (Attach the picture of Srey Sros Facebook)	Never 0 Yes, always 1 Yes, sometimes 2 Yes, occasionally 3 Refuse to answer 99	
Q114	Have you accessed Srey Sros website in the past 6 months? (Attach the picture of Srey Sros webpage)	Never 0 Yes, always 1 Yes, sometimes 2 Yes, occasionally 3 Refuse to answer 99	
Q115	Have you ever received a voice message from Voice4U by number 070221011?	Yes 1 No 0 Refuse to answer 99	
Q116	Have you ever called to Voice4U by number 1295?	Yes 1 No 0 Refuse to answer 99	

3. Image of coupon used in TG IBBS 2016

4. Result of newly-identified cases in the survey

Table 1: Descriptive characteristics of new HIV reactive participants

Variables	n (%)
Community Type	
Urban	37 (88.1)
Rural	5 (11.9)
Age	
18- 25	16 (38.1)
25-34	20 (47.6)
35-44	4 (9.5)
≥45	2 (4.8)
Current marital status	
Married	0 (0.0)
Widowed/divorced/separated	1 (2.4)
Never married	40 (95.2)
Other	1 (2.4)
Education (in years, median (IQR))	
Primary (0-6)	11 (26.2)
High school (7-12)	25 (59.5)

Higher education (>12)	6 (14.3)
Main occupation	
Hair dresser/beautician	13 (30.9)
Labor/farmer	9 (21.4)
Seller	5 (11.9)
Entertainment Worker	3 (7.1)
Sex worker	2 (4.8)
Private company	3 (7.1)
Other	7 (16.7)
Monthly income in past 6 months (USD, median (IQR))	
< 100	8 (19.1)
100-199	15 (35.7)
200-299	13 (30.9)
≥300	6 (14.3)

Abbreviations: *USD, the United State Dollar; IQR, Interquartile Range.*

Table 2: Gender identity and hormone use experiences of new HIV reactive participants

Variables	n (%)
Self-identified	
Female	13 (30.9)
Third gender	29 (69.1)
Frequency of dressing up as a woman	
All the time	25 (59.5)
Not all the time	17 (40.5)
Ever used hormone/non-hormone substance	22 (52.4)
Pill	19 (45.2)
Injection	10 (23.8)
Skin patches	4 (9.5)
How hormone/non-hormone substance hormone were injected	
Self-inject	2 (4.8)
Injected by skilled personnel	4 (9.5)
Injected by non-skilled personnel	4 (9.5)
Ever shared needle during injecting hormone/beauty substance	1 (4.8)
Ever had operation to change any parts of your body to become a woman	2 (4.8)
Ever injected for medical purposes (lifetime)	
Place of last medical injection	
Public facility	6 (17.7)
Private facility	18 (52.9)
NGO	3 (8.8)
Community health provider	7 (20.6)

Abbreviations: *NGO, Non-Governmental Organization*

Table 3: Sexual experience of the new HIV reactive participants with biological women

Variables	n (%)
Ever had sex with a woman (lifetime)	3 (7.1)
Ever had sex with a woman, past 12 months (n=3)	3 (100)
Ever had sex with a woman, past 12 months (n=3)	0 (0.0)
Type of female sexual partners, past 12 months (n=30)	
Only in exchange for money/gifts	0 (0.0)
Only not in exchange for money/gifts	0 (0.0)

Table 4: Sexual experience of new HIV reactive participants with biological men

Variables	n (%)
Had sex with a man in the past 12 months	42 (100)
Role in anal sex with a man	
Insertive	0 (0.0)
Receptive	38 (90.5)
Both	4 (9.5)
Had anal sex with a man, past 3 months	**36 (85.7)**
Number of male sexual partners, past 3 months (n=36)	**10 (SD 15.7)**
Used condom last anal sex, past 3 months (n=36)	**9 (25.0)**
Anal sex with a man not in exchange for money in the past 3 months	39 (92.9)
Number of male sexual partners not in exchange for money/gifts, past 3 months (n=39)	**6 (SD 11.6)**
Condom use in anal sex with male sexual partner not in exchange for money/gifts, past 3 months (n=39)	
Not always	30 (76.9)
Always	9 (23.1)
Reason for not using condom with men not in exchange for money in the past 3 month (n=30)	
We are in a relationship	15 (46.9)
He/she is not HIV/STI infected	6 (18.7)
Too high to use condom	1 (3.1)
No condom available	9 (28.1)
Feel better without condom	6 (18.7)
I am HIV-infected	0 (0.0)
I penetrated, so I am not at risk	2 (6.2)
Partner refused	6 (18.7)
Other	2 (6.2)
Had sex with a man in exchange for money in the past 3 months	**19 (45.2)**
Number of male sexual partners in exchange for money in the past 3 months (n=19)	**9 (SD 12.4)**
Condom use with male sexual partner in exchange for money/gifts in the past 3 months (n=19)	
Not always	6 (30.0)
Always	14 (70.0)
Reason for not using condom with men in exchange for money (n=6)	

We are in a relationship	3 (50.0)
She is not HIV/STI infected	6 (100.0)
Too high to use condom	6 (100.0)
No condom available	2 (33.3)
Feel better without condom	1 (16.7)
I penetrated, so I am not at risk	1 (16.7)
Partner refused	3 (50.0)

Figure 1: Access to condoms and lubricant by type of facility in past 12 months among new HIV reactive participants

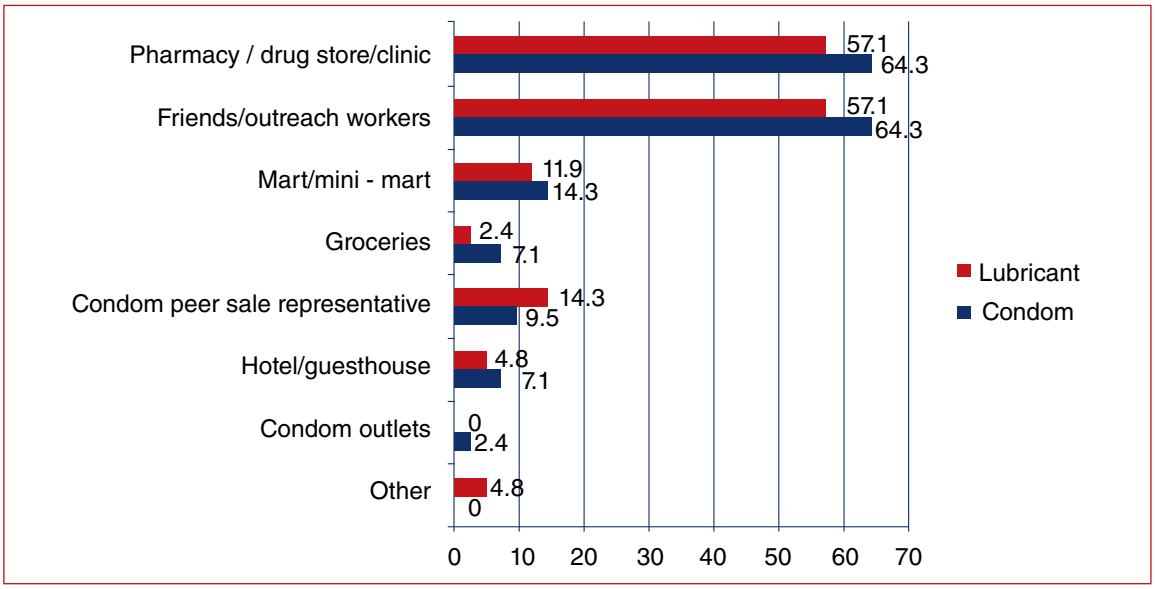

Table 5: STI symptom and treatment experience of new HIV reactive participants

Variables	n (%)
Experienced any STI symptom in the past 12 months	**10 (23.8)**
Cut or sores in the genital area	2 (4.8)
Swelling in the genital area	1 (2.4)
Abnormal urethral discharge	3 (7.1)
Symptoms on the anus	3 (7.1)
Symptom in the mouth/throat	1 (2.4)
Last place sought for STI treatment (n=)	
Never sought treatment	2 (1.0)
Pharmacy	32 (16.6)
Private clinic/hospital	29 (15.0)
Public Hospital/STD clinic	31 (16.1)
NGO Clinic/hospital	42 (21.8)
Traditional healer	3 (1.5)

Abbreviations: *STI, Sexual Transmitted Infectious; NGO, Non-Government Organization*

Table 6: HIV testing experience and status awareness of new HIV reactive participants

Variables	n (%)
Ever been tested for HIV	
Never	12 (28.6)
1-3 months	7 (23.3)
4-6 months	4 (13.3)
7-12 months	8 (26.7)
> 12 months ago	11 (36.7)
Received results from the last HIV test (n=30)	**29 (96.7)**
Self-reported HIV positive (n=30)	**1 (3.3)**
Currently on ART (n=)	**0 (0.0)**
Place of your last HIV test	
Private facilities	4 (40.0)
Public facilities	2 (20.0)
NGO facilities/community based HIV testing	1 (10.0)
Other	2 (20.0)
Willingness to use HIV self-test if it were available	**29 (87.9)**
Ever heard of Pre-exposure prophylaxis (PrEP)	**9 (29.0)**
Likeliness of using PrEP	
Unlikely	2 (6.5)
Likely	28 (90.3)
Not sure	1 (3.2)
Preferred place to access PrEP if available (n=955)	
Local NGOs	16 (51.6)
ART clinic	4 (12.9)
Pharmacy	8 (25.8)
Other	3 (9.7)

Abbreviations: *HIV, human immunodeficiency virus; ART, Antro Viral Therapy; PrEP, Pre-Exposure Prophylaxis; NGO, Non-Governmental Organization*

Table 7: Substance use among new HIV reactive participants

Variables	n (%)
Drank at least one can of beer or glass of wine in the past 3 months	31 (73.8)
Frequency of having more than 5 drinks in one day in the past 3 months	
Never more than five drinks	11 (26.2)
Less than once a month	24 (57.1)
1-3 times a week	5 (11.9)
4 or more times a week	2 (4.8)
Ever used/tried drugs in the past 12 months	
Never	37 (88.1)

Yes, ATS (Yama, Crystal Ice, Ecstasy)	
Other drugs (Marijuana, Heroin, etc.)	
Ever injected any illicit drugs in the past 3 months	**0 (0.0)**
Ever had sex during/after using illicit drugs in the past 3 months (n=1,375)	**3 (7.1)**

Figure 2: Discrimination experience of new HIV reactive participants

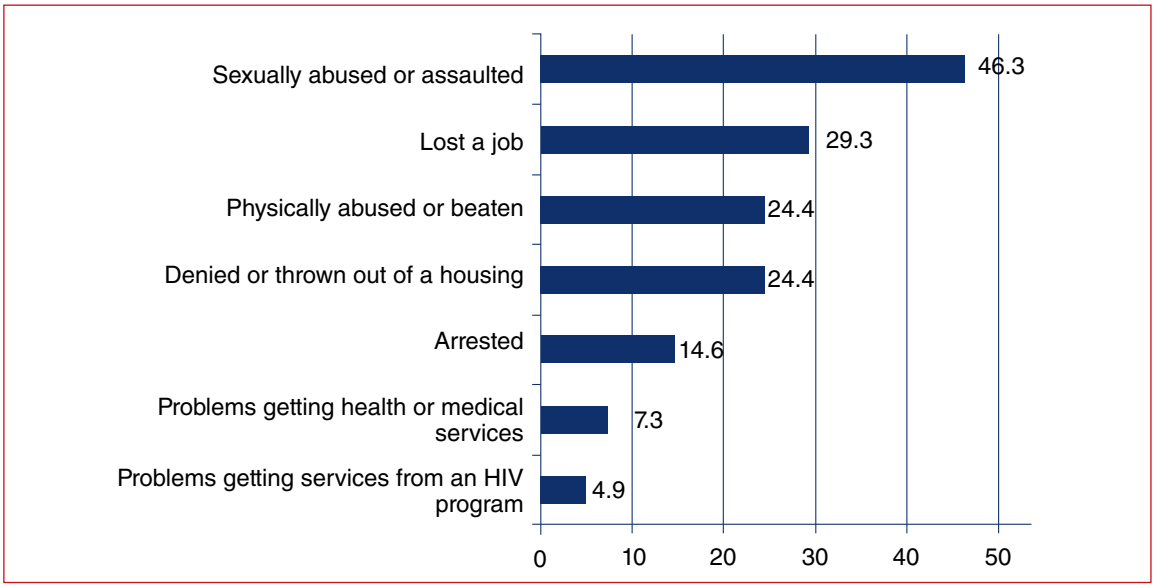

Table 8: Exposure to HIV programs among new HIV reactive participants

Variables	n (%)
Reached by NGO in the past 3 months	13 (30.9)
In the past 3 months, what kind of services have you received	
HIV/Health education	11 (26.2)
Condom	12 (28.6)
lubricant	9 (21.4)
VCCT/STI testing	6 (14.3)
Law support services	2 (4.7)
Ever had UIC card (n=13)	**1 (7.7)**
Visit Mstyle clubs in the past 12 months	**10 (23.8)**
Visit Sreysros clubs in the past 12 months	**5 (11.9)**
Ever used online services (e.g. Facebook, website) developed by MSM/TG	**24 (57.1)**
Accessed MStyle Facebook page in the past 6 months	**3 (7.1)**
Accessed MStyle Website in the past 6 months	**2 (4.8)**
Access Sreysros facebook page in the past 6 months	**3 (7.1)**
Access Sreysros website in the past 6 months	**2 (4.7)**
Ever received a voice message from Voice4U by number 070221011 and/or 1295	**1 (7.7)**

Abbreviations: *UIC, Unique Identity Code; NGO, Non-Governmental Organization*

5. List of research team members

Members of NCHADS's Surveillance Unit:

1. Dr. Mun Phalkun : Chief of Surveillance Unit
2. Dr. Chann Navy : Deputy-chief of Surveillance Unit
3. Dr. Lay Panhavorn : Surveillance Unit
4. Mrs. Seng Sopheata : Surveillance Unit
5. Dr. Chun Vichea : Surveillance Unit

Members of Flagship Project (Research Team):

1. Dr. Yi Siyan : Director, KHANA Center for Population Health Research
2. Mr. Tuot Sovannary : Manager, KHANA Center for Population Health Research
3. Dr. Ngin Chanrith : Senior Research Advisor, KHANA Center for Population Health Research
4. Mr. Chhim Srean : Senior Technical Officer, Research, FHI 360
5. Mr. Ly Cheaty : Research Manager: HIV, Population Services Khmer (PSK)
6. Mr. Chhoun Pheak : Research Fellow, KHANA Center for Population Health Research
7. Ms. Pal Khuondyla : Research Fellow, KHANA Center for Population Health Research

Members of Data Collection Team:

1. Mr. Noan Sereyboth : Field Coordinator
2. Mr. Keat Engchhoung : Team Leader
3. Mr. Lmot Samkol : Team Leader
4. Mr. Ong Seyha : Team Leader
5. Mr. Chhay Leangchheng : Interviewer
6. Mr. Choem Bunthy : Interviewer
7. Mr. Heng Bunna : Interviewer
8. Mr. Sam Ousphea : Interviewer
9. Mr. Kuo Chak : Interviewer
10. Mr. It Ponnrith : Interviewer
11. Mr. Seng Menghuor : Interviewer
12. Mr. Yi Seiha : Interviewer
13. Mr. Yoeu Sas : Interviewer

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