HEALTH RESEARCH UNION

INTEGRATED BIO-BEHAVIORAL SURVEY AND POPULATION SIZE ESTIMATION AMONG MEN WHO HAVE SEX WITH MEN IN GEORGIA

Risk Behaviors and HIV Prevalence and Population Size Estimation Among Men Who Have Sex with Men

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Acronyms

AIDS	Acquired Immune AIDS Deficiency Syndrome
AIDS Center	Infectious diseases, AIDS and clinical immunology research center
Anti HBc	Antibodies to hepatitis B core antigen
Anti-HCV	Hepatitis C virus antibodies
CI	Cumulative incidence
DEFF	Expected effect of the design
HBs Ag	Hepatitis B surface antigen
HBV	Hepatitis B Virus
HCV	Hepatitis C Virus
HIV	Human Immunodeficiency Virus
ITB	Information transmission biases
MSM	Men who have Sex with Men
NCDC	National Center for Disease Control and Public Health
NSU	Network scale-up
OR	Odds Ratio
p	*p* value
PSU	Primary sampling unit
RDS	Respondent-driven sampling
RDS-A	RDS analyst
RPR	Rapid Plasma Reagen
SPSS	A statistical package for the social sciences
SSU	Secondary sampling unit
STI	Sexually Transmitted Infection
TPHA	Treponema Pallidum Hemagglutination
TSU	Tertiary sampling unit
UNAIDS	UNAIDS Joint United Nations Programme on HIV/AIDS
VCT	Voluntary counseling and testing
WHO	World Health Organization
$\chi 2$	A chi-square test
95% CI	95% confidence interval

Definitions

Man, who has Sex with Man (MSM) - A man, who has had sexual contacts with other men, independently of his self-identification as gay.

Regular sexual partner – a sexual partner with whom the sexual relationship lasts for more than one year or lasts for less than one year, but there is an intention to continue the relationship.

Casual sexual partner – a sexual partner who is not a regular partner and with whom a sexual relationship is established without financial compensation.

Commercial sexual partner - a sexual partner with whom a sexual relationship is established in exchange for material remuneration (pays the partner or receives remuneration from the partner).

Study Summary

Introduction

HIV infection continues to be a major public health problem worldwide. Compared to the general population, the risk of HIV infection is on average 26 times higher among men who have sex with men (MSM) due to social problems, HIV-related stigma, discriminatory gender and cultural norms, poverty and other inequities that create barriers to access HIV prevention and treatment services for this key population.

Despite the low prevalence of HIV in the general population in Georgia, high concentration of the infection in key populations, including MSM, represents one of the country's major public health problems and the greatest challenge to achieve the goal of ending the AIDS epidemic by 2030. Thus, it is appropriate to conduct behavioral biomarker studies on a regular basis for the estimation of HIV prevalence in key populations, assessment of factors contributing to the spread of HIV infection, and evaluation HIV prevention interventions and programs.

This report describes an integrated bio-behavioral surveillance survey (IBBSS) among MSM conducted in 2023 in Tbilisi, Batumi, and Kutaisi. The study objectives were:

1. Estimate the prevalence of HIV infection, hepatitis B, hepatitis C and syphilis among MSM;
2. Determine HIV-related risky sexual behaviors among MSM;
3. Evaluate the knowledge, attitude and practices about HIV/AIDS, hepatitis B and hepatitis C among MSM;
4. Assessment of stigma, discrimination and violence among MSM;
5. Evaluate the utilization of medical services and preventive programs among MSM;
6. Identify preferred sources of information on HIV/AIDS and STIs.

Methods

The study was conducted using cross-sectional design in three cities of Georgia: Tbilisi, Batumi, and Kutaisi. Recruitment of the participants in the study was done by respodent driven sampling (RDS) methodology. The study included behavioral and biomarker components. Inclusion criteria for the study participants were age ≥18 years, male biological sex, sexual (both passive and active) contact (anal or oral) with another man in the past 12 months, Georgian citizenship, lliving in the city selected for the study, ability to answer the questionnaire prepared in Georgian language, ability to give an informed consent to participate in the study, willingness to participate in both study components.

In behavioral component of the study face-to-face interviews were conducted using the specially developed structured questionnaire. As a result of the survey, the following information was collected from the study participants: socio-demographic characteristics; alcohol and drug use; history of sexual life; number and types of sexual partners; engaging in commercial sex; risky sexual behaviors; different sexual practices; use of condoms and lubricants; knowledge of sexually transmitted infections (STI), practices and utilization of medical services; knowledge, attitude and practices about HIV/AIDS, hepatitis B and C; practices of stigma, discrimination and violence; preferred sources of information about STIs. The biomarker component of the study included testing of blood samples of the study participants for HIV infection, syphilis, hepatitis B and C.

Collected data were entered and analyzed using statistical software SPSS v22. Univariate, bivariate, and multivariate analyses were conducted. To obtain RDS data, collected data were entered into RDS-Analyst 3.6.0 software, where univariate analysis was performed using Gile's SS (Sequential Sampler) method.

Results

Prevalence of HIV, hepatitis and syphilis

- 15.3% of study MSM were positive for HIV.
- RPR was positive in 15.2%, anti-HBc was positive in 21.3%, and active HBV infection (positive HBsAg) was in 3.1% of study individuals.
- No statistically significant difference was found in HIV prevalence compared to the 2018 study results.
- In terms of syphilis and hepatitis C, there is a statistically significant increase in prevalence. Particularly, there is a considerable rise in the prevalence of syphilis (from 9.7% to 15.2%), as well as of hepatitis C (from 1.8% to 7.8%).

Sexual behavior

- To the question 'What type of sexual partner you are' 15.5% answered 'penetrated', 33.0% - 'penetrator', and 55.0% - 'penetrative and penetrator'.
- In the past 12 months, 55.2% of respondents had more than 3 casual partners. 0.9% had their first anal sex at the age of ≤10, 2.7% - at the age of 11-13, 30.7% - at the age of 14-17.
- 34.0% of study MSM did not use a condom during the last anal sex, in general, 39.7% use a condom always, and 13.9% - never.

- 23.3% of respondents had sex with a man in a foreign country, and 67.4% did not use a condom.
- 5.4% of study participants are aware, and 3.2% suppose that the male partner with whom they had their last anal sex, was HIV-positive.
- Only 57.5% used condoms with a casual male partner during the last anal sex, and only 42.4% reported that they always use condoms with a casual sex partner.

Sexual history: commercial partners

- In the last 12 months, 6.2% of study subjects had sex with 1-5 partners, 0.6% - with more than 5 commercial partners and 0.8% did not have anal sex with a commercial male sexual partner.
- 79.1% of surveyed MSM used a condom with a commercial male partner during the last anal sex.

Involvement in commercial sex (sex business)

- 6.8% of MSM engage in sex with men to receive material remuneration, of which 34.2% indicated that they do not have income sources other than commercial sex.
- 21.9% of MSM who are involved in commercial sex, had more than two commercial clients in one working day.
- The rate of sex for material remuneration is highest in Batumi.
- In the past 1 year, 58.9% used condoms regularly with a casual female partner (58.9%) and with a commercial female partner (77.2%).

Group sex

- In the last 12 months, 28.5% of study subjects engaged in the group sex. There was a statistically significant correlation between the group sex and alcohol consumption.
- During the last group sex, the condom usage rate with all partners was lower in MSM who tested positive for syphilis (71.0%).
- 80.4% of respondents buy condoms in the pharmacy, and 42% receive them from non-governmental organizations.

Sexually transmitted infections (STIs)

- For the last 12 months, almost one-fifth (18.4%) has had discharge or rash/ulcer/pimple on the genitals or around the anus.
- 71.5% of MSM have undergone STI testing.
- 67.4% of study participants who have had genital or anal discharge, or ulcer/pimple visited medical facilities, 15.8% self-treatment, 17.8% visited a pharmacy, 8.4% -physician's home, 6.9% - medicine man.
- 21.3% did not disclose symptoms to their partner, 12.5% did not stop sex after the onset of symptoms and 14.5 didn't use condoms during symptoms.

Knowledge, attitude and practice regarding HIV/AIDS

- 86.7% of surveyed MSM think that the risk of HIV transmission can be reduced by using a condom, according to 8.3% of participants it is not possible. Almost one-fifth (19.6%) believe that it is impossible for a person who looks healthy to have HIV infection. The awareness among the surveyed MSM regarding methods of HIV transmission is as follows: by mosquito bite - 23.8%, sharing food - 15.2%.
- 80.6% of study participants have been tested for HIV and for majority (87.8%) it is known where to test for HIV if needed. 36.1% of MSM have been tested for HIV during the last 3 months, 37.3% during the last 3-12 months. Testing rate is higher in younger age group.
- Only 3.9% of surveyed MSM believe that their individual risk of being HIV-infected is high, 20.7% evaluate this risk as medium, according to 33.7% the risk is low and for 10.0% this risk does not exist.

Knowledge, attitude and practice regarding hepatitis B and C infections

- 62.2% of surveyed participants have been tested for hepatitis C and this rate is higher among the group of older MSM (87.7% vs 72.5%; p<0.001).
- Only half of study participants (50.6%) have heard about the national hepatitis C elimination program and only 47% know that treatment for hepatitis C in the country is completely free.
- 41.8% of surveyed MSM have been tested for hepatitis B. 38.9% and 34.6% know that antiviral medication and vaccine for hepatitis B exists, respectively. Only 7.5% have been vaccinated and 39.6% would get vaccine against hepatitis B if offered.
- The prevalence of hepatitis and syphilis was highest in Kutaisi.

Difference between beneficiaries and nonbeneficiaries of preventive services

An individual was considered as beneficiary of preventive services if he had received condom and lubricant by social worker or peer educator or in the healthcare office during the last 12 months.

- 23.9% of service (condom and lubricant from a social worker or in a healthcare office) beneficiary and 5.6% of nonbeneficiary MSM were anti-HIV positive (p<0.001).
- 19.6% of services beneficiaries and 10.1% of nonbeneficiaries were RPR (+) (p<0.01).
- Frequency of condom use during the last sexual contact does not statistically differ between beneficiaries and nonbeneficiaries.
- Proportion of study participants, who have been a victim of violence during the last 12 months is 2 times higher in MSM who receive services (27.5% vs 11.9%; p<0.001).

Drug and alcohol use

During the last 12 months, most frequently used substances were named as follows: Marijuana (38.5%), ecstasy (11.3%), amphetamine (11.2%) and Subutex (7.0%). 27.4% of surveyed MSM indicated being under the influence of alcohol or drugs during the last anal sex, in particular alcohol (71.1%), Marijuana (27.7%), Poppers (6.3%), Heroin (5.4%) and Cocaine (5.3%).

Conclusions and recommendations

- Prevalence of HIV infection slightly decreased compared to 2018, however this difference is not statistically significant. There is a significant difference in hepatitis C prevalence compared to the previous study. However, HCV prevalence rate in 2018 (1.8%), is 3 times lower than the prevalence rate (6%) among the general population in the country. This is difficult to explain, due to the fact that in 2020 meta-analysis of 1221 studies showed that HCV seroprevalence in MSM population is higher than in general population.
- One third of beneficiaries mentioned being underage when having first sexual contact (especially alarming in childhood). it is very important to conduct further studies to evaluate factors associated with underage sexual contacts to plan preventive interventions of health-related consequences.
- Rate of condom use is low (only one-third uses it consistently), including among beneficiaries of community organizations. We did not find statistically significant difference in condom use between beneficiaries and nonbeneficiaries. It is especially important to note the inadequate rate of condom use with commercial or casual sexual partners. This entails that educational activities regarding sexually transmitted diseases and their prevention should be implemented more actively.
- Respondents frequently reported having symptoms of sexually transmitted diseases, however percentage of MSM who have been tested for STI has increased.
- It is alarming that from those who had symptoms of sexually transmitted infections, less individuals referred to a medical facility than to self-treatment, physician's home visits or a non-traditional medicine. In this regard, it is important to conduct regulatory and educational interventions, since self-treatment and "medications" given by traditional healers poses a risk to people's health. It is especially problematic that in case of receiving self-treatment or nontraditional treatment, contact tracing becomes impossible. The issue of rising drug resistance of the sexually transmitted microorganisms (for example, gonorrhea) is also noteworthy.
- Perception of HIV infection risk is low among MSM. Informational campaign should be reinforced for MSM to adequately evaluate infection risk, which is a crucial factor for using preventive methods.
- Percentage of respondents who have heard about hepatitis C elimination program and the opportunity to receive free treatment is low. In the situation, where hepatitis C elimination program coverage is significantly decreased in the country,

low awareness in this group indicates that overall, the communication with population regarding HCV elimination program is not adequate.

- Hepatitis B testing and vaccination rate is also very low. Accordingly, the importance of planning and conducting informational campaign regarding viral hepatitis among MSM population is obvious.
- High-risk behaviors are the most prevalent and awareness level is lowest in Kutaisi, accordingly, in this city, activities of community organizations should be reinforced to increase awareness and improve prevention.
- HIV infection (5 times) and syphilis (2 times) prevalence is significantly higher among preventive programs' beneficiaries compared to nonbeneficiaries (statistically significant difference), which could be explained by the fact that they refer to non-governmental organizations more commonly after being diagnosed for any infection. Due to the fact that cross-sectional study design was used and the survey did not consider determining temporal sequence (the infection had been diagnosed first, or the respondent had been enrolled in preventive program), it is impossible to assume any cause-and-effect relationship. Accordingly, preventive program coverage should be increased among noninfected MSM. More beneficiaries reported having experienced violence compared to nonbeneficiaries. This also can be explained by the fact that MSM victims of violence more frequently refer to non-governmental organizations. Similarly, temporal sequence cannot be defined by this study.

Introduction

HIV infection continues to be a major public health problem worldwide. Although the recent scientific advances, progress in medical technology, and widespread development of prevention and treatment services have reduced the global burden of HIV, new cases of HIV infection have increased in some regions [1]. For example, the number of new HIV infections increased by 48% in Eastern Europe and Central Asia from 2010 to 2021 [2]. The World Health Organization (WHO) estimates that globally 1.7 million people were infected with HIV in 2022 [1].

In 2020, the world set ambitious targets 95-95-95 to end the HIV epidemic by 2030 [3]. Despite significant progress, achieving these goals is unlikely without accelerating the implementation of HIV prevention and treatment services. Social problems, HIV-related stigma, discriminatory gender and cultural norms, poverty and other inequities create barriers to accessing prevention and treatment services for people living with HIV, especially among key populations, including men who have sex with men (MSM) [4].

Compared to general population, the risk of HIV infection is on average 26 times higher among MSM [5]. According to UNAIDS 2023 data, the global prevalence of HIV in the adult general population is 0.7%. This indicator reaches 7.7% in MSM population [6]. Thus, prioritizing key populations in the fight against HIV will have a significant impact on the epidemic. Implementation of effective prevention services in key populations, including MSM, can be achieved through the implementation of combined biomedical and behavioral prevention interventions, including sexual education, providing access to condoms, harm reduction services, voluntary male circumcision, pre-exposure prophylaxis (PrEP), etc. [7]. To implement the above-mentioned interventions, it is also necessary to provide a stigma-free and non-discriminatory environment.

Georgia is a country with low prevalence of HIV/AIDS. The prevalence of HIV in the adult general population is 0.4% [8]. According to the data of Infectious Diseases, AIDS, and Clinical Immunology Research Center as of October 30, 2023, totally 10,288 cases of HIV infection have been registered in Georgia, of which approximately 75% are men. Almost half of those infected (48.4%) developed AIDS, and 21.1% died. Since 2022, an increasing number of new cases of HIV infection has been observed in Georgia [9]. Despite the low prevalence of HIV in the general population, high concentration of the infection in key populations, including MSM, represents one of the country's major public health problems and the greatest challenge to achieve the goal of ending the AIDS epidemic by 2030. Integrated Bio-Behavioral Surveillance Surveys (IBBSS) conducted in recent years in Georgia show that HIV prevalence is alarmingly high among MSM (25.1% in 2015 and 21.5% in 2018) [10,11].

It is appropriate to conduct behavioral biomarker studies on a regular basis for the estimation of HIV prevalence in key populations, assessment of factors contributing to the spread of HIV infection, and evaluation HIV prevention interventions and programs. In Georgia integrated behavioral surveillance surveys with biomarker component have been conducted in MSM since 2002. The most recent study was conducted in 2018 in three cities of Georgia, namely in Tbilisi, Batumi, and Kutaisi [11].

This report describes another integrated bio-behavioral surveillance survey (IBBSS) in MSM conducted in 2023 in Tbilisi, Batumi, and Kutaisi. This study was conducted together with the MSM population size estimation study, the results of which will be published as a separate report.

Study goal and objectives

The goal of the study was to estimate the prevalence of HIV infection and evaluate risky behaviors among men who have sex with men (MSM).

Study objectives:

7. Estimate the prevalence of HIV infection, hepatitis B, hepatitis C and syphilis among MSM;
8. Determine HIV-related risky sexual behaviors among MSM;
9. Evaluate the knowledge, attitude and practices about HIV/AIDS, hepatitis B and hepatitis C among MSM;
10. Assessment of stigma, discrimination and violence among MSM;
11. Evaluate the utilization of medical services and preventive programs among MSM;
12. Identify preferred sources of information on HIV/AIDS and STIs.

Study methods

Study design

The study was conducted using cross-sectional design. Inclusion of the participants in the study was done by respodent driven sampling (RDS) methodology. The study included behavioral and biomarker components. Behavioral component implied face-to-face interviewing of study participants with specially designed structured questionnaire. Biomarker component included blood testing of surveyed study subjects for HIV infection, syphilis, hepatitis B and hepatitis C.

Study site

The study was conducted in three cities of Georgia: Tbilisi, Batumi, and Kutaisi.

Sample size

The sample size for each city was determined by closely matching the sample sizes of the 2018 IBSS conducted among MSM. The minimum number of MSM participating in the study was determined to be 650 individuals, including 300 MSM in Tbilisi, 200 MSM in Batumi and 150 MSM in Kutaisi. In total, 653 people participated in the study. The numbers of research participants by cities were distributed as follows: Tbilisi - 302 participants, Batumi - 201 participants, and Kutaisi - 150 participants.

Selection of study participants

Criteria for selection of study participants

Selection of the potential participants and enrollment in the study was done according to the following inclusion and exclusion criteria:

Inclusion criteria:

- Age ≥18 years
- Male biological sex
- Sexual (both passive and active) contact (anal or oral) with another man in the past 12 months
- Georgian citizenship
- Living in the city selected for the study
- Ability to answer the questionnaire prepared in Georgian language
- Ability to give informed consent to participate in the study (signing the informed consent form specially developed for the study)

- Consent to participate in both study components (behavioral and biomarker components)

Exclusion criteria:

- Already participating in the current study
- Refusal to participate in any component of the study
- Inability to give informed consent (including due to being under the influence of alcohol or drugs)
- Not having valid coupon

Recruitment of study participants

Respondent-driven sampling (RDS) is a method used to recruit hard-to-reach populations with stigmatized behaviors, such as MSM. RDS method includes "snowball sampling" (which involves recruitment of research participants by other participants) with mathematical modeling, which allows to weight the sample and get closer to representative estimates as much as possible. Although the RDS methodology has limitations such as sampling error, it is widely used for the recruitment and enrollment of hard-to-reach populations in the study.

We started the recruitment of study participants with a purposive selection of "seeds" that represented the target population and the first participants of the study. Besides the inclusion and exclusion criteria, additional factors such as different socio-demographic characteristics and access to various groups of MSM were considered during selection of "seeds" to ensure the diversity of the sample. In total 15 “seeds” were selected for the study, 7 in Tbilisi, 5 in Batumi and 3 in Kutaisi.

Selection of “seeds” were carried out by organizations with long experience of working with MSM: NNLE „Equality Movement “and NNLE „Tanadgoma – Center for Information and Counseling”.

Table 1. Social-demographic characteristics of "seeds" by cities

Characteristics	Tbilisi	Batumi	Kutaisi
Age groups			
<25 years	5	2	1
≥25 years	2	3	2
Education level			
High school/college/vocational training center	0	1	0
Student	1	1	0
Incomplete/complete university	6	3	3
Marital status			
Married	0	0	1
Never been married	7	5	2
Employment			
Permanent job	4	3	2
Irregular job	2	0	1
Unemployed	1	2	0
Monthly income			
<300 GEL	1	1	0
300-700 GEL	0	1	1
700-1000 GEL	0	1	2
>1000 GEL	6	1	0
Refused to answer	0	1	0
Total	**7**	**5**	**3**

Enrollment of each selected "seed" in the study was done after signing a specially designed informed consent form. After study enrollment the "seeds" participated in behavioral (interviewing) and biomarker (blood sampling) components. After completing these procedures, each "seed" was given three coupons with special, unique code to recruit three MSM from their social network for study participation. The "seeds" were instructed in detail how to recruit potential participants. All coupons had serial numbers, location of study sites and information about monetary reward. "Seeds" were offering their peers to participate in the study and giving coupons to those who agreed. Potential study subjects should present coupons for study participation. Each of the three MSM recruited by the initial seed to participate in the study represented the first wave of the recruitment. These participants were also given coupons to recruit three other MSM from their social networks to participate in the study, representing the second wave of the recruitment. Participants of the second wave were similarly given three coupons to recruit three other MSM and this process continued until the desired number of study

participants was reached. The distribution of recruitment coupons was discontinued shortly before the desired number of respondents was reached. The desired sample size was achieved in all three cities selected for the study. The number of waves from the "seeds" varied between the cities (Table 2).

Table 2. Information about recruitment

Study site	Maximal number of waves	Total number of coupons issued	Number of returned coupons	Number of respondents recruited by „seeds“
Tbilisi	10	817	295	295
Batumi	15	570	196	196
Kutaisi	11	426	147	147
Total		**1813**	**638**	**638**

Recruitment of the study participants included a double incentive system: a primary reward for participating in the study and a secondary reward for recruiting other MSM into the study. The primary reward was 40 GEL (approximately 14 USD), and the secondary reward was 15 GEL (approximately 5.5 USD) for the inclusion of each new respondent in the study.

Data related to coupons was managed in the MS Excel coupon management database specially developed for the study.

Before inclusion in the study, each potential participant underwent verification procedure, which allowed to verify that the individual really met study inclusion criteria. The procedure included an informal interview with the potential study subject about places and means of finding partners, sexual practices, frequency of changing partners and health problems related to homosexual relationships.

During the study enrollment, each participant was assigned a 15-digit unique identification code, which was recorded in the identification database to avoid duplication of the study subjects. The unique codes were generated using first letters or digits of name, surname, mother's and father's names, place of birth, gender, etc. of the study subjects.

Data collection

Fieldwork in all three cities began on July 20, 2023, and ended on October 30, 2023. Field work was carried out by the following organizations: NNLE "Health Research Union" (Tbilisi), NNLE "Equality Movement" (Tbilisi, Kutaisi and Batumi), NNLE "Imereti Medicine Development Center" (Kutaisi), NNLE „Tanadgoma – Center for Information and Counseling" (Batumi).

Behavioral component

Data collection was carried out through individual face-to-face interviews. The survey tool was a structured questionnaire used in previous IBSS study conducted among MSM in 2018. Prior to the fieldwork the questionnaire was adapted by a group of experts in the field and some questions were added, such as questions to evaluate knowledge, attitude and practices about hepatitis B and C. MSM size estimation study was conducted in conjunction with the IBSS, so the questionnaire also included questions to estimate the size of the MSM population.

The study participants were interviewed by interviewers specially trained for this study. The interviewers were selected from the employees of NNLE "Health Research Union", NNLE "Equality Movement", NNLE "Imereti Medicine Development Center", NNLE „Tanadgoma – Center for Information and Counseling" who had experience working with MSM and conducting similar studies. At the beginning of the study, all interviewers participated in the training, which included instruction, practical exercises, and piloting of all research procedures, such as enrolling subjects in the study, obtaining informed consent, conducting interviews, etc. During the training, all interviewers had the opportunity to review the study protocol and data collection instruments. During the training, special attention was paid to the ethical side of the research, in particular, the issues of the LGBT community; gender and sexuality; gay and bisexual men's subpopulation; HIV/AIDS-related stigma, discrimination, and activism; strategies and forms of ethical communication with the LGBT community; anonymity and confidentiality.

Interviewers conducted face-to-face interviews in a private environment with full confidentiality. The average duration of the interview was 30-40 minutes. The interviews were conducted in Georgian using electronic questionnaires administered by the interviewers.

As a result of the survey, the following information was collected from the study participants: socio-demographic characteristics; alcohol and drug use; history of sexual life; number and types of sexual partners; engaging in commercial sex; risky sexual behaviors; different sexual practices; use of condoms and lubricants; knowledge of

sexually transmitted infections (STI), practices and utilization of medical services; knowledge, attitude and practices about HIV/AIDS, hepatitis B and C; practices of stigma, discrimination and violence; preferred sources of information about STIs.

Biomarker component

The biomarker component of the study included testing of blood samples for HIV infection, hepatitis B, hepatitis C and syphilis.

After completing the behavioral component, the study participants were asked to provide voluntarily blood samples for HIV, hepatitis B, hepatitis C and syphilis testing which was organized at the place of interview in every city. With the consent of the study subject, after the pre-test consultation, an experienced nurse was taking a blood sample in the amount of 3-5 ml. Samples were coded using unique identification number assigned in the study and fifteen-digit code. The double coding system made it possible to minimize the risks of losing connection between the sample and the questionnaire.

Blood samples were sent to the laboratory of clinic NEOLAB (Tbilisi branch). If blood could not be transported on the same day, the collected samples were centrifuged, and the serum was stored in a refrigerator at 4-8^{0}C.

Rapid tests (On Site HIV1/2 Ab Plus Combo Rapid test, CTK Biotech) or Abbott ELISA (HIV Ag/Ab Combo Reagent Kit, ARCHITECT i1000SR) were used to screen for HIV infection. Confirmation of anti-HIV positive cases were performed at Infectious Diseases, AIDS, and Clinical Immunology Research Center.

Screening for anti-HCV (hepatitis C virus antibodies) was performed by rapid tests (On Site HCV Ab Plus Combo Rapid test, CTK Biotech) or ELISA (HCV Ab – CVAB, Diagnostic BioProbes Srl- Dia-pro).

Hepatitis B virus surface antigen (HBsAg) and anti-core antibodies (anti-HBc) were screened by ELISA (HBsAg and anti-HBc(total) one Version ULTRA, Diagnostic BioProbes Srl- Dia-pro; Abbott, HBs Ag Qual II Reagent Kit, ARCHITECT i1000SR).

Syphilis screening was performed with a traditional algorithm: initially testing with a rapid plasma reagin (Syphilis RPR test, HUMAN), and in case of positive result confirmatory treponemal test such as T. pallidum hemagglutination assay (Syphilis TPHA liquid, HUMAN).

laboratory test results were notified to the study participants within 1 week. Study participants who were diagnosed with HIV infection, hepatitis B, hepatitis C or syphilis by confirmatory testing were referred to appropriate diagnostic and treatment facilities.

Study ethics

Study participation was voluntary. Each potential study participant was informed about the goal, objectives, methods, procedures, risks, and benefits of the study. All individuals who agreed to participate in the study signed an informed consent form and then were enrolled in the study. Anonymity of the study participants was protected. The identity of the participants was not recorded, only the 15-digit code of the respondent was mentioned on the entire documentation. In the case of positive screening test result on HIV infection or hepatitis C the participant's identification data (name, surname, personal number) was obtained.

Before initiation of field work, the study protocol and instruments were reviewed and approved by Institutional Review Board of Health Research Union (IRB00009520; IORG005619).

Data analysis

Data entry, management and statistical analysis were performed using statistical software SPSS v23. Descriptive statistical methods were used to characterize the variables studied in the target populations. The study variables were compared between different study groups using t-test statistic for quantitative and chi-square tests for categorized data. The selected indicators were compared with the IBSS 2018 data.

The structures of social networks of MSM and the recruitment data were analyzed using network visualization program (NetDraw 2.179).

To obtain RDS data, collected data were entered into RDS-Analyst 3.6.0 software, where univariate analysis was performed using Gile's SS (Sequential Sampler) method.

Results

Socio-demographic characteristics

653 MSM participated in the study, with 302 (46.2%) interviewed in Tbilisi, 201 (30.8%) – in Batumi, 150 (23.0%) – in Kutaisi. One third (30.7%) of study participants were ≤24 years old. 1.3% of MSM have not received education, 16.7% have received incomplete secondary education, 30.9% - complete secondary/college/technical school, 12% - incomplete higher, 33.4% - higher and 5.7% are students. 10.2% of MSM are married, 14.6% - divorced/separated, 3.5% - widowed, 71.7% have never been married. Almost half of respondents (45.5%) have permanent job, 26.5% - irregular job and 28.0% are

unemployed. 15.4% has monthly income of ≤300 GEL and 29.8% - more than 1000 GEL. 76.5% of MSM have never participated in similar studies before, 17.1%, 1.0% and 0.5% participated in a similar study in 2018, 2015 and 2012 years, respectively.

Prevalence of infections

15.3% of study participants tested positive for HIV. RPR was positive in 15.2% of study subjects. Confirmation of RPR-positive cases was done by TPHA test, and syphilis was confirmed in 93.9%. 21.3% of MSM were positive for anti-HBc, and active HBV infection was found in 3.1% of individuals.

Alcohol and drug use

22.6% of MSM do not consume alcohol. For the last month, 2.4% consumed alcohol at least once a week. In the past 12 months, among the most used drugs, Marijuana (38.5%) was reported most commonly, followed by Ecstasy (11.3%), Amphetamine (11.2%) and Subutex (7.0%), and less commonly Ephedra (0.6) and GHB/GBL (0.8%). In the last one year, 5.8% of study participants injected drugs at least once, and 2.2% used needles/syringes that had already been used by someone else. In the last 12 months, 5.3% of respondents had unprotected sex with person who inject drugs (PWID), 5.0% does not remember.

Sexual Behavior

Number and types of partners

To the question 'what type of sexual partner you are' 15.5% answered „penetrated", 33.0% - „penetrator", 55.0% - both, penetrated and penetrator and 1.9% refused to answer. 27.4% of MSM were under the influence of substances during their last anal sex, and most reported was alcohol (71.1%), Marijuana (27.1%), Poppers (6.3%), Heroine (5.4%) and Cocaine (5.3%). In the past 12 months, 14.1% did not have regular male partner, 41.9% had one regular male partner, 32.2% had 2-3 and 8.8% had more than 3 regular partners. One fifth (21.7%) had casual 1-3 male partners, 55.2% - more than three. Most respondents (80.3%) did not have commercial male partner in the past 1 year, 8.6% had 1-5 partners, 1.1% - more than five partners.

0.9% of respondents had first anal sex at the age of ≤10, 2.7% - at the age of 11-13, 30.7% - at the age of 14-17, 64.0% at age ≥18, 1.7% - refused to answer.

49.7% had the last anal sex with one regular partner, 49.0% - one casual partner, 0.7% - commercial partner, 0.1% - several partners (group sex). 34.0% of MSM did not use condom during their last sexual intercourse. To the question 'In general, in what frequency had you and your male partners used condom during anal sex in the last 12

months ‘39.7% answered ‘always’, 13.9% answered that they had never used. 23.3% had sex with male partner in another country and 11.9% had not used condom. 5.4% of study participants were aware, and 3.2% presumes that the male partner, with whom they engaged in anal sex, was HIV-positive.

Regular male partners

In the last 12 months, 3.6% of study participants did not have anal sex with regular partner, 42.0% had sex with one regular partner, 28.8% and 9.5% - with 2-3 and more than three partners, respectively. Only 51.3% used condom with regular male partner during the last sexual intercourse. The most common reasons of condom non-usage were ‘did not consider it necessary’ (39.3%), ‘I don’t like it’ (17.3%) and ‘we did not have it’ (12.5%). To the question ‘in general, in what frequency did you and your regular partner/partners used condom during anal sex for the last 12 months’ 31.1% answers ‘always’, 16.6% - ‘often’, 17.6% - ‘sometimes’, and 12.2% - ‘never’.

Sexual history: casual male sexual partners

In the last 12 months, 23.6% of respondents did not have anal sex with a casual male sexual partner, 44.7% had with 1-5 partners, 29.7% had with more than 5 partners. Only 57.5% used condom during their last sexual intercourse with a casual partner. The most common reasons of condom non-usage were ‘we did not have it’ (33.7%) and ‘refusal by a partner’ (29.5%). To the question ‘in general, in what frequency did you and your casual male partner/partners used condom during anal sex in the last 12 months’ 42.4% answers ‘always’, 11.0% - ‘often’, 16.5% - ‘sometimes’, and 6.5% - ‘never’.

Commercial partners

In the past 12 months, 0.8% of study subjects did not have anal sex with a commercial male sexual partner, 6.2% had with 1-5 partners, and 0.6% had with more than 5 commercial partners. Only 79.1% used condom with a commercial male partner during the last anal sex. To the question, 'in general, in what frequency did you and your commercial male partners used condom during anal sex in the last 12 months 57.4% answers 'always' and 16.5% - 'never'.

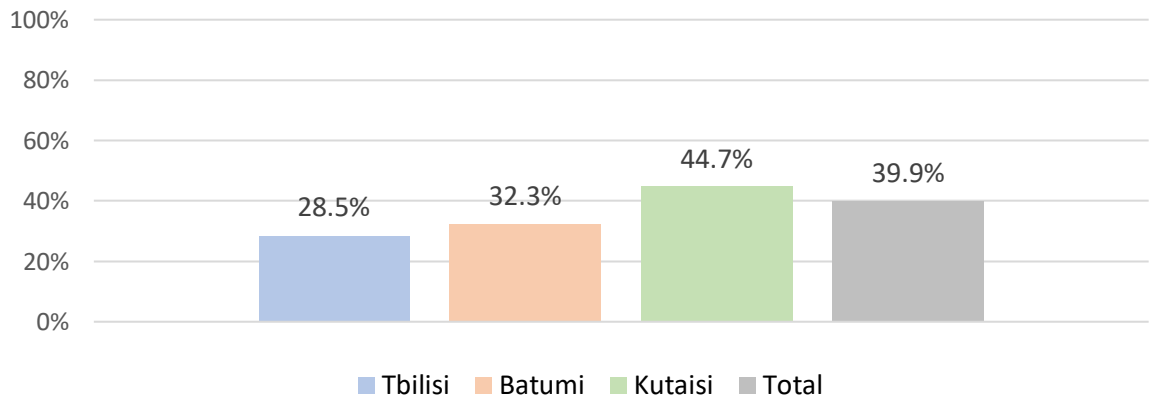
Involvement in commercial sex (sex business)

6.8% of MSM engage in sex with men in order to receive material remuneration. 97.3% receive material remuneration with money, 6.6% - with food, and 3.0% - with home/accommodation. 35.5% of respondents receive 51-100 GEL for the service, 45.1% - more than 100 GEL. 58.0% of MSM having commercial sex practice said that they do not have income sources other than commercial sex. 54.6% of respondents had 1-2 clients on one working day. 40.0% of MSM who are involved in commercial sex have more than 3 regular partners.

Sexual practice with women

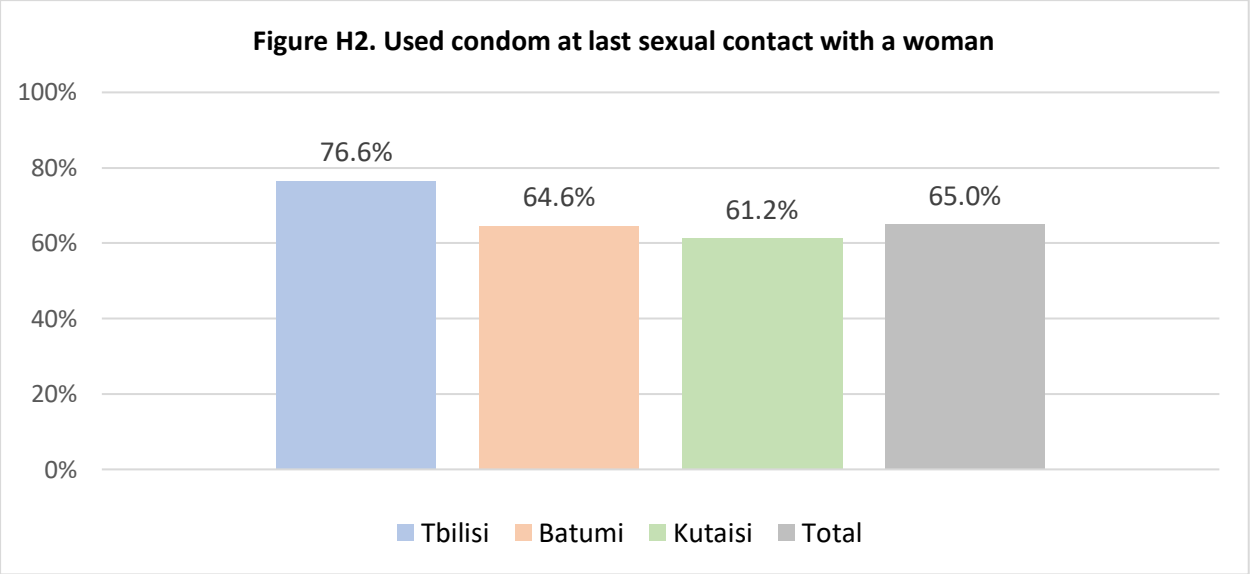
Among the surveyed MSM 39.9% reported having sex with a woman in the past 12 months, of which 32.2% had two or more regular female partners, 56.7% had two or more casual female partners, and 18.2% had two or more commercial female partners. Among the study participants, the highest frequency of sexual contact with a woman in the last 1 year was recorded in Kutaisi (44.7%), and the lowest in Tbilisi (28.5%) (Table H, Figure H1). This indicator was also relatively high among MSM ≥25 years old (39.6%), compared to younger ones (<25 years) (28.1%) (OR=1.6; 95% CI: 1.1-2.4) (Table H1).

Figure H1. Had sexual contact with a woman in the past 12 months

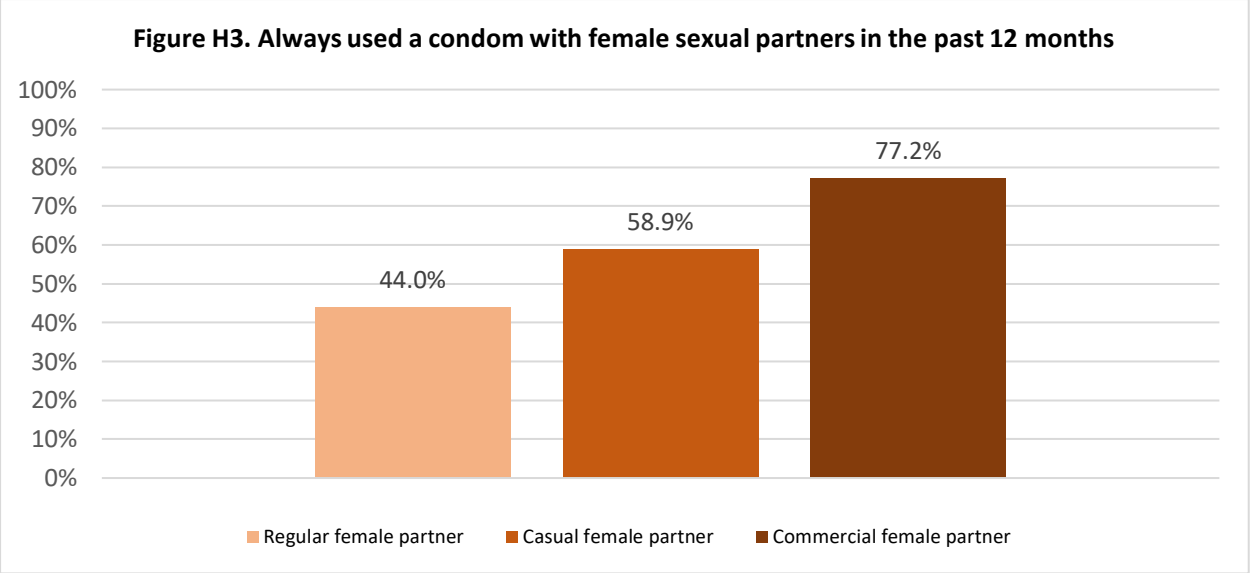


Approximately two-thirds (65.0%) of the respondents used a condom during the last sexual contact with a female partner. This indicator was the highest in Tbilisi (76.6),

compared to other cities (Table H, Figure H2). The likelihood of condom use at last sexual intercourse with a woman was statistically significantly associated with condom use during last anal contact with a man. Specifically, a higher proportion of the respondents who had used a condom during their last anal intercourse with a male partner reported using a condom at their last sex with a female partner than those who had not (84.0 vs. 39.0; OR=8.2; 95%CI: 1.1-16.2; p<0.0001) (Table H2).

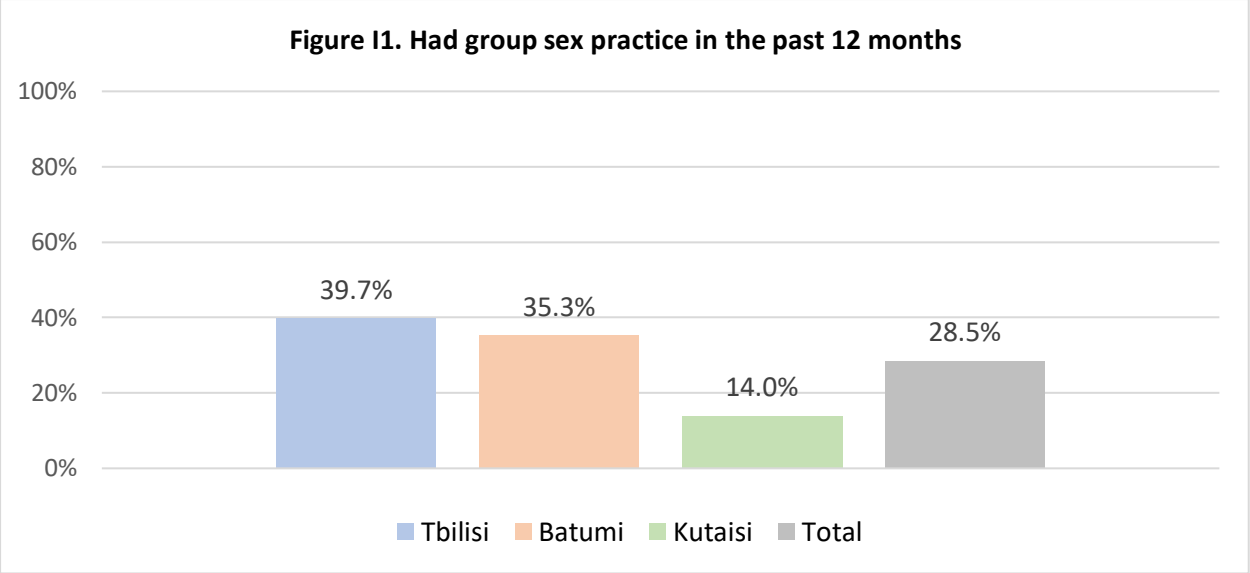


Among those who had a regular female partner in the last 1 year, only 44% used condoms consistently. The frequency of consistent condom use was relatively high with casual female partners (58.9%) and commercial female partners (77.2%) (Table H, Figure H3).

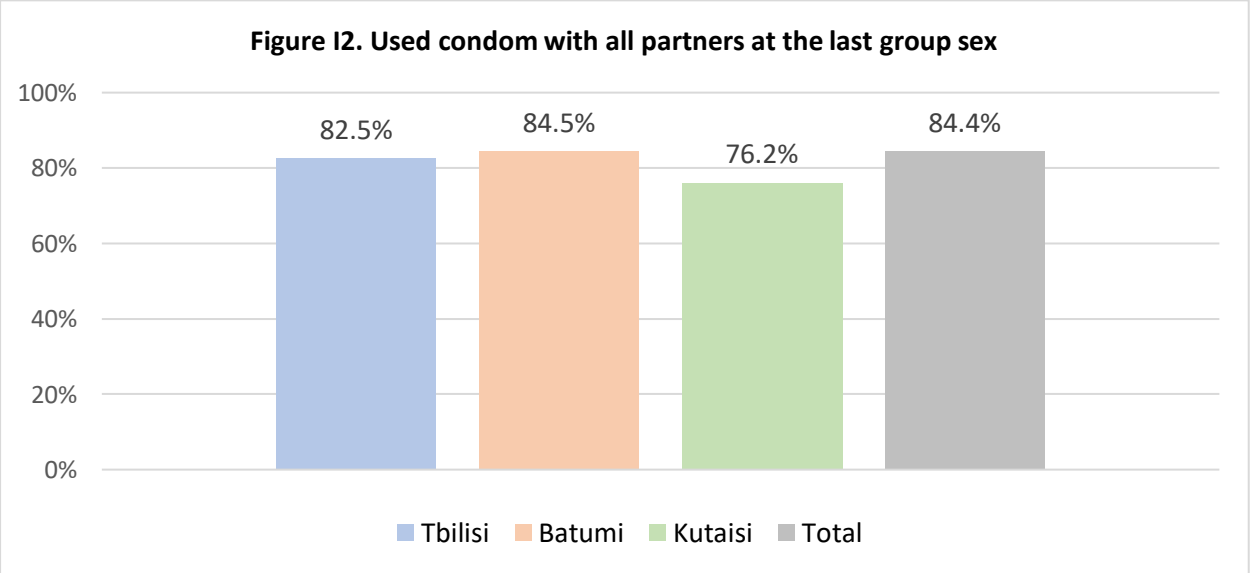


Group sexual practice

Group sex was practiced by 28.5% of the study subjects in the last 12 months, the majority of whom (71.2%) reported that these groups consisted of only men. Group sexual practices were highest in Tbilisi (39.7%) and lowest in Kutaisi (14.0%) (Table I, Figure I1). The likelihood of group sex practice was relatively higher among MSM living with HIV infection (42.4%) compared to HIV-negative respondents (31.3%) (OR= 1.6; 95%CI: 1.1-2.5; p=0.03). Group sexual practice was also statistically significantly associated with alcohol consumption, in particular, respondents who reported that they had never or rarely (one or two times per month) consumed alcohol in the past 1 month were less likely to engage in group sexual practice than more frequent (every day or once per week) consumers (30.0 vs 38.9%; OR=1.4; 95%CI: 1.1-2.1; p=0.02) (Table I1).



The frequency of condom use with all partners during the last group sex was 84.4%. Compared to other cities, this indicator was the lowest in Kutaisi (76.2%) (Table I). The chance of condom use with all partners during the last group sex was lower among MSM who tested positive for syphilis (71.0%) compared to those who tested negative (87.9%) (OR=0.3; 95%CI=0.1-0.8; p=0.01) (Table I2).



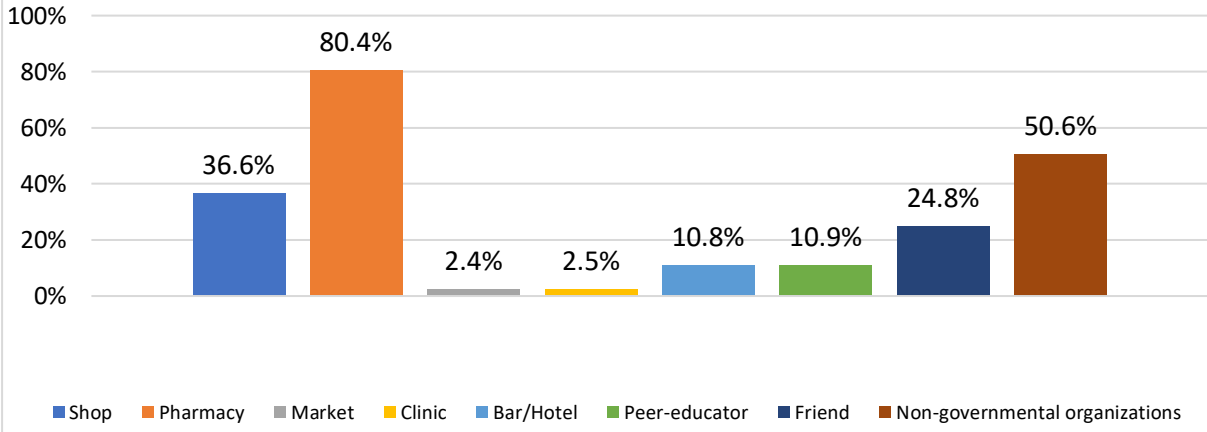
Other sexual practices

Of the other sexual practices, fingering (24.6%) was the most frequently reported by study participants, followed by using sex toys (7.9%) and fisting (2.4%). Sexual practices such as rimming, BDSM, rings, and anal penetration with vegetables was indicated by 2.1% of the respondents (Table W).

Condoms and lubricants

92.9% of the surveyed MSM stated that they know where or from whom condoms can be purchased or obtained. The most frequently named places or persons for purchasing or obtaining condoms by the respondents were distributed as follows: pharmacy (80.4%), non-governmental organizations (50.6%), shop (36.6%) and friend (24.8%) (Table J, Figure J1).

Figure J1. Place/person where/from whom can a condom be purchased/obtained



Only one-third (33.0%) of the study participants received condoms and lubricants from social workers, at health cabinets or peer educators in the past 3 months. This indicator was significantly lower in Kutaisi (24.7%) compared to other cities (Figure J2). 48.4% of the respondents received condoms and lubricants from preventive programs in the last 12 months. This indicator was also the lowest in Kutaisi (31.3%) (Table J).

Figure J2. Received condom and lubricant from preventive programs in the past 3 months

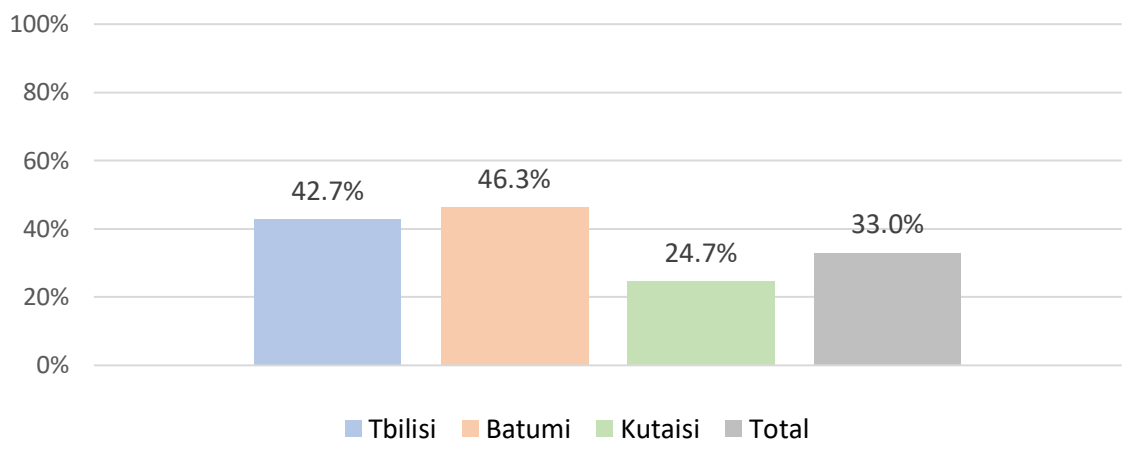
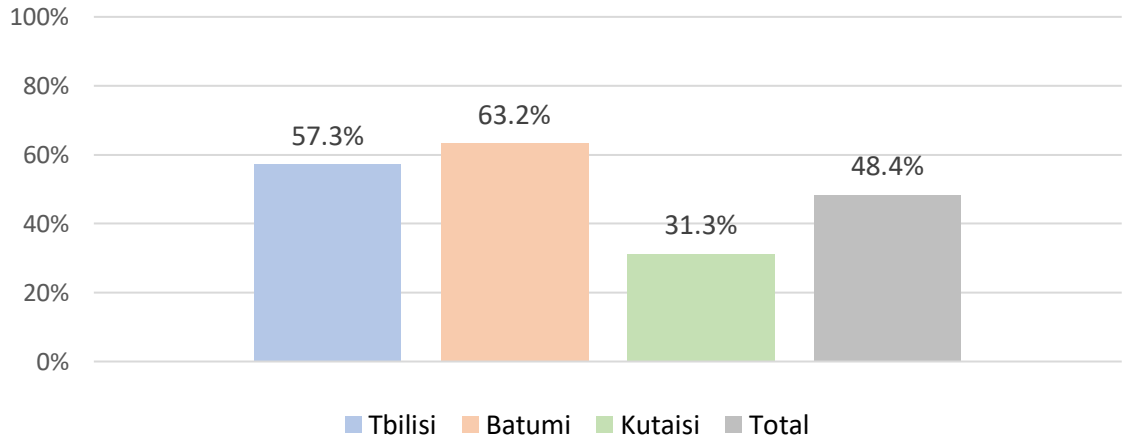


Figure J3. Received condom and lubricant from preventive programs in the past 12 months



Consistent use of lubricant during anal intercourse with male partners in the last 3 months was mentioned by small proportion of the respondents (19.8%). This indicator was remarkably lower in Kutaisi (10.0%) compared to other cities (Table J).

Sexual transmitted infections (STIs)

Most of respondents (92.0%) are aware of sexually transmitted infections. Main symptoms of STIs named by MSM were discharge, rash, burning, itching and etc. For the past 12 months, almost one fifth (18.4%) has had discharge or rash/ulcer/pimple on genitals or around anus. 71.5% of MSM have undergone STI testing, from which 22.3% tested in the last 3 months, 22.1% - in the last 3-12 months, 13.0% - in the last 1-2 years, and 18.9% - more than 2 years ago (Refer to diagram #3 for comparison of STI testing rate to previous study results). The main reasons of STI testing were: 'For prophylaxis' (67.7%), 'because of the symptoms' (15.2%) and 'sexual partner had STI' (5.6%).

STI treatment referral and other medical services

67.4% of study participants having genital or anal discharge or an ulcer/pimple, referred to a medical facility, 15.8% - to self- treatment, 17.8% - to pharmacy, 8.4% - to physician's home, 6.9% to a medicine man. 21.3% did not reveal their symptoms to their partner, 12.5% did not stop having sex after discovering their symptoms and 14.5% refused to use condoms during symptoms. In the last 12 months, 3.6% of study participants have referred to a proctologist, 1.8% of the respondents have undergone circumcision.

Knowledge, opinion and attitude regarding HIV/AIDS

Majority of study participants (97.2%) have heard of human immunodeficiency virus, HIV infection or AIDS. 11.3% of respondents think that HIV transmission is impossible by having one, non-infected sexual partner. 86.7% of the surveyed MSM believe that HIV transmission can be decreased by using a condom, 8.3% think that it is not possible to decrease the risk and 1.9% does not know if it is possible. Almost one fifth (19.6%) believes that it is impossible for a person who looks healthy, to have HIV infection.

The awareness among the surveyed MSM regarding modes of HIV transmission is as follows: by mosquito bite 23.8%, sharing food 15.2%, sharing a syringe/needle 90.0%, from mother to child 52.5%.

The majority (87.8%) knows where to get HIV test if needed and 80.6% of surveyed participants have been tested for HIV and. 36.1% of MSM have been tested for HIV during the last 3 months, 37.3% during the last 3-12 months, 15.1% during the last 1-2 years and 11.5% more than 2 years ago.

98.3.1% of respondents are aware of their HIV status. To the question: "what was your HIV test result" 11.4% responded as "positive", 82.1% responded as "negative", 1.5% answered "undetermined", 4.1% refused to answer this question. 3.9% of surveyed MSM

believe that their individual risk of being HIV-infected is high, 20.7% evaluates the risk as medium, 33.7% thinks, that their risk is low and for 10.0% this risk does not exist.

Knowledge, attitude and practice regarding hepatitis C and B viral infections.

62% of the surveyed participants have been tested for hepatitis C. Only half (50.6%) of surveyed MSM have heard about the national hepatitis C elimination program, only 47.0% of study participants are aware, that hepatitis C treatment is completely free in the country and 9.9% believe, that a vaccine exists against hepatitis C. The answers to the question regarding methods of hepatitis C transmission are as follows: By blood transfusion (65.7%), unprotected sex (58.7%), sharing syringe/needle (56.6%), receival of medical services by unsterilized instruments (9.9%) and others.

Only 41.8% of the surveyed MSM have been tested for hepatitis B. 60.7%, 53.7% and 53.4% of the study participants named blood transfusion, unprotected sex and sharing syringe/needle as modes of hepatitis B transmission, respectively.

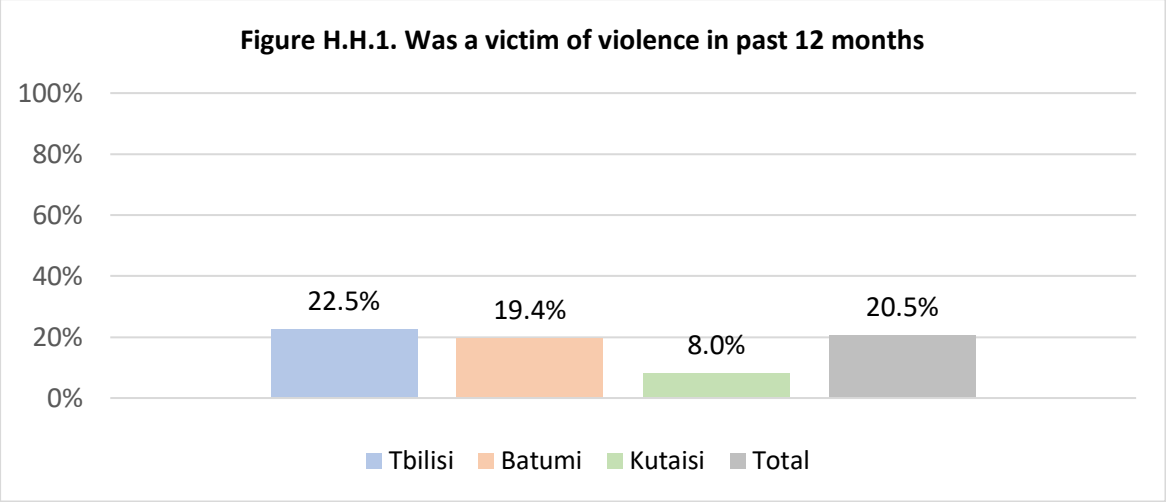
Only 38.9% of study participants know that antiviral medication exists for hepatitis B treatment. 34.6% of respondents are aware of the existence of a vaccine and 7.5% are vaccinated. To the question: "If offered, would you get vaccine against hepatitis B" 39.6% answered "yes", 6.0% answered "no" and 20.1% answered "I don't know". 35.8% of MSM selected medical facility as the preferable place for hepatitis B vaccination, 4.9% of respondents selected community organization.

Stigma, discrimination and violence

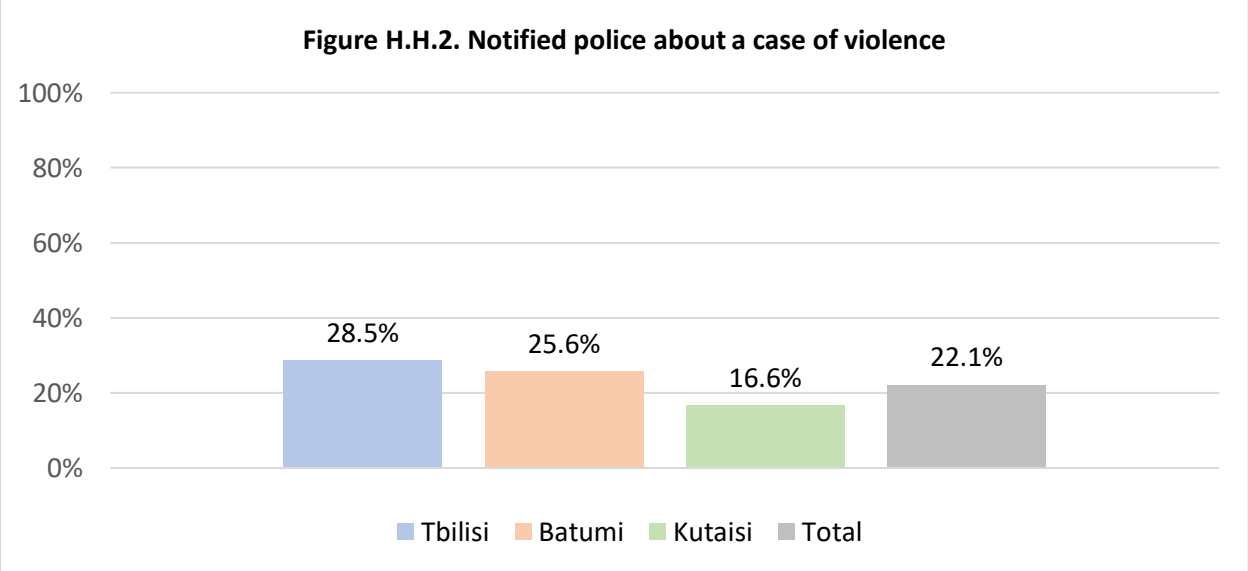
A small proportion of the surveyed MSM reported that they were discriminated due to their sexual orientation. In particular, during the last 12 months, 4.4% of respondents were denied employment, 2.4% were denied police assistance, 1.5% were denied medical care, and 1.1% were denied renting an apartment (or released from an apartment) because they were MSM (Table H.H.1).

During the last 1 year 20.5% of the research subjects were victims of different forms of violence due to their sexual orientation. The highest frequency of violence was recorded in Tbilisi (22.5%), and the lowest in Kutaisi (8%) (Figure H.H.1). Among those who were victims of violence, the forms of violence were distributed with the following frequency: verbal violence 98.2%, physical violence 52.2%, economic violence (extortion of money, not giving money, forcing to share income, etc.) 16.5% and sexual violence 13.4% (Table H.H.2). Respondents who were victims of violence were asked a question about who perpetrated the violence on them. Verbal and physical violence were mostly committed by unknown persons (66.4% and 59.4%, respectively). Sexual violence was committed by an acquaintance in 74.9% of the cases. Economic violence was almost equally distributed

among unknown persons and acquaintances to the research subjects (34.9% and 32.2%, respectively) (Table H.H.2).



Among those who were victims of violence (of any form) in the last 12 months, only 22% reported about it to the police. The frequency of reporting the cases of violence to the police was highest in Tbilisi (28.5%) and lowest in Kutaisi (16.6%) (Figure H.H.2). Among the reasons for not reporting a case of violence to the police the most frequent was mistrust to the police ("there is no point, there will be no adequate response") (42.2%), followed by embarrassment related to own sexual orientation (16.5%) (Table H.H.2).



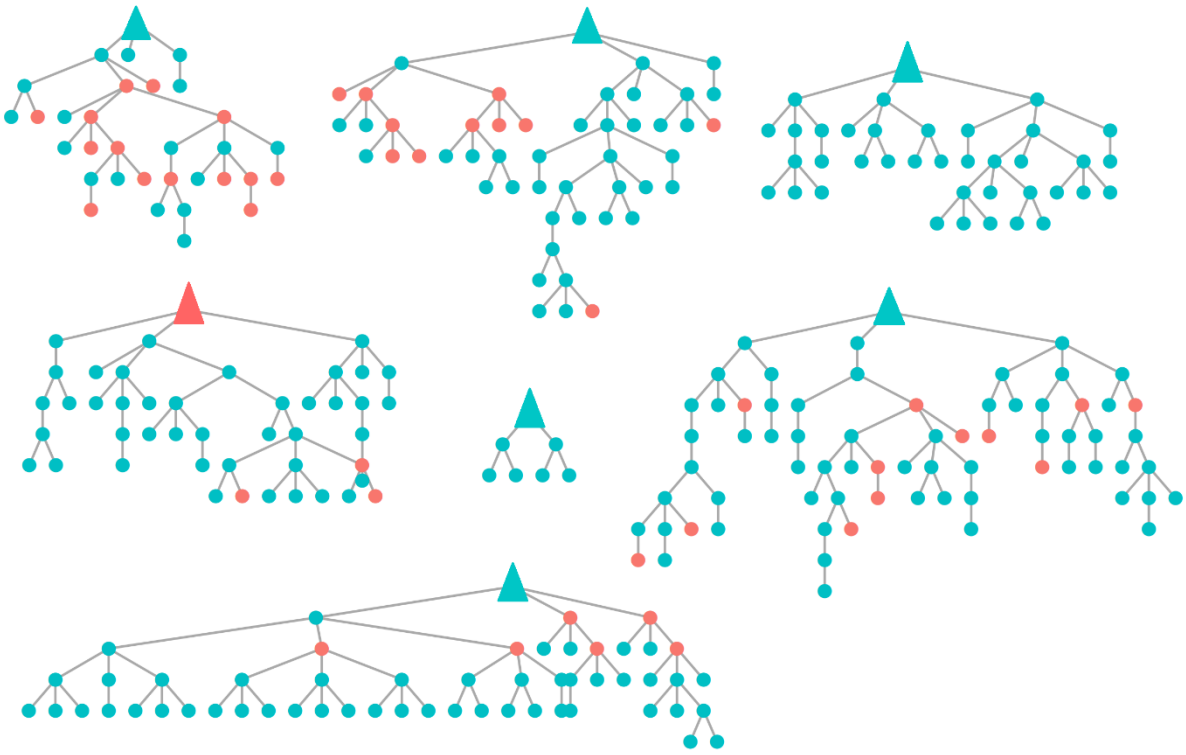
Sources of information

51.1% of the study participants received information about HIV/AIDS and other sexually transmitted infections (STIs) through the Internet, 38.7% from friends, 29.2% from TV or radio, and 19.8% from community organizations. Among the most reliable sources of information, almost half of the respondents named non-governmental organizations (49.8%) and the Internet (48.7%) (Table Q).

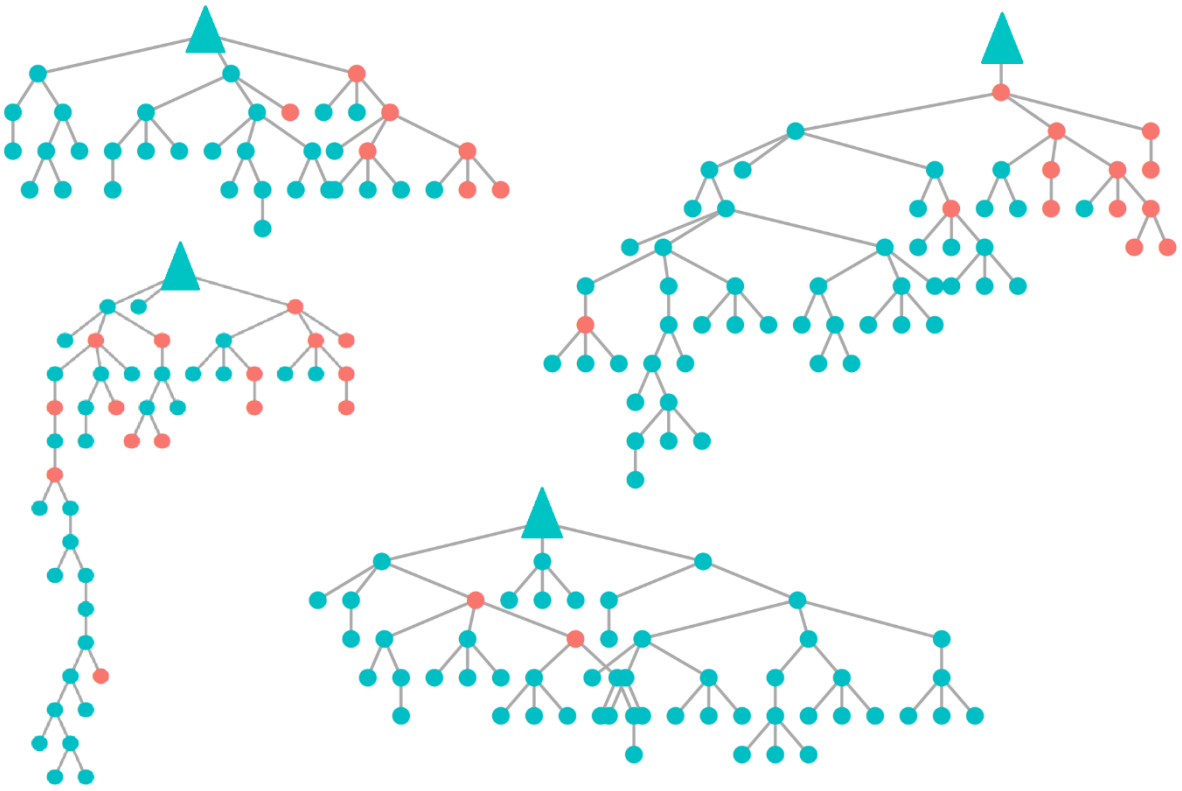
Recruitment of Participants by HIV Status

The images below illustrate the distribution of MSM recruited by the "seeds" participating in the study across each of the three cities. These images were generated using RDS Analyst software. The HIV status of MSMs was denoted using the color orange. In the provided pictures, "seeds" are identified by large triangles.

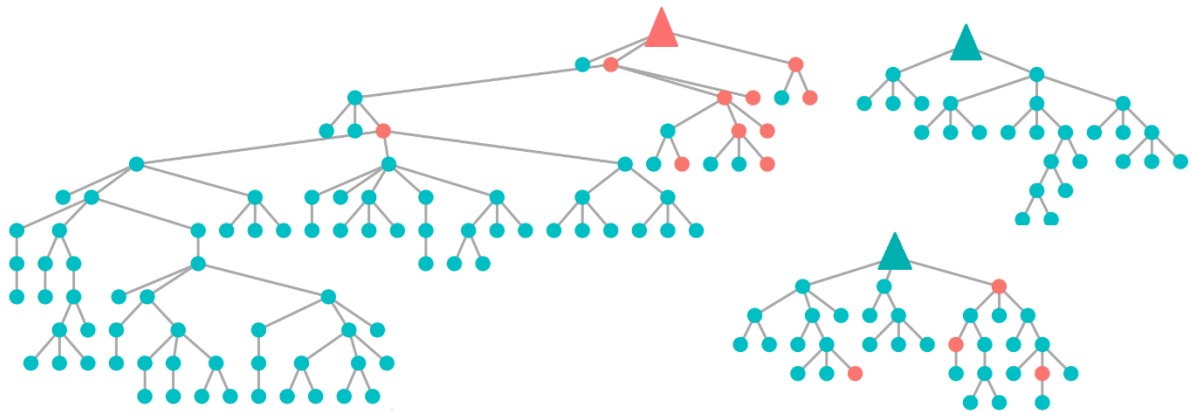
Picture 1: Distribution of MSM in Tbilisi by HIV status



Picture 2: Distribution of MSM in Batumi by HIV status



Picture 3: Distribution of MSM in Kutaisi by HIV status



Association of age with different factors

18.4% of MSM aged ≥25 and 8.9% of MSMs aged ≤24 tested positive for Anti-HIV ($p<0.01$). The distribution of Anti-HCV is relatively higher in the older age group (17.5% vs 1.4%; $p<0.01$). Positive RPR is more common in MSMs aged ≥25 relative to MSM aged ≤24 (17.3% vs 10.8%; $p<0.05$). The prevalence of Anti-HBV was three times lower among the young age group compared to the older age group. (9.9% vs 26.8%; $p<0.001$).

Taker, as a type of sexual partner, is more common among MSM in the young age group (22.3% vs 12.4%; $p<0.001$). People aged ≥25 were more likely to be under the influence of substances during their last anal sex, but this difference was not statistically significant.

6.1% of MSM from younger age group and 4.5% of older age group had their first anal sex at the age of 11-13 ($p<0.001$).

For the last 12 months, sexual intercourse without condom use with an accidental partner was higher in MSM aged ≥25 (5.0% vs 3.0%; $p=0.19$).

In the last 12 months, 45.7% of older MSM and 38.9% of MSM from younger age group engaged in anal sex for money.

26.3% of MSM aged ≤24 and 10.6% of MSM aged ≥25 who engage in sex for money, receive less than 50 GEL for their services ($p=0.13$)

Participants aged ≤24 were more likely to have STI testing in the last year (43.6% vs 37.6%, this difference is statistically significant).

MSM aged ≤24 have better knowledge about where to test for HIV (94.7% vs 90.7%; $p=0.08$). The percentage of MSM who have been tested for HIV in the last 3 months, is relatively higher in the young age group (42.3% vs 32.5%; $p<0.001$). 11.8% of participants aged ≥25 and 7.0% of participants aged ≤24 estimate their individual risk of HIV infection as high ($p<0.001$). Older age group MSM were more commonly tested for HCV (87.7% vs 72.5%, $p<0.001$).

87.7% of participants aged ≥25 and 72.5% of participants aged ≤24 have been tested for HCV. Knowledge of HCV elimination program is higher in individuals aged ≥25 ($p<0.001$).

71.8% of MSM in the young age group and 69.6% of MSM in the older age group are tested for HBV ($p=0.67$). There was no difference in HBV vaccination rate between the young age group and the older age group (22.1% and 16.9%; $p=0.20$).

Distribution by cities

The highest anti-HIV prevalence was seen in Batumi (18.4%), followed by Tbilisi (15.6%) and Kutaisi (10.7%) (p=0.13). Anti-HCV prevalence was significantly higher in Kutaisi (40.0%), compared to Batumi (16.5%) and Tbilisi (2.3%) (p<0.001).

Proportion of MSM, who are RPR-positive, was higher in Kutaisi (19.3%) compared to Tbilisi (15.2%) and Batumi (11.9%). For confirmation TPHA test was done in RPR-positive individuals, from which in 6 cases syphilis was not confirmed, all of the mentioned 6 cases were MSM from Kutaisi.

Anti-HBc distribution was highest in Kutaisi (32.0%), Batumi (23.4%) and Tbilisi (14.6%). HBsAg was positive in 4.6%, 4.5% and 1.7% of study participants in Kutaisi, Batumi and Tbilisi, respectively (p<0.14).

Proportion of ≤24-year-old MSM was highest in Tbilisi (40.1% vs 33.8% and 16.0% in Batumi and Kutaisi, respectively. P<0.001). The education level was particularly low in Kutaisi, where 30.0% of participants mentioned, that they had not received education or had received incomplete secondary education (Tbilisi-6.6%, Batumi 5.0%) and this difference was statistically significant. 30% of MSM, who were surveyed in Kutaisi, are married, which was significantly higher than the proportion of married MSM in Tbilisi (3.5%) and Batumi (2.6%) (p<0.01). Kutaisi also had a higher index (28.0%) of unemployment among MSM compared to Tbilisi (25.2%) and Batumi (18.9%) (p<0.001).

76%, 72.1% and 60.6% of surveyed MSM in Kutaisi, Batumi and Tbilisi, respectively, have a stable accommodation (p<0.01). The most positive results regarding monthly income were seen in Tbilisi, where 56.2% mentioned 1000 GEL and more compared to 37.0% and 15.4% in Batumi and Kutaisi, respectively.

In Tbilisi 2.3% of MSM had their first anal sexual intercourse at ≤10 years of age, 7% at 11-13 years of age, which is higher compared to other cities (p<0.05). Proportion of MSM, who have never used a condom during an anal intercourse for the last 12 months, was highest in Kutaisi (p<0.01).

Proportion of MSM, who have had >1 regular partner during the last 12 months, was highest in Batumi (<0.05). Instances of not using a condom during anal intercourse were more frequent in Kutaisi compared to Batumi and Tbilisi (35.2% and 24.3%; p<0.01).

Proportion of MSM, who have had anal intercourse with >5 casual male sexual partners during the last 12 months, was highest in Batumi (49.5%), followed by Tbilisi (36.0%) and Kutaisi (13.2%).

Engagement in sexual contact in exchange for payment is more frequent in Batumi and Tbilisi (16.9% vs 8.9% and 6.7%; p<0.01).

The question: "Do you know where to refer to for HIV testing" was positively answered by 94.3%, 93.9% and 84.8% of MSM living in Tbilisi, Batumi and Kutaisi respectively (p<0.01).

Frequency of HIV testing is higher in Batumi (85.4%), compared to Tbilisi (81.9%) and Kutaisi (76.0%), however the difference is not statistically significant. The majority of MSM from all three cities know their HIV status. The question: "What was your HIV status" was replied as "positive" in 15.0% of MSM living in Batumi and 11.1% and 7.8% of study participants living in Tbilisi and Kutaisi, respectively (p=0.19).

Hepatitis C elimination program awareness is low in MSM population, especially those surveyed in Tbilisi, where 39.2% said that they have not heard of the mentioned program, this is followed by Kutaisi (29.2%) and Batumi (27.0%). The highest HCV testing rate was seen among MSM living in Kutaisi and frequency of treatment was highest in Batumi, however none of these differences were statistically significant.

Proportion of study participants who were HBV tested and vaccinated against hepatitis B was lowest in Kutaisi (p<0.001).

Service beneficiaries and non- beneficiaries

23.9% of beneficiaries of services (condom and lubricant from social worker or in health cabinet) and 5.6% of non-beneficiary MSM tested positive for anti-HIV (p<0.001). RPR test was positive among 19.6% of beneficiaries and 10.1% of non-beneficiaries (p<0.01). Similarly, more MSM who were program beneficiaries were exposed to HBV compared to non-beneficiaries (25.1% vs 17.0 %; p<0.05)

74.6% of beneficiaries and 68.2% of non-beneficiaries reported condom use during their last sexual intercourse, but this difference was not statistically significant.

The proportion of study participants who had been victims of abuse in the past 12 months was two times higher among MSM who receive the services (27.5% vs 11.9%; p<0.001).

Comparison of 2018 and 2023 study results

Study sample data was used for comparison

Prevalence of HIV was 15.3% among study participants, which was slightly less than the previous survey's result (16.3%) and this difference was not statistically significant.

Prevalence of Syphilis was higher during the current study (14.2% vs 9.7%; p<0.05).

Statistically significant difference was found between the current and previous studies by the anti-HCV prevalence. 7.8% and 1.8% of surveyed MSM were anti-HCV (+) in 2023 and 2018, respectively (graphic #1).

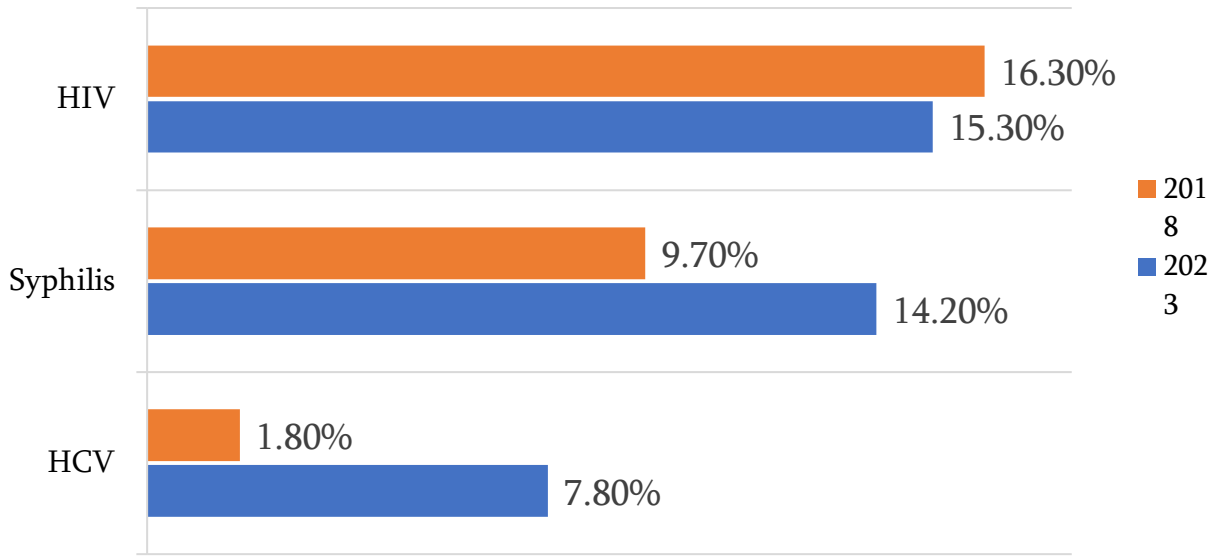
More MSM was tested for STI in 2023 than in 2028 (75.3% vs 62.8%; p<0.001) (graphic #2).

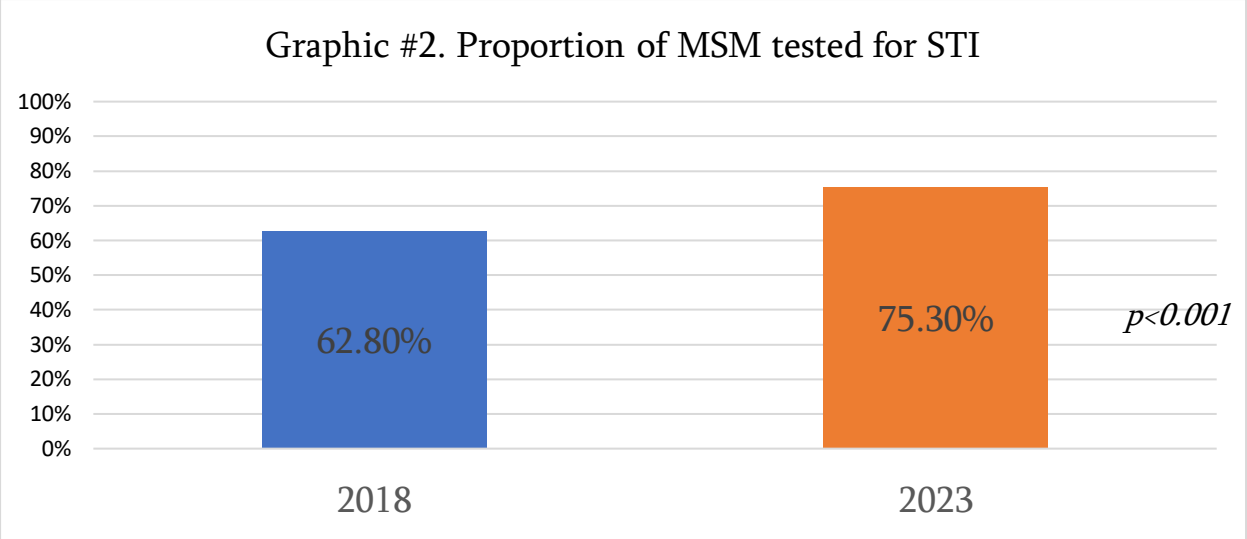
47.2% of MSM surveyed in 2023 versus 45.1% of MSM surveyed in 2018 said that they always used condoms during anal intercourse during the last 12 months but this difference was not statistically significant.

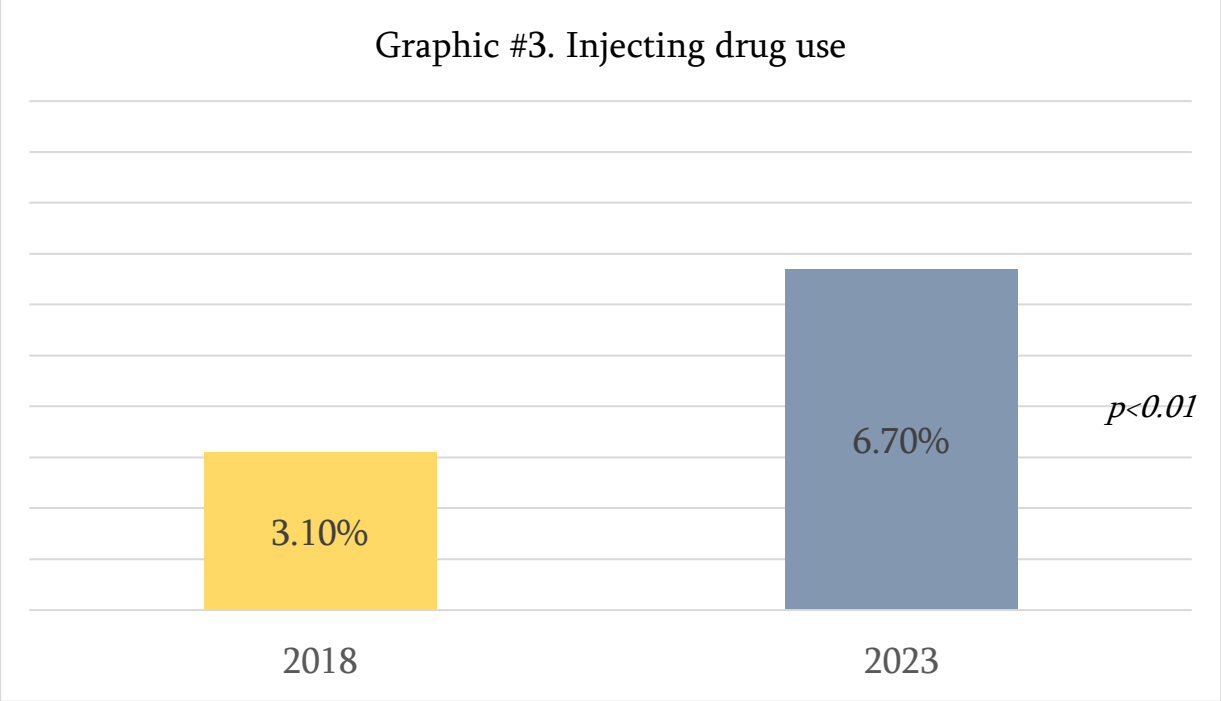
Injecting drug use was twice as high during the current study compared to the study conducted in 2018 (6.7% vs 3.1%; p<0.01) (graphic #3).

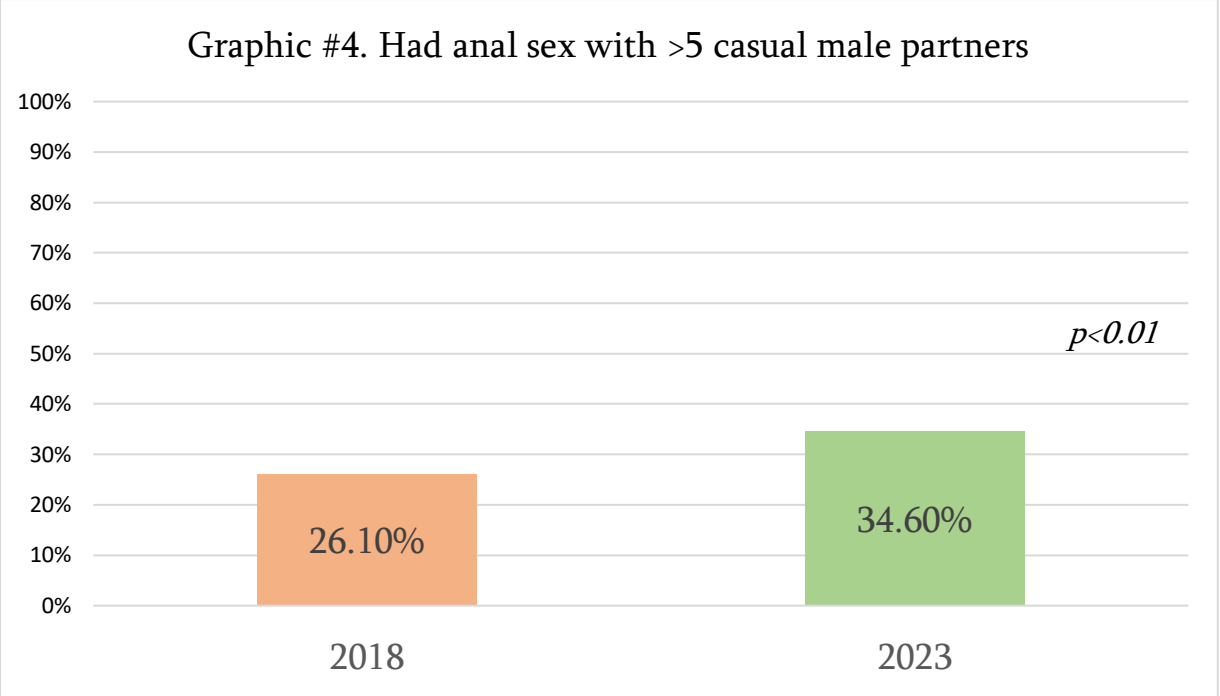
34.6% of participants of the current study vs 26.1% of MSM surveyed in 2018 declared to have anal sex with more than 5 casual partners and this difference was statistically significant (graphic #4).

Graphic #1. Infectious diseases prevalences



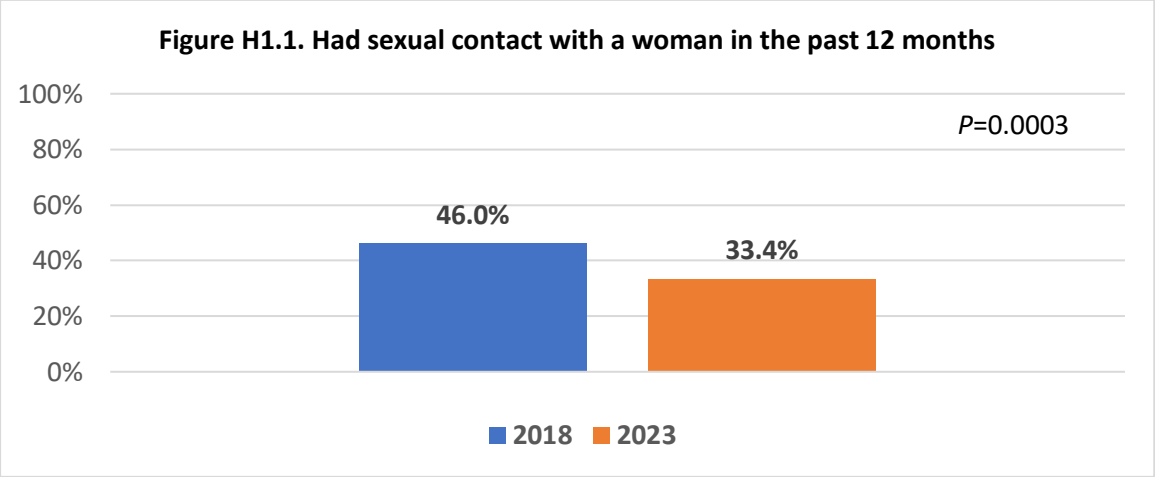

Graphic #2. Proportion of MSM tested for STI
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
62.80%
75.30%
p<0.001
2018
2023


Graphic #3. Injecting drug use
3.10%
6.70%
p<0.01
2018
2023

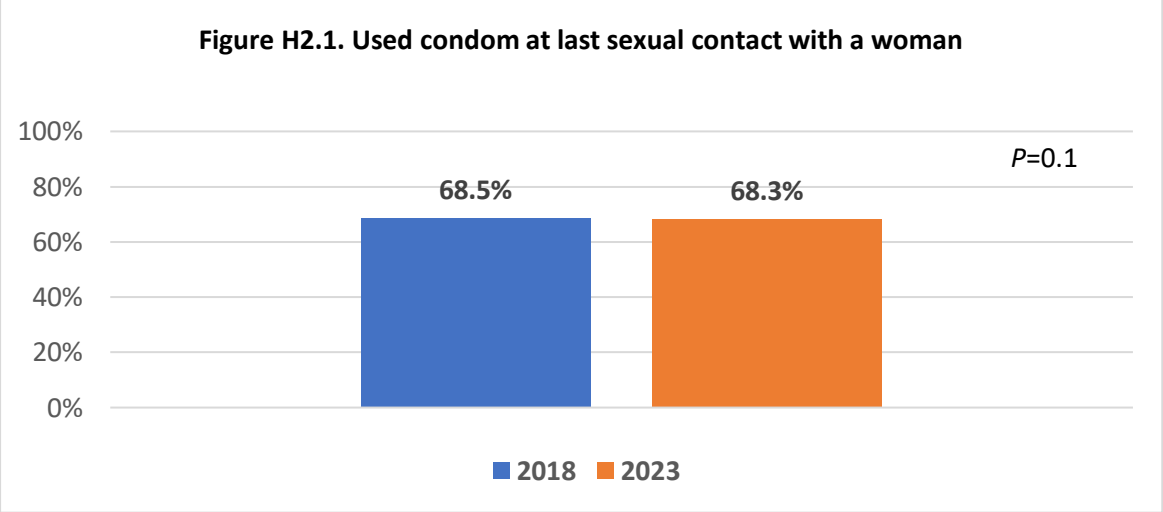

Graphic #4. Had anal sex with >5 casual male partners
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
p<0.01
26.10%
34.60%
2018
2023

Sexual practice with women

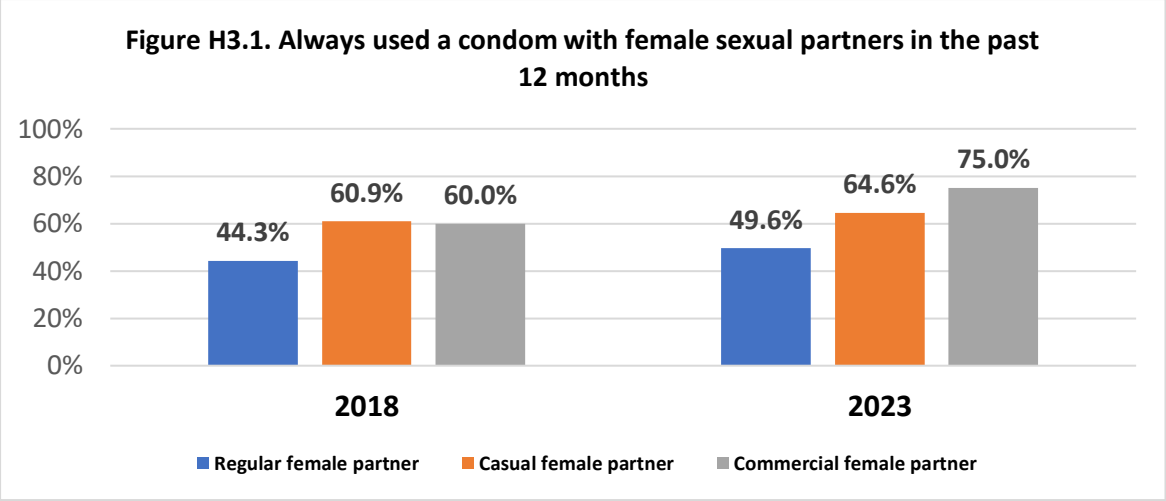
Compared to 2018, a smaller proportion of respondents in the current survey reported having had sex with a woman in the past 12 months (Figure H1.1).



From 2018 to 2023, the frequency of condom use by MSM during the last sexual contact with a woman haven't changed (Figure H2.1).

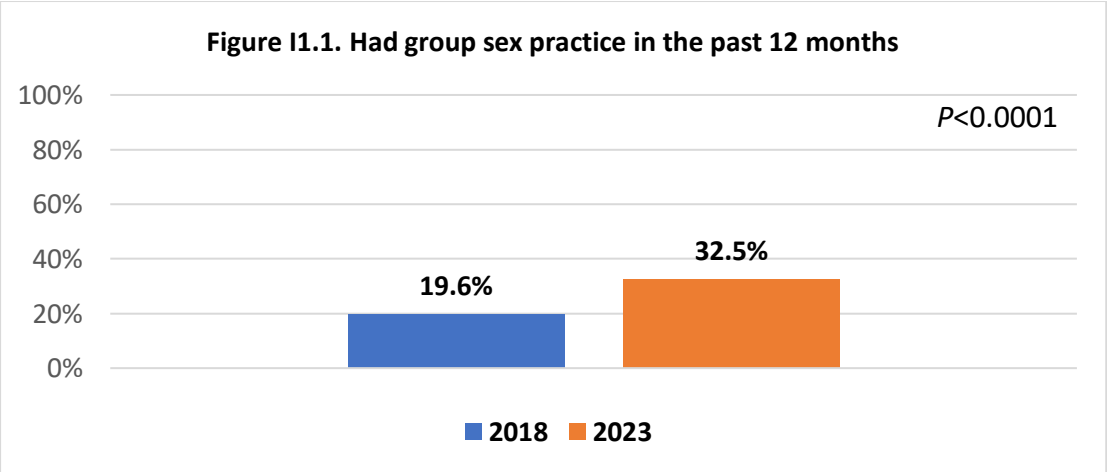


From 2018 to 2023, the frequency of consistent condom use with regular or casual partners in the past 12 months haven't changed, although higher proportion of MSM surveyed in 2023 (75%) reported always using condom with commercial female partners in the past 1 year compared to the 2018 study participants (60%) (Figure H3.1).

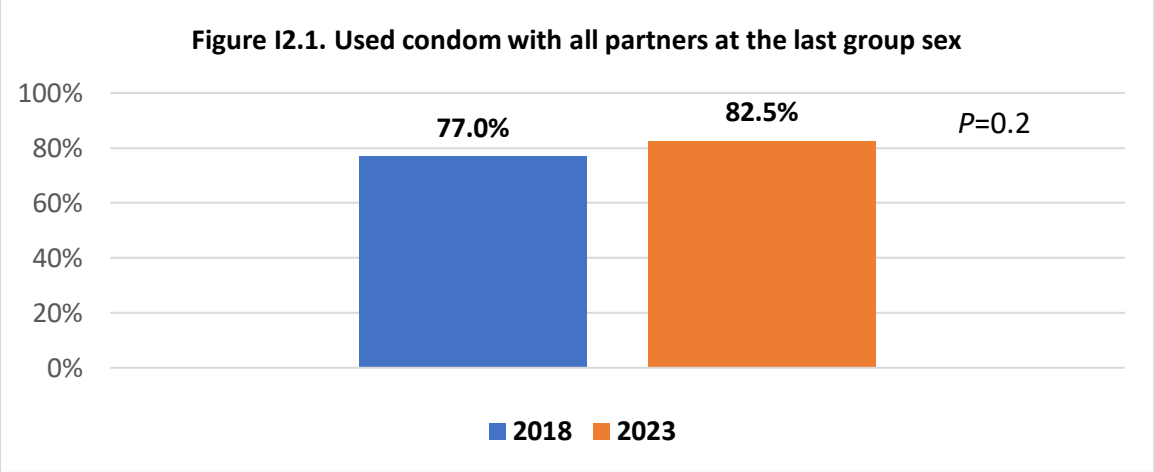


Group sex practice

In current study 32.5% of the surveyed MSM reported having group sex practice during the past 12 months, which is significantly higher proportion compared to 2018 survey where 19.6% of the respondents were engaged in group sex (Figure I1.1).

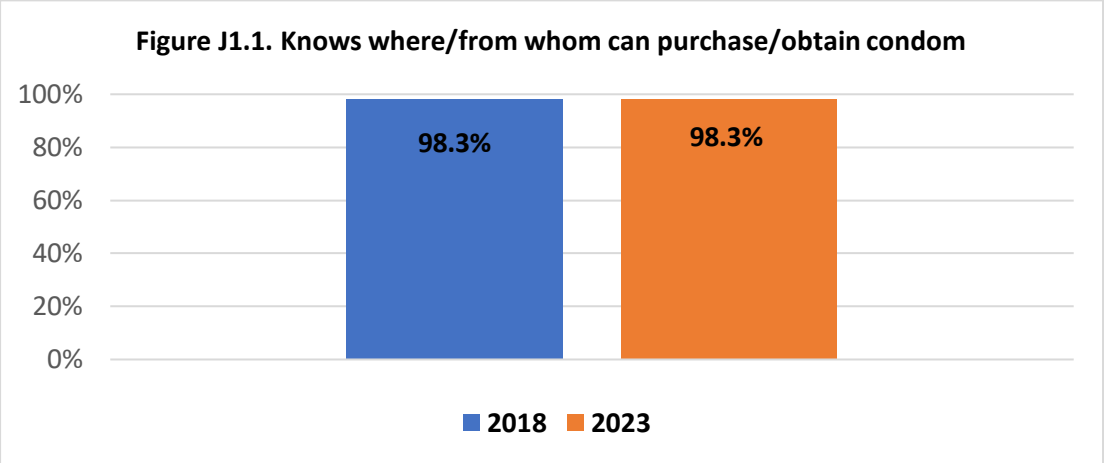


At last group sex condom was used with all sexual partners by 82.5% of MSM surveyed in 2023 which exceeds the same indicator from 2018 survey (Figure I2.1).

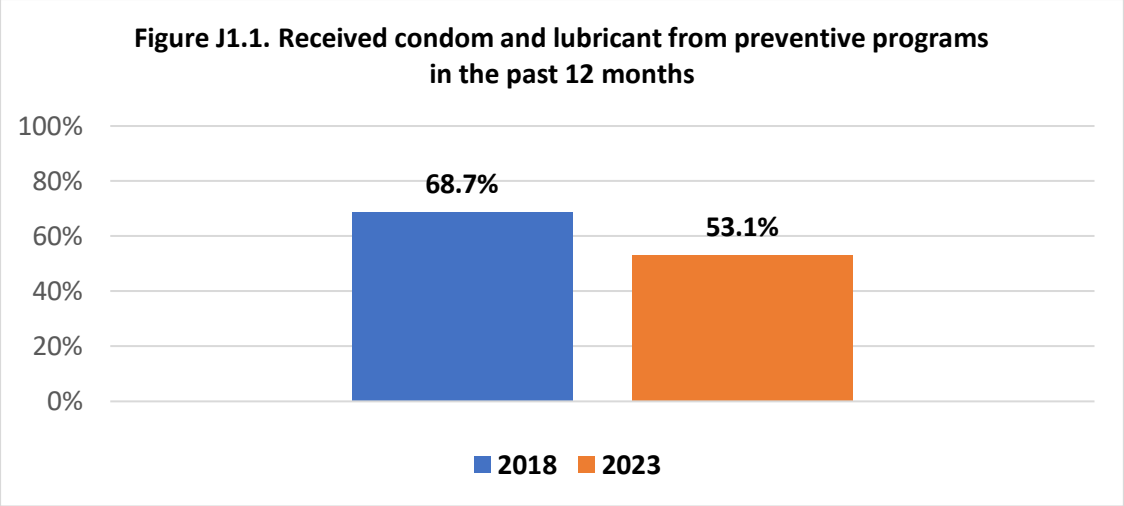


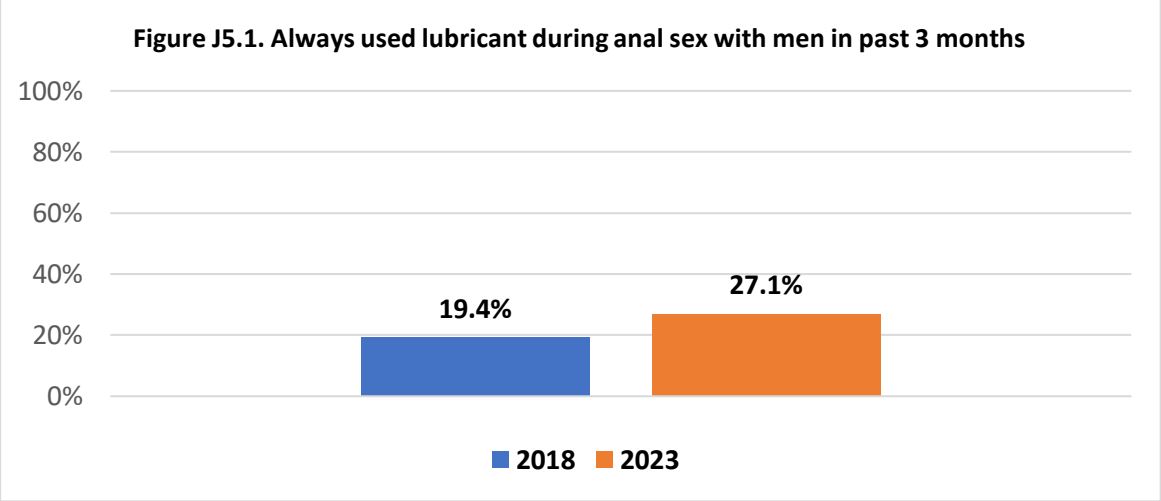
Condoms and lubricants

98.3% of the current study participants knew where or from whom can be condoms purchased or obtained. Similar result was shown in 2018 survey (Figure J1.1).



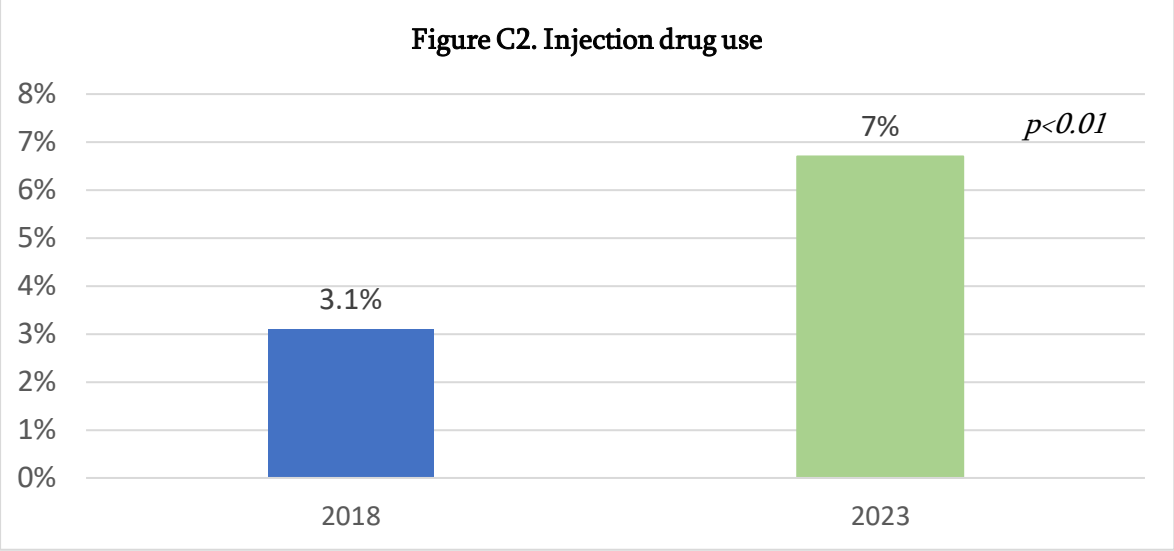
Among MSM surveyed in 2023, 53.1% reported that have received condom and lubricant from preventive programs. In the 2018 survey the higher proportion of the study subjects (68.7%) noted that used such services in the previous year (Figure J1.1). From 2018 to 2023 the rise in the frequency of consistent use of lubricants during anal sex with male partners in the past 3 months is observed (19.4% vs. 27.1%) (Figure J5.1).





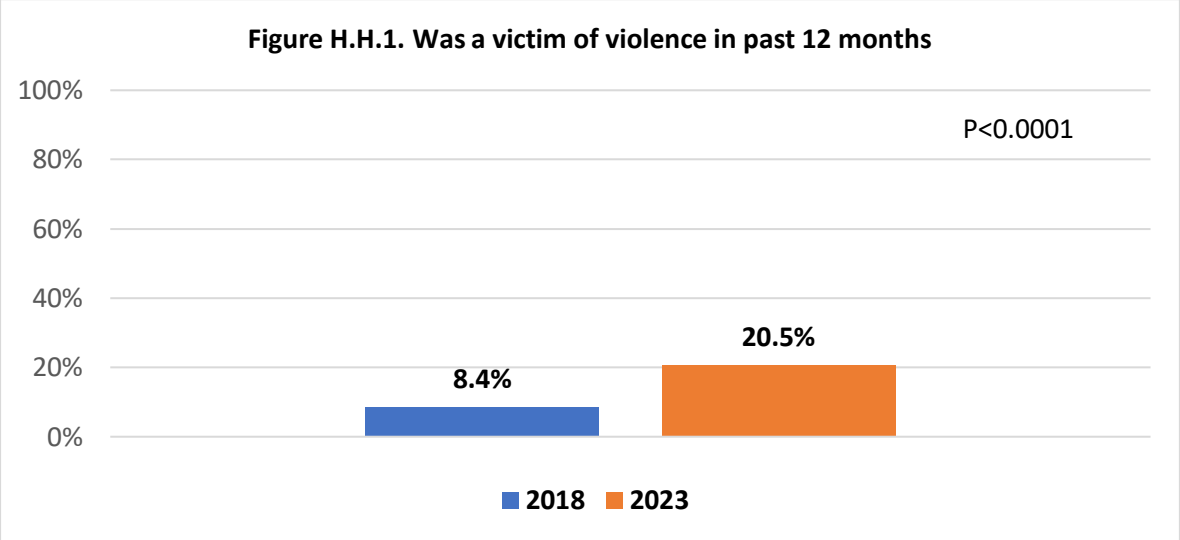
Injection drug use

The frequency of injection drug use is twice as high among MSM surveyed in 2023 compared to 2018 study participants (6.7% vs 3.1%; p<0.01) (Figure C2).

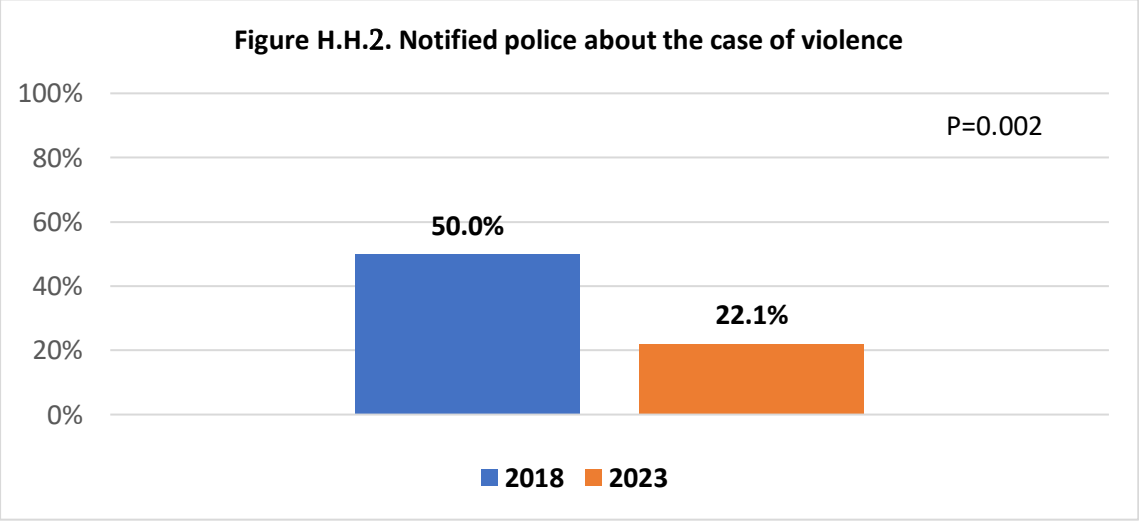


Violence

A significantly higher proportion of 2023 survey participants (20.5%) reported being a victim of violence (of any type) because of their sexual orientation in the past 12 months compared to 2018 study subjects (8.4%) (p<0.0001) (Figure H.H.1).



It should be noted that from 2018 to 2023, the frequency of notifying police about the cases of violence has decreased. In particular, according to the results of the 2018 survey, among those who were the victims of any type of violence, 50% reported about these cases to the police, while only 22.1% of the participants who were victims of violence in the 2023 survey behaved the same way (p=0.002) (Figure H.H.2).



Population Size Estimation Among Men Who Have Sex with Men

Executive summary

Estimating and monitoring the prevalence of men who have sex with men (MSM) is a crucial task to ensure the timely implementation of HIV/AIDS prevention and control measures in the country. Therefore, evaluating the effectiveness of existing medical services and preventive programs for high-risk groups, such as men who have sexual contact with men (MSM), will contribute to the ability to allocate financial resources for future interventions at the national or international level.

In 2018, the organizations "Curatio International Foundation" and " Tanadgoma – Center for Information and Counseling" conducted the study of the MSM population size in Georgia for the third time. According to the research, there are 18,500 men in Georgia who have sexual contact with men. In Georgia, 13.3% of HIV transmission occurs among MSM, following transmission through heterosexual contact and injecting drug use. Therefore, calculating the size of the MSM population is necessary for preventing the transmission of HIV and hepatitis C infections.

The Health Research Union (HRU) conducted an IBSS study among MSM in three large cities of Georgia (Tbilisi, Batumi, and Kutaisi), where study participants were selected using the principle of respondent-oriented sampling (RDS). Additionally, the study employed the "Nomination" questionnaire and surveyed households through a specially designed questionnaire. The purpose of the study was to calculate the size and prevalence of the MSM population in Georgia in 2022. This report presents the results of the aforementioned research.

The final estimates are as follows:

Estimated number of MSM in three cities of Georgia per 15-64-year-old men

- 8 367 (7 109-9 756)

National prevalence of MSM in three cities of Georgia per 15-64-year-old men

- 1.88% (1.60%-2.19%)

Estimated number of MSM in Georgia per general population

- 23 268 (19 803-27 105)

National prevalence of MSM in Georgia per general population

- 0.62% (0.53%-0.73%)

1. Introduction

According to the 2020 UNAIDS report (Country progress report – Georgia), Georgia is considered a country with low HIV infection/AIDS prevalence, with a rate of 0.4% in the general adult population [14]. However, given Georgia's relatively small size, the presence of approximately 10,500 people infected with HIV by 2023 is significant. It is crucial to note that a considerable number of HIV-infected individuals may be unaware of their status. In 2022, 617 new cases of HIV infection were reported, representing an increase from the figures in 2020/21. The COVID-19 pandemic exacerbated the issue of reduced HIV testing in Georgia and other regional countries, likely contributing to a decline in registered cases. Since the onset of the SARSCoV-2 pandemic, the decrease in reported cases is believed to stem from a lack of testing among individuals at the highest risk of HIV infection (AIDS Center, 2022) [13]. In Georgia, the human immunodeficiency virus is concentrated within main risk groups, including men who have sex with men, injecting drug users, sex workers, and transgender individuals.

High-risk groups constitute less than 5% of the global population, yet they account for 70% of new cases of HIV infection and AIDS, as of 2021 [15]. In 2022, the prevalence of HIV is 11 times higher among men who have sex with men, with a 28 times higher risk of HIV transmission compared to the general population (adults aged 15-49) [16]. According to a 2018 study assessing the MSM population size in Georgia, there are approximately 18,500 MSM across the country, equivalent to 1.55% of the adult (15-64) male population [12]. Among the studied countries in the region, Georgia exhibits the highest prevalence of HIV among MSM. The 2018 biomarker/behavioral surveillance study reported varying rates of HIV infection in MSM, with Tbilisi recording the highest prevalence at 21.5%. In recent years, sexual transmission of HIV has increased, accounting for 51.5% of all registered cases, with 13.4% occurring among men who have sex with men [13].

As per the results of the analysis of the MSM population size submitted by UNAIDS to the Global AIDS Monitoring System (inclusive of data from 2019, covering the last 5 years and data from 38 countries), the global average proportion of adult men who have sex with men in the last 12 months is 1.9%. This figure remains stable, varying only in accordance with the number of the adult male population. The distribution of the MSM population within the 15-49 age group in middle and low-income countries is as follows: Latin America reports the highest proportion at 3.37, followed by the Caribbean at 2.7, and Eastern Europe and Central Asia at 2.1. The lowest rate is observed in the countries of the Middle East and North Africa, standing at 1.02 [17].

Given these circumstances, it is imperative to determine the precise size of the MSM population in Georgia. This information is vital for identifying the vulnerable population, estimating the prevalence of HIV and other sexually transmitted infections, and designing

effective sexual health and wellness programs. Population size estimation (PSE) is employed at the local and state levels to enhance social and economic calculations, respond to critical health needs, and monitor epidemics. However, measuring a partially hidden population, such as MSM, poses a significant challenge. Existing methods used to determine the size of hidden populations are prone to errors [18]. Recognizing the importance of accurately measuring the size of this hidden population, we employed different methods for calculation, including the catch-back and service consumption ratio method based on independent sampling, as well as the respondent-oriented sampling and network size determination method based on a social network approach.

2. Methodology

2.1 Research Tasks

The primary objective of this study was to estimate the size of the MSM population in Georgia in 2022.

2.2 Target Population

Men who have sex with men were defined as individuals who have had sexual (both passive and active) contact (anal or oral) with another man in the past 12 months.

2.2.1 Criteria for inclusion in the study

Within the framework of IBSS, participants were selected based on the following criteria:

1. Biological sex - male
2. Adult (18 years or older) at the time of inclusion in the study
3. Citizen of Georgia
4. Knows the Georgian language
5. Resident or worker in Georgia
6. Presented a valid survey participation coupon on the research site
7. Provided informed consent
8. Confirmed sexual (both passive and active) contact (anal or oral) with another male within the past 12 months

2.3 Overview of Methods

The results presented in this report are derived from various methods used to estimate the size of the hidden population (MSM population), including: (1) Network Scale-Up (NSU) method, (2) Network based Capture-Recapture, (3) Service Multiplier Method, (4) Unique Object Multiplier Method, (5) Mobile Apps and Websites Service Multiplier, (6) Handcock's RDS Network-Based Method and (7) Wisdom of the Crowd (WOC) method. The indicators of MSM population size and prevalence in Georgia were estimated using these methods.

2.3.1 Method 1: Determining the Size of the Network

2.3.1.1 Survey of Households and Data Collection

A household survey to estimate the size of the MSM population was conducted in three cities of Georgia - Tbilisi, Batumi, and Kutaisi, similar to the research on the supervision of MSM behavior.

A multi-stage sampling method was employed in this study. The primary sampling units (PSUs) were the municipalities of three large cities in Georgia, treated as clusters. Secondary Sampling Units (SSUs) were represented by the polling stations within these municipalities—30 districts in Tbilisi, and 20 districts each in Batumi and Kutaisi. For the selection of Tertiary Units (TSUs), a systematic random sampling approach was used to choose households. Every fifth household representative participated in the research. Respondents within households were identified using the Kish methodology (for the 18-64 age group) [19]. In instances where an interview couldn't be conducted in a household (after three attempts), the subsequent household was selected.

The sample size was determined according to the methodology provided for descriptive studies (source: www.openepi.com). The expected proportion was set at 0.50, maximizing the sample size. The research's degree of accuracy (margin of error) was set at +/- 0.05, with a confidence level of 95%. The estimated population size was approximately 2.5 million. We defined the design effect as equal to 1.5. To calculate the total number of subjects for the study, we also considered the loss rate, setting the maximum at 15% (Table 2).

Quantitative data were collected through face-to-face individual interviews using a specially designed questionnaire. Participants included citizens of Georgia, representatives of the adult population aged 18-64, who provided oral informed consent to participate in the survey. The total number of participants was 770, distributed across the three cities as follows: 470 respondents in Tbilisi, and 150 respondents each in Batumi and Kutaisi.

Table 1. Population of Georgia, 2022

City	Total	Men	Men aged 15-64
Tbilisi	1108717	502890	347697
Batumi	152839	72757	51024
Kutaisi	147635	69194	46830
Other cities	2327209	1148979	792106
Georgia	3736400	1793820	**1237657**

Source: National Statistical Service of Georgia

Table 2. Sample size estimation for the household survey

Parameter	Explanation	Value
Target population size:	*Target population size (Rounded)*	**2 500 000**
Estimated percentage in the target population with the event of interest:	*50 % - the value maximizing the sample size estimation has been considered*	**50 %**
Confidence interval width	*Sample percentage to be within +/- 5 % of the target population value*	**5 %**
Confidence coefficient	*95 % confident that the confidence interval around the sample percentage captures the target population value.*	**95 %**
Number of clusters	*3 clusters (cities)*	**3**
Estimated Design effect (*DEFF*)	*Sample variance could be 1.5 times bigger than it would be if the survey were based on the same sample size but selected by simple random sampling*	**1.5**

Minimum sample size	Minimum number of participants to be studied	**655**
Non-response rate	Not more than 15% is expected to fail to adequately participate	**15 %**
Sample size	Planned number of households to be approached	**770**

2.3.1.2 Network Scale-Up

The first step of the NSU method is to estimate the average network size of respondents in the household survey. First, we asked respondents how many people they knew or had a meal with during the last two years from 16 pre-specified groups. Using questions about "how many X's do you know" in each group can reduce potential bias in network size estimation and is based on an adapted game of contacts [20,21]. This method has been successfully applied to estimate the size of hard-to-reach populations [12,22,23].

The definition of a "Person you know" was as follows: [People that you know by sight and name, and who also know you by sight and name] **AND** [People that you had some contact with either in-person, over the phone or internet (e.g.: e-mail, Skype, chat through social networks) in the last 2 years] **AND** [People of all ages who live in Georgia].

The definition of a "person you know with whom you shared meal" was as follows: [People that you know by sight and name, and who also know you by sight and name] **AND** [People that you shared a meal or drink with in the last 2 years, including family members, friends, coworkers, or neighbors, as well as meals or drinks taken at any location, such as at home, at work, or in a restaurant] **AND** [People of all ages who live in Georgia].

Next, using the 16 known population sizes (Table 3), we back-calculated the average network size for the residents of each of the three cities (equations shown below). To account for implausible responses, we capped the responses at 30 for the total number reported known in each group.

The following steps were used to calculate the average network size in our data:

(1) First, we estimated the network size for each participant (i) using the populations listed in Table 1, with known size (j)

$$\widehat{c_i} = \frac{\sum_j m_{ij}}{\sum_j e_j} \times N$$

- Where $\widehat{c_i}$ is the estimated network size for person i
- m_{ij} is the number of people person i reports knowing in group j
- e_j is the population size of group j
- N is the size of the general population

(2) Next, we estimated the average network size across all participants ($\hat{c}$)

(3) and then calculate the population size of each group j, using $\hat{c}$

$$e_j = \frac{\widehat{e_j}}{\hat{c}} \times N$$

- Where $\widehat{e_j}$ is the average number of individuals known in each of the 16 groups reported by respondents

(4) We then calculated a bias factor as:

$$Bias\ factor_j = \frac{E_j}{e_j}$$

- Where E_j is the observed population size for group j

(5) If the bias factor was greater than 2.0 or less than 0.5, we removed the population from our calculations and repeated all steps until all bias factors were within the range of 0.5 to 2.0. We obtained our final estimate of the average network size for our participants from the remaining groups.

Table 3. List and population size of sixteen "known size" populations in Georgia

Question Known	Size	Sex Category	Same-sex Population Size in Georgia	Total Population in Georgia	% of the same-sex category	% of total population
First name of "Mamuka" in 2022?	21720	Male	1793800	3736400	1.2	0.6
First name of "Luka" in 2022?	43626	Male	1793800	3736400	2.4	1.2
First name of "Zurab, or Zura, or Zuka or Zuriko" in 2022?	49494	Male	1793800	3736400	2.8	1.3
First name of "Vazha" in 2022?	11498	Male	1793800	3736400	0.6	0.3
First name of "Sophiko, or Sophio or Sopho" in 2022?	31340	Female	1942500	3736400	1.6	0.8
First name of "Manana" in 2022?	33390	Female	1942500	3736400	1.7	0.9
First name of "Shorena" in 2022?	15602	Female	1942500	3736400	0.8	0.4
First name of "Nino, or Niniko, or Nina" in 2022?	127463	Female	1942500	3736400	6.6	3.4
First name of "Maya" in 2022?	47401	Female	1942500	3736400	2.4	1.3
First name of "Davit, or Dato, or Datuna, or Datiko" in 2022?	100978	Male	1793800	3736400	5.6	2.7
Married in 2022	26048	Both	3736400	3736400	0.7	0.7
Teachers in 2022-2023	62296	Both	3736400	3736400	1.7	1.7
Deaths in 2022	49118	Both	3736400	3736400	1.3	1.3
Deaths due to cancer in 2022	4530	Both	3736400	3736400	0.1	0.1
Injured or deaths in road accidents in 2022	8060	Both	3736400	3736400	0.2	0.2
Students in higher education institutions in 2022-2023	161292	Both	3736400	3736400	4.3	4.3

Source: National Statistical Service of Georgia; State Services Development Agency of the Ministry of Justice of Georgia..

MSM Population Size Estimations

To gauge the size of the MSM (Men who have Sex with Men) population, respondents were asked about the number of MSM individuals they were acquainted with or had shared food or drink with in the past two years. The maximum limit for responses to this question was set at 30. Subsequently, employing the average size of participants' networks, the estimated MSM population size (ê) was determined as follows:

$$\hat{e} = \frac{\sum_i m_i}{\sum_i \hat{c_i}} \times N$$

- Where $\hat{e}$ is the estimated size of the MSM population
- m_i is the number of MSMs identified by i as acquaintances
- $\hat{c_i}$ is the estimated personal network size of participant i, and
- N is the total adult (18-64) population size in each of the three cities in 2022.

We used bootstrap resampling to estimate uncertainty in our estimate of m, the number of MSM reported by each participant. We used 1000 replications to estimate the point estimate and 95% confidence interval for m.

Bias Adjustment

We adjusted our population size estimates for two biases: (1) transparency bias and (2) popularity bias [1]. Transparency bias arises when MSM individuals do not openly identify others in their social network due to stigma. Popularity bias occurs because MSM individuals may have smaller network sizes than the general population. To address these biases, respondent-driven sampling (RDS) was employed, collecting data from MSM individuals in one of the three listed cities.

The questionnaire included inquiries about the number of people each participant knew within the 16 groups outlined in Table 3 (derived from a population of known size).

Information transparency bias was computed by assessing the number of people within the participant's network (those known in the 16 groups) who were aware of the participant's MSM identity. This figure was then divided by the total number of individuals in each group that the participant reported knowing. This calculation provided the proportion of those in the participant's network who were aware of their MSM status.

The following calculations were applied: **Information transparency bias (ITB)** = Total number of people in the 16 groups that knew the participants were MSM divided by the total number of people in the 16 groups reported by the participants. **The correction factor (visibility factor)** = 1 / ITB.

Correction factor = 1 / ITB. To assess the robustness of this correction, the process was repeated 1000 times through Bootstrap resampling, resulting in a 95% simulated confidence interval (SI).

The ***Popularity bias*** was calculated as the average number of people across the 16 groups that the RDS participants reported divided by the same average among the household participants.

The following calculations were applied: **Popularity ratio** = Average number of people in the 16 groups teported by the RDS survey participants divided by the average number of people in the 16 groups teported by the household survey participants. **The popularity correction factor** = 1/popularity ratio.

2.3.2 Method of Coefficients

The Method of Coefficients involves utilizing two independent data sources to estimate the coefficient. This method relies on data from a subset of the target population, such as MSM, obtained from external sources [14]. For each of these data sources, a coefficient is computed, and these coefficients are then applied to estimate the size of the total MSM population. It is essential that the external data source is specific to the target population; for instance, it may involve HIV testing among men who have sex with men in the past 12 months. The MSM count in each external source is crucial for calculating the coefficient, and this external data is referred to as the base data or "benchmark."

Internally, the ratio is computed within the target group, reflecting the proportion that experienced a corresponding baseline ("benchmark") event. For instance, using RDS data, we determined the proportion of MSM who had undergone HIV testing within the last year. The coefficient was then calculated as the reciprocal of this proportion (1 divided by the proportion). Subsequently, we estimated the MSM population by multiplying this coefficient by the external data's population size.

2.3.2.1 Regional Prevalence Estimates

To gauge the size and prevalence of MSM populations in three cities, the following approach was employed:

(1) Basic information related to MSM was gathered from routine information sources, as detailed below under "Routine Information Collection."

(2) Coefficients (M) were computed to estimate the size of the MSM population. This involved determining the proportion of MSM who had experienced a "benchmark event," such as HIV testing. The coefficient (M) was then calculated by taking the reciprocal of this proportion, done separately for each city.

(3) The estimated number of MSMs for each city was obtained by multiplying the count of individuals who experienced the benchmark event by the respective coefficient (M).

(4) Estimating MSM Prevalence. The evaluation of indicators was segmented into three parts for each city. Population size calculations were based on data from the National Statistical Service of Georgia (www.geostat.ge), utilizing 2022 population data by age.

Routine Information Gathering

The Multiplier-Benchmark method was employed to estimate the approximate size of the MSM population in various cities in Georgia. Data for this calculation were sourced from multiple entities, including the National Center Of Dermatology And Venereology, " Tanadgoma – Center for Information and Counseling", JSC "Equality Movement," and relevant government agencies specializing in this field. Baseline data concerning MSM were collected from the following key sources:

1. **National Center for Disease Control and Public Health (NCDC):** The NCDC, serving as the state central organization overseeing the HIV/AIDS epidemic surveillance system, provided vital information. Specifically, they supplied the number of unique MSM individuals included in the HIV prevention package for the high-risk group of men who have sex with men. In 2022, the package covered 11,836 persons, with 10,213 beneficiaries utilizing the HIV testing service.

2. **The National Center of Dermatology and Venereology:** This center implements various programs across the country to prevent the transmission of infectious diseases (including HIV and sexually transmitted infections) among men who have sexual contact with men. The minimum package provided to the MSM target population comprises several interventions free of charge. These include behavioral interventions, risk reduction counseling combined with TB prevention information, voluntary HIV counseling and testing (NCT), STD testing and treatment, pre-exposure prophylaxis, post-exposure prophylaxis, Hepatitis C testing, and hepatitis B vaccination.

Table 4. 2022 MSM coverage figures in the Cabinet of Health provided by The National Center of Dermatology and Venereology

City	Services in the health cabinet	HIV testing	STD treatment
Tbilisi	994	596	442
Batumi	168	94	110
Kutaisi	194	121	146
Total	**1356**	**811**	**698**

Source: The National Center of Dermatology and Venereology

3. **" Tanadgoma – Center for Information and Counseling".** The non-governmental organization provides support to various vulnerable groups, including men who have sex with men (MSM), injecting drug users (IWM), sex workers (SM), youth, prisoners, the LGBT community, victims of trafficking, individuals affected by HIV/AIDS, those impacted by tuberculosis, forcibly displaced persons, and others. With many years of experience, the organization offers its services to both the general population of reproductive age and at-risk populations. A range of services is extended to MSM, encompassing voluntary HIV/AIDS counseling and testing, screening and self-testing, prevention packages (including condoms and lubricants), as well as testing for sexually transmitted infections (such as syphilis). The organization uniquely tracks data on the number of MSM individuals who have availed themselves of these services, providing valuable insights into the coverage of services among this specific group.

Table 5. " Tanadgoma – Center for Information and Counseling", 2022

Characteristics	HIV screening (quick and self-test)	HIV prevention package	STD testing (syphilis)
MSM	4764	5471	611

Source: " Tanadgoma – Center for Information and Counseling"

4. **Equality Movement.** The non-governmental organization (NGO) "Equality Movement" is dedicated to providing essential social and legal services tailored to the needs of LGBTQ+ individuals. The organization's primary goal is to foster equal rights and opportunities for LGBTQ+ people, facilitating their integration into society. Additionally, the NGO actively works to reshape public awareness and advocates for policy changes. "Equality Movement" offers a diverse range of services to LGBTQ+ individuals, including HIV infection testing, Voluntary Counseling and Testing (VCT), the provision of preventive packages (consisting of condoms, lubricants, and PrEP), as well as access to services provided by psychologists, social workers, and lawyers. The organization also provides access to qualified medical services from professionals with various specialties. In the year 2022, Equality Movement successfully implemented a project funded by

the Global Fund, specifically targeting MSM (Men who have Sex with Men), HIV-positive MSM, and transgender individuals. Within the scope of this project, a minimum/basic preventive package, including condoms, lubricants, and informational materials, reached a total of 5944 beneficiaries. Among them, 5207 beneficiaries underwent quick and easy testing for HIV infection and other sexually transmitted infections.

2.3.2.2. Service Multiplier Method

The Service Multiplier Method is a ratio-based approach that utilizes data obtained from health centers associated with program outreach to hidden populations. The primary external data source is service consumption data reported by MSMs, referred to as the "Benchmark." Voluntary HIV counseling and testing (NCT) conducted over the past year serves as the multiplier in this method. As part of the research, information regarding the number of beneficiaries who availed themselves of these services in Tbilisi, Batumi, and Kutaisi was collected from "health cabinets" and non-governmental organizations actively engaged with the hidden population (Table 4). Additionally, data provided by NCDC served as an external source for the coefficient method.

To calculate the service utilization ratio, internal data involved the proportion of the target group that documented the corresponding baseline ("benchmark") event. This internal data was derived from the IBSS survey, where respondents provided information on the services they received in the "health offices" during the last 6 months. The questionnaire included details about the addresses and services offered by "health cabinets," encompassing testing for HIV, sexually transmitted infections, and treatment for sexually transmitted infections.

2.3.2.3. Unique Object Multiplier Method

Calculating the coefficient using a unique item involves randomly assigning a unique item to the target population. The procedure for calculating the coefficient using a unique item comprises two main stages. In the initial stage, a fixed number of memorable, unique items (e.g., bracelet, mirror, hanger) are distributed shortly before the study begins (1-2 weeks). In the subsequent stage, it is crucial to input specific questions into the research tool—IBSS questionnaire, through which the following information can be obtained: whether a unique item has been received in the last 2 months; if the participant could envision or describe the item; when, where, and how many items the beneficiary received; and the identity of the person who gave the item.

By utilizing the information acquired from the implementation of these two stages, it becomes possible to calculate the coefficient method using the following formula:

$$N = \frac{n}{p}$$

- Where N represents the estimated size of the key population.

- *n* is the total number of unique items distributed within the key population.
- *p* denotes the proportion of the key population who reported receiving a unique item during the survey.

To choose a unique item for the study, a focus group discussion was conducted with community representatives of the key population. A sock was selected as a distinctive, engaging, and easily memorable unique item. Beneficiaries could also easily use or consume it if they desired. The focus group discussion also identified suitable locations for distributing the unique item by a social worker experienced in working with the MSM community, such as a bar or an event organized by the community. A protocol was developed to ensure data accuracy in the distribution of the unique item, specifying the quantity of socks to be distributed. As part of the research, 500 socks were distributed, with each eligible participant receiving one. During the handover, individuals were advised not to lose or give away the received sock and to retain it for a duration of 3 months.

2.3.2.4. Gay Mobile Apps and Websites Service multiplier

Virtual platforms serve as secure public spaces for MSM, allowing them to connect and seek sexual partners discreetly, free from stigma or discrimination. These platforms, including mobile applications and social networking sites, indirectly assist in estimating the MSM population size. However, such estimates are generalized and based on the number of registered MSM on various platforms.

As per previous surveys on the size of the MSM population, Georgian MSM primarily utilize HornetApp, MambaApp, GeyromeoApp, and GrindrApp. Before the study, a focus group discussion was held with experienced members of the MSM community, resulting in a list of the most commonly used virtual platforms by MSM. This list remained unchanged from the previous survey. Consequently, within our study framework, researchers, following a predetermined schedule, created profiles on each platform and regularly visited them for a month and a half.

Data collection for coefficient calculation through virtual platforms involved two phases:

1. *First phase.* Two weeks before the study, researchers recorded the total number of registered online MSM users during both day and night on each platform using a pre-designed format. Additionally, within a month after the study commenced, two momentary assessments were conducted to count the online visibility of MSM on these sites. The non-duplicated number of MSM using different virtual platforms at various times was determined.
2. *Second phase.* As part of the IBSS survey, beneficiaries were asked whether they had used any mobile application or website platform in the last month. The proportion of MSM participating in the survey and their practice of using virtual platforms 2 weeks before or within a month after the survey were identified.

This data helps us to calculate the coefficient using the above method. It is through these two data that we calculated the approximate number of MSMs using the ratio method using a unique item. In the initial phase, data entry and analysis were conducted using Microsoft Excel, while in the second phase, data entry and processing were performed using SPSS 26.0.

The following formula was used to calculate the coefficient for all methods:

$$Var\ (N) = \frac{Var\ (M)}{[E\ (P)]^2} + \frac{[E\ (M)]^2}{[E\ (P)]^4} Var(P)$$

- Where M is the number of MSM who had a benchmark event (received different services in health clinics/ distributed a unique item/ used different virtual platforms).
- P is the proportion of those MSM who, within the scope of the survey, identified receiving services/received a unique item within the scope of the survey/used different

The variances for M and P were combined by using the following formula.
To approximate the Poisson distribution, the normal distribution was employed for calculating the confidence interval. In the computation of the 95% confidence interval (CI), with an α confidence level (type 1 error) set at 0.05, $z_{\alpha/2}$=1.96. The RDSAT standard deviation (SE) was derived from P. In the confidence interval calculation, a 1000-fold bootstrap was applied to determine the lower and upper bounds of the confidence interval for P and to estimate the uncertainty associated with the number of individuals who participated in the study. The confidence interval was computed using the following formula:

$$95\%CI\ for\ N = N \pm 1.96 \times \sqrt{Var(N)}$$

2.3.3. Method 3: Capture-Recapture

The capture-recapture (CR) method has been employed in recent years to estimate the size of latent populations. Methodologies vary among studies. In our research, we utilized a modified version of this method that eliminates the necessity for two independent samples, as required in standard capture-recapture methods, and avoids the use of "benchmark" information. The anonymity of participants and their contacts was maintained, and this modified capture-recapture method is also referred to as the "telefunken" method.

Based on the content of this method, researchers are afforded the opportunity to repeatedly reach representatives of the hidden population through RDS waves. The proportion obtained by identifying identical individuals should be utilized to estimate the total population size, employing the Lincoln-Peterson formula:

$$P = \frac{n \text{ x } s}{t}$$

Where,

- P is the total estimated population
- n is number of captures
- s is number of recaptures
- t is matches

To apply this method, two critical criteria must be satisfied: (i) the study sample must be representative of the anonymous population, and (ii) all members of the anonymous population participating in the study must have an equal chance of being captured.

Data collection for this method was executed through a survey of participants involved in the IBSS study. This process entailed gathering personal information from each RDS respondent and identifying 5 contacts (MSM) from each of them. A code was generated for each individual, considering the number of digits specified by the protocol. This involved acquiring data on the size of the survey respondents' network, along with demographic and personal characteristics (height, weight, hair color, eye color, ethnicity), phone numbers, and matching anonymized codes.

In particular, participants were required to disclose the last four digits of their phone number, with each digit being coded based on whether it was odd or even, low (0-4) or high (5-9). For instance, if the last 4 digits of the telephone code are 2451, it would be encoded as even-even-odd-odd-low-low-high-low. This approach allowed each research participant and their associated acquaintance to be identified with a corresponding code, preserving the anonymity of both the respondent and their representatives while enabling matching with contacts reported by other respondents.

The study beneficiary had to select acquaintances from the list whose numbers were recently added to the mobile phone contact directory. If there were fewer than five MSM acquaintances' numbers in their cell phone, they listed all contacts. In cases with a large number of MSM contacts, the selection of the first contact was made by randomly choosing the first letter of the last name from the alphabet. Subsequently, a unique code was created for the first person recorded with this letter in the respondent's phone contacts, and the remaining four contacts were selected sequentially—each subsequent SMS contact.

When calculating the population size using this method, study beneficiaries were treated as the "capture," acquaintances named by respondents during interviews as the "recapture," and the number of matches in named acquaintances was referred to as the "matches." A drawback of this method is the potential for false matches (matching of individuals who happen to have the same code), introducing the possibility of an error in the obtained population size. Considering this, the standard error, estimating the range of possible errors of coincidence, is calculated by the following formula:

$$SEp = \sqrt{\frac{n \times s \times (n-t) \times (s-t)}{t^3}}$$

And, 95% CI = P ± 1.96 x $\sqrt{SE_p}$

Taking our example into account, with n = 539 (representing the capture - the number of respondents in the study from which information was gathered) and s = 2074 (the recapture - information about their contacts), and considering the individual code created for each respondent, it was found that the number of matches in these contacts is 191 (t = 191). In this scenario, the estimated population size (P) would be 5853.

$$SEp = \sqrt{\frac{539 \times 2074 \times (539-191) \times (2074-191)}{191^3}} = 11480$$

This provides us with a 95% confidence interval= 5853 ± 1.96 x $\sqrt{11480}$

2.3.4. Method 4: Handcock's RDS Network Based Method

As we are aware, the Respondent Driven Sampling (RDS) method is employed for hidden populations, relying on social contact tracing. The RDS recruitment process involves selecting individuals from the target population through social networks. Handcock's RDS-based method aids in approximating sequential sampling to network data identified by RDS. The primary essence of this method lies in the chain of recruitment, the timing of recruitment, and the size of

the network of recruited subjects, providing insights into the number of personal networks within the target population that have yet to be involved in the study. In RDS recruitment, individuals who are socially active and have more social contacts enter the study at an earlier stage than those who are isolated.

In the analysis of this method, a Bayesian framework was employed, utilizing results obtained from previous research. For our study, estimates from the 2018 research on the size of the MSM population in Tbilisi, Batumi, and Kutaisi were used as prior knowledge. The RDS-A statistical analysis program was employed for the analysis.

2.3.5. Wisdom of Crowd

The average of multiple estimates is more accurate than any single estimate. This evaluation method is known as the Wisdom of Crowd (WOC). Wisdom of the crowds assumes that, in aggregate, the responses of a sufficient number of key population members about the size of their population will provide a good estimate of the actual size of their population. Participants in the RDS survey were asked for their best guesstimate on the population size and the average was computed.

Within the research framework, IBSS participants were asked to specify the number of MSM individuals residing in Tbilisi, Batumi, and Kutaisi. Using the Gilles rating scale (a component of the RDS-A analysis system) and relying on the responses of the study participants, we computed both the mean value and the 95% confidence interval, encompassing the minimum and maximum values.

3. Ethical issues

Participation in the study was voluntary. To estimate the size of the MSM population, both the household survey component and beneficiaries of the MSM behavioral surveillance study were informed about the study's purpose, objectives, methods, procedures, risks, and benefits. All subjects who willingly agreed to take part in the study signed an informed consent form and were only then included in the study. The principle of anonymity was upheld, with the identity of the participants not being recorded. For those recruited within the IBSS component, only the 15-digit code of the respondent was referenced in all documentation.
Before commencing the study, the study protocol and instruments underwent review and approval by the Ethics Committee of the Health Research Union (IRB00009520; IORG005619).

4. Results

Socio-demographic characteristics of General population and MSM recruited in IBBS surveys

Demographic data of MSM population

A total of 653 participants were enrolled in the study. The median age of the participating MSM varied across cities: 26 years in Tbilisi, 40 years in Kutaisi, and 27 years in Batumi. The highest percentage of individuals with higher education was observed in Batumi (9.7%), followed by Tbilisi (8.2%), and Kutaisi (2.9%). Regarding marital status, 38.1% of MSM residing in Kutaisi, 4.1% in Batumi, and 3.6% in Tbilisi were reported as married. Employed or self-employed MSM were distributed across cities as follows: 71.0% in Tbilisi, 66.3% in Kutaisi, and 80.8% in Batumi (table 6).

Table 6. IBBS study population characteristics (RDS-A population estimations).

Characteristics	Tbilisi N= 302	Kutaisi N= 150	Batumi N= 201
Age (median)	26 y	40 y	27 y
≤ 24 years	36.0%	9.3%	30.0%
>24 years	64.0%	90.7%	70.0%
Education			
Higher education	8.2%	2.9%	9.7%
Other	91.8%	97.1%	90.3%
Marital status			
Married	3.6%	38.1%	4.1%
Other	96.4%	61.9%	95.9%
Employment			
Employed/self-employed	71.0%	66.3%	80.8%
Unemployed	29.0%	33.7%	19.2%

Demographic data of the general population

A total of 770 participants were included in the household survey conducted in Tbilisi, Batumi, and Kutaisi. The majority of respondents in all three cities were women (Tbilisi - 63.1%, Kutaisi - 54.0%, and Batumi - 56.0%). The median age of the participants, distributed by cities, was as follows: Tbilisi - 47 years, Kutaisi - 45 years, and Batumi - 46 years. The highest level of higher education was reported in Tbilisi (58.0%), followed by Batumi (56.7%), and Kutaisi (45.3%). In terms of marital status, the majority of participants in all three cities were married (Tbilisi - 55.5%, Kutaisi - 54.9%, and Batumi - 50.3%). According to employment status, the distribution of employed/self-employed participants by cities was as follows: Tbilisi - 85.7%, Kutaisi - 75.3%, and Batumi - 79.9% (Table 7).

Table 7. Household survey population characteristics

Characteristics	Tbilisi N= 470	Kutaisi N= 150	Batumi N= 150
Sex			
Female	63.1%	54.0%	56.0%
Male	36.9%	46.0%	44.0%
Age (median)	47 y	45 y	46 y
≤ 24 years	5.3%	9.3%	4.0%
>24 years	94.7%	90.7%	96.0%
Education			
Higher education	58.0%	45.3%	56.7%
Other	42.0%	54.7%	43.3%
Marital status			
Married	55.5%	54.9%	50.3%
Other	44.5%	45.1%	49.7%
Employment			
Employed/self-employed	85.7%	75.3%	79.9%
Unemployed	14.3%	24.7%	20.1%

NSU population size estimates

According to the analysis conducted by the NSU method, the total number of MSM for all three cities was 8540, which was equal to 1.92% of the target population (Table 8).

Table 8. MSM population size estimation

MSM population			MSM prevalence % (15-64y men)		
Estimated number	95% CI		MSM prevalence	95% CI	
8540	6765	12450	1.92	1.52	2.79

Multiplier population size estimates

The MSM population size was assessed through various methods, employing coefficients derived from different sources, such as health cabinets, HIV testing, HIV prevention services, distribution of a unique item within the survey, and engagement with mobile/web applications. The current population estimates for MSM obtained through health cabinets, HIV testing, HIV prevention services usage, and the unique item distribution are 7,700, 8,122, 10,296, and 5,269, respectively. Furthermore, the distribution rates for specific mobile/web applications are as follows: "MambaApp" – 16,325, "HornetApp" – 3,318, "GeyromeoApp" – 11,645, and "GrindrApp" – 5,203 (refer to Table 9).

Table 9. Estimated number of MSMs according to indicators

All three cities	Multiplier type	Estemated number	95% CI	
	Health cabinets	7700	5852	9625
	HIV testing	8122	6912	9341
	Service usage	10296	7928	12664
	Unique item	5629	3715	7543
	MambaApp	16325	8489	24161
	HornetApp	3318	1858	4778
	GeyromeoApp	11645	1980	21311
	GrindrApp	5203	4007	6400

Capture-recapture estimates

We employed unique "Telefunken codes" individually assigned to each participant in the study, to calculate the size of the MSM population using the capture-recapture method. The results indicated the highest MSM population rate in Tbilisi, recording 2,829, followed by Batumi with 1,623, and Kutaisi with 1,312. The MSM population size for other cities collectively amounted to 6,446, and for the entire country of Georgia, the estimated population was 12,299 (Table 10).

Table 10. Estimating MSM population size using the capture-recapture method

	MSM population						MSM prevalence among 15-64 years men		
City	Match	Capture	Recapture	Estimated number	Lower	Upper	Estimated prevapence	Lower	Upper
Tbilisi	85	264	911	2829	2462	3197	0.81%	0.69%	0.93%
Batumi	61	132	750	1623	1315	1948	3.18%	2.58%	3.82%
Kutaisi	45	143	413	1312	1089	1536	2.80%	2.33%	3.28%
All three cities	191	539	2074	5853	5268	6438	1.31%	1.18%	1.44%
Other cities				6446	5608	7284	0.81%	0.71%	0.92%
Georgia				12299	10700	13898	0.99%	0.86%	1.12%

Wisdom of the Crowd

By utilizing the results from the IBSS survey and employing the Wisdom of the crowd method, we derived estimates for the size of the MSM population. The findings indicate that the MSM population size in all three cities was 11,945, with a range spanning from 8,370 to 14,591. The distribution of the MSM population by cities is as follows: Tbilisi - 11,500, Batumi - 215, and Kutaisi - 230 (Table 11).

Table 11. Population size of MSM using Wisdom of the Crowd Method

City	Estimated number	Lower	Upper
Tbilisi	11500	8370	14591
Batumi	215	167	276
Kutaisi	230	226	259
All three cities	11945	8763	15126

Handcock's method estimates

Applying Handcock's RDS-based method, which utilizes prior knowledge for calculation, the estimated MSM population size in all three cities is 11,792. The distribution by city is as follows: Tbilisi - 9,736, Batumi - 976, and Kutaisi - 1,080 (Table 13).

Table 13. Prior and subsequent knowledge of MSM population size

	MSM population						MSM prevalence % (15-64 years old men)		
City	Prior point	95% CI		Estimated point	95% CI		Estimated prevalence	95% CI	
Tbilisi	6875	4968	9087	9736	7521	11893	2.80%	2.16%	3.42%
Batumi	689	405	1045	976	613	1368	1.91%	1.20%	2.68%
Kutaisi	763	452	1149	1080	684	1504	2.31%	1.46%	3.21%
All three cities	8327	5825	11281	11792	8818	14765	2.65%	1.98%	3.31%

Data Synthesis and Triangulation

For data synthesis and triangulation, we utilized the "Anchor Multiplier tool (UCSF)" developed by the University of San Francisco, which incorporated results from all methods. During data processing, the program did not receive data from "Mamba.ru," leading to the exclusion of this specific dataset from the analysis. According to the results, the estimated MSM population size in all three cities was 8,367, falling within a range of 7,109 to 9,756. Among men aged 15-64, the percentage of the MSM population was 1.88%, with a confidence interval ranging from 1.60% to 2.19% (Table 14).

Table 14. MSM population size among men aged 15–64, 2022

All three cities	Mean %	Lower %	Upper %	Population (mean)	Population (lower)	Population (upper)
Anchored Multiplier Variance Adjusted	**1.88%**	**1.60%**	**2.19%**	**8367**	**7109**	**9756**
Prior PSE	1.87%	1.31%	2.53%	8327	5825	11281
NSU multiplier	1.92%	1.52%	2.79%	8540	6765	12450
Health cabinets multiplier	1.73%	1.31%	2.16%	7700	5852	9625
HIV testing multiplier	1.82%	1.55%	2.1%	8122	6912	9341
Service multiplier	2.31%	1.78%	2.84%	10296	7927	12663
Unique item multiplier	1.26%	0.83%	1.69%	5629	3715	7543
Grindr	1.17%	0.90%	1.44%	5204	4007	6400
Hornet	0.74%	0.42%	1.07%	3318	1858	4778
GayRomeo	2.61%	0.44%	4.78%	11645	1979	21310
Wisdom of the Crowd multiplier	2.68%	1.97%	3.40%	11945	8763	15127
Capture-recapture	1.31%	1.18%	1.44%	5853	5267	6438
Handcock's multiplier	2.65%	1.98%	3.31%	11792	8818	14765

Discussion and recommendations

During the study we had to adjust to the following limitations:

The most recent Census data available for our analyses were from 2014. Therefore, we calculated the proportion of the 15-64 age group from the total population of Georgia using 2022 data. We applied the calculated proportion to each city to estimate the corresponding adult population. We used these estimates as the denominators for the prevalence estimates.

MSMs may not disclose their status because of stigmatization. Therefore, respondents may be unaware of their acquaintance's behavioral peculiarities. This could result in an underestimate of the proportion of MSMs in a respondent's network and, therefore, underestimate of the population size of MSMs. This bias is defined as information transparency bias. To account for this bias, we adjusted our population size estimates using data reported by MSMs in our IBSS sub-study.

A second potential bias is related to popularity. The general population may have a lower chance of knowing hidden population members if members have smaller network sizes, on average. This bias can also result in an underestimate of the population size of MSMs if they are less likely to be included in the general population's social networks. To adjust for this bias, we calculated popularity ratios as the ratio of the general population's network size to MSMs average network size in each city.

Our population size estimates are based on data from three cities. We used this data to estimate the prevalence in the remaining population of Georgia. However, it is possible that our data from the three cities are not representative of all of Georgia.

We used external data sources for the multiplier benchmark method, which may be of varied quality. Due to the fact that we do not have access to the individual data, it is possible that MSMs were included multiple times in the benchmark databases.

Additionally, we assume that those included in the benchmark data represent all MSMs in Georgia and that MSMSs have an equal chance of being included in both the IBSS survey and the benchmark data. Because of these potential biases, we only used benchmark data in which MSMs were clearly identified.

In our study the final summary estimate of the MSM population size is very close to the average estimate for the whole world and is significantly lower than the corresponding estimates for Northern America and Eastern Europe.

It should be recommended, that the further development and validation of novel approaches are needed to better estimate MSM population size, as far as none of the individual methods currently available for this task is highly reliable, especially taking into consideration the country-specific contexts. It is necessary to accurately synthesize data from the different sources to get data close to the reality.

We hope, that the MSM population size estimates reported here will aid with the planning and evaluation of activities for modification of risky behavior, HIV and viral hepatitis prevention, treatment and care programs.

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Annex 1.

Network scale-up method survey questionnaire

Section **P.** Number of people you know with specific name

Now I want you to recall all the people you know by specific name and write their number down. Please also take into consideration that

- You should know such person by face and name, and he/she should also know you by face and name;

And

- **Alternative 1** You should have had contact with such person during the last 2 years personally, by phone or by the Internet (e.g. via e-mail, Skype, correspondence on social networks);

Or

- **Alternative 2** You should have shared food or drink with such person anywhere during the last 2 years (e.g. at work, restaurant, home), this person might be a family member, coworker, neighbor, etc.;

And

- Such person should be of any age and should live in Georgia

For example: Imagine that I am asking you to recall the number of people whose name is "Manana". Let's recall the total number of people whose name is "Manana". Let's say you recalled and counted 11 such people. Excellent! Let's now exclude the number of people whom you know, although they do not know you (let's say there is 1 such person). Then exclude all the people named "Manana" who do not live in Georgia (in this case, let's assume that all the people named "Manana" you know live in Georgia). Also, exclude all the people named "Manana" whom you have interacted with neither personaly, nor by phone/the internet during the last 2 years (let's say there are 3 such people). Therefore, the number of your acquaintances named "Manana" is 11-1-3 = 7 people. We

know that this is not an easy task. Please try your best and recall. Finally, if you could not recall a single person with such particular name, please enter - 0.

Description	Answers	How many of them know that you have sex with a man?
How many "**Mamuka**" do you know?	_____ people	_____people
How many "**Luka**" do you know?	_____ people	_____people
How many "**Zurab**", "**Zura**", "**Zuka**" and "**Zuriko**" do you know?	_____ people	_____people
How many "**Vazha**" do you know?	_____ people	_____people
How many "**Sophiko**", "**Sophio**" and "**Sopho**" do you know?	_____ people	_____people
How many "**Manana**" do you know?	_____ people	_____people
How many "**Shorena**" do you know?	_____ people	_____people
How many "**Nino**", "**Niniko**" and "**Nina**" do you know?	_____ people	_____people
How many "**Maias**" do you know?	_____ people	_____people
How many "**Davits**", "**Datos**", "**Datunas**" and "**Datikos**" do you know?	_____ people	_____people

Section PP . Number of acquaintances by groups

Now I will ask you about other people you know. I will repeat once more and remind you that

- You should know such person by face and name, and he/she should also know you by face and name;

And

- **Alternative 1** You should have had contact with such person during the last 2 years personally, by phone or by the Internet (e.g. via e-mail, Skype, correspondence on social networks);

Or

- **Alternative 2** You should have shared food or drink with such person anywhere during the last 2 years (e.g. at work, restaurant, home), this person might be a family member, coworker, neighbor, etc.;

And

- Such person should be of any age and should live in Georgia

Question	Total	How many of them know that you have sex with a man?	Only men	How many of them know that you have sex with a man?
1 How many people do you know who **got married** in 2022?	_____ people	_____people	_____ men	_____ men
2 How many **school teachers** do you know?	_____ people	_____people	_____ men	_____ men
3 How many people did you know who **died** in 2022?	_____ people	_____people	_____ men	_____ men
4 How many people did you know who **died of cancer** in 2022?	_____ people	_____people	_____ men	_____ men
5 How many people do you know who **were injured or died in a road accident** in 2022?	_____ people	_____people	_____ men	_____ men
6 How many **higher education students** do you know?	_____ people	_____people	_____ men	_____ men

Section O: Quotient method with unique items

1. In the previous 2 months, did you receive a socks?	1. Yes 2. No *go to*→0 88. Don't Know *go to*→0 99. Decline to answer *go to*→0
2.Can you show it to me?	1. Yes *go to*→5 2. I do not have it with myself 99. Decline to answer
3.Can you describe it to me?	1. The description was correct 2. Incorrect description 99. Decline to answer
4.Is this the bracelet you received? (show it to them)	1. Yes 2. No 99. Decline to answer
5.How many item did you receive?	
6.When did you receive this item?	_____ weeks ago
7. Where did you receive this item?	
8.Who did you receive this item from? (only one answer)	1. Friend 2. Sex partner 3. Social worker 4. Person from the same district 5. Co-worker 6. Stranger

Service use

9. Have you received service in „health cabinet“ during last 6 months? (specify health room, which is located in
... Service use means, that you received VCT- Voluntary Counseling and Testing on HIV and/or STI testing and/or STI treatment)

Address of “health cabinet”

Tbilisi- 5 Lubliana str.

Batumi- 33 Khimshiashvili str.

Kutaisi- 2 Otskheli str.

Yes	1
No	2
Don’t know	88
Refused to answer	99

Mobile / Web Apps Section

10.Do you use **Grindr** mobile apps?	1.Yes 2. No *go to*→**11**
10.1. Did you logged into **Grindr** mobile apps for last two weeks?	1. Yes 2. No 88. Don't Know 99. No Response

11. Do you use **Hornet** mobile apps?	1.Yes 2. No *go to*→**12**
11.1. Did you logged into **Hornet** mobile apps for last two weeks?	1.Yes 2.No 88. Don't Know 99. No Response
12. Do you use **Mamba.ru** website?	1.Yes 2. No *go to*→**13**
12.1. Did you logged into **Mamba.ru** website during last month?	1.Yes 2.No 88. Don't Know 99. No Response
13. Do you use **Gayromeo.com** website?	1.Yes 2. No *go to*→**R**
13.1. Did you logged into **Gayromeo.com** website during last month?	1.Yes 2.No 88. Don't Know 99. No Response

Section R. Network size

Now I am going to ask you some questions about your social network. Please take your time to carefully think about these questions. I am going to ask you to give me some estimates about the number of men who have sex with men that there are in Tbilisi and the number of men who have sex with men that you personally know.

Please give me your best estimate. You do not need to give me anyone's names.

#	Question	response
1	How do you think how many MSM is living in Tbilisi?	
2	How many of them do you know personally and the same time they know you by name?	
3	How many of them are above 18 years?	
4	How many of them have had homosexual contacts during last 12 months?	
5	How many of them have you seen during last 1 month?	
6	How many of them have you seen during last 3 months?	
7	How many of them do you think you can bring to participate in the research?	
8	Would you choose the same person for participation in the study who has given you the coupon? (In case he had not received it before)	1. yes 2. no

9	Why did you agree to participate in the study (More than once answer is allowed)	1. Monetary incentive . Influence of the person who gave the coupon to me . The study topic is interesting/ useful for me 4. I had plenty of free time 5. Other (indicate) _____

Section RR. Capture-recapture

Now, I am going to ask you some questions about some appearance characteristics like height, weight, hair and eye color and also race. Moreover, I will ask you about your list 4 digits of your phone number (just last 4) and record it as coded number (telefunken). For example, for any phone numbers which end in 1234, it is Odd-Even- Even-Low-Low-Low (explain how you did it and why).
A mix of these six variables will be used to assign you a unique non-identifying code, which later will be used in analysis. Nobody can use this code to identify you or your friends.

Variables	response	0. The participant own info.
Telefunken Code	0; 1; 2; 3; 4.....L 5; 6; 7; 8; 9.....H 0; 2; 4; 6; 8.....O 1; 3; 5; 7; 9.....E	
Approximate height	High.....H Middle..... M Short .....S	
Approximate weight	Obese .....O Normal.....N Thin. .....T	
Hair color	Dark .....D Light .....L Ginger/red....G No hair.....N	
Ethnicity	Georgian ..... G Azeri ..... Z Armenian.....A Other ..... O	

I want to ask the same questions from five MSM contacts whose you have their phone number in your phone's directory. Using a randomized list of alphabet letters, I will help you to choose them by random among your entire contact list. Please tell me their approximate height, approximate weight, hair color, eye color, and race/ethnicity and telefunken code:

Variables		Contact 1	Contact 2	Contact 3	Contact 4	Contact 5
Telefunken Code	0; 1; 2; 3; 4.....L 5; 6; 7; 8; 9.....H 0; 2; 4; 6; 8.....O 1; 3; 5; 7; 9.....E					
Approximate height	High.....H Middle ..... M Short..... S					
Approximate weight	Obese..... O Normal.....N Thin .....T					
Hair color	Dark..... D Light ..... L Ginger/red ..... G No hair.....N					
Ethnicity	Georgian .....G Azeri..... Z Armenian.....A Other .....O					

Section RRR. Wisdom of crowd

Now I am going to ask you some questions about size of men who have sex with men in Tbilisi. Please take your time to carefully think about these questions.

1. Earlier you mentioned that ____ men who have sex with men live in Tbilisi. What are minimum and maximum estimates? Minimum:_____ Maximum:_____.
2. How many of them are 18 year and over?

Overall: _____

Minimum: _____

Maximum: _____

Annex 2.

NSU questionnaire for Household survey

Questionnaire number __

Section A. For interviewers			
Interviewers code	_____ _____	Interview started	____ _____(hr/m)
Date of interview	_____ _____	Interview finished	____ _____(hr/m)

Section B. Demographic Data	
1. Age	_____ years
2. Sex	1. Male 2. Female
3. Ethnicity	1. Georgian 2. Other _____
4. Educational level	1. I have no education 2. Incomplete average 3. Complete Secondary/College/Prof. school 4. Incomplete higher 5. Higher 6. Student 99. Refused to answer
5. Marital status	1. Unmarried 2. Married 3. Divorced 4. Widow 99. Refusal to answer
6. Employment	1. Employed/self-employed 2. Unemployed 99. Refusal to answer

Section C. Number of People You Know by Specific Name
Now I want you to recall all the people you know by specific name and write their number down. Please also take into consideration that • You should know such person by face and name, and he/she should also know you by face and name; And • **Alternative 1** You should have had contact with such person during the last 2 years personally, by phone or by the Internet (e.g. via e-mail, Skype, correspondence on social networks); Or • **Alternative 2** You should have shared food or drink with such person anywhere during the last 2 years (e.g. at work, restaurant, home), this person might be a family member, coworker, neighbor, etc.; And • Such person should be of any age and should live in Georgia

For example: Imagine that I am asking you to recall the number of people whose name is "Manana". Let's recall the total number of people whose name is "Manana". Let's say you recalled and counted 11 such people. Excellent! Let's now exclude the number of people whom you know, although they do not know you (let's say there is 1 such person). Then exclude all the people named “Manana” who do not live in Georgia (in this case, let's assume that all the people named “Manana” you know live in Georgia). Also, exclude all the people named “Manana” whom you have interacted with neither personaly, nor by phone/the internet during the last 2 years (let’s say there are 3 such people).

Therefore, the number of your acquaintances named “Manana” is 11-1-3 = 7 people.

We know that this is not an easy task. Please try your best and recall. Finally, if you could not recall a single person with such particular name, please enter - 0.

Description	Answers
How many “**Mamuka**” do you know?	_____ people
How many “**Luka**” do you know?	_____ people
How many “**Zurab**”, “**Zura**”, “**Zuka**” and “**Zuriko**” do you know?	_____ people
How many “**Vazha**” do you know?	_____ people
How many “**Sophiko**”, “**Sophio**” and “**Sopho**” do you know?	_____ people
How many “**Manana**” do you know?	_____ people
How many “**Shorena**” do you know?	_____ people
How many “**Nino**”, “**Niniko**” and “**Nina**” do you know?	_____ people
How many “**Maia**” do you know?	_____ people
How many “**Davit**”, “**Dato**”, “**Datuna**” and “**Datiko**” do you know?	_____ people

Section D. Number of Acquaintances by Groups

Now I will ask you about other people you know. I will repeat once more and remind you that

- You should know such person by face and name, and he/she should also know you by face and name;

And

- **Alternative 1** You should have had contact with such person during the last 2 years personally, by phone or by the Internet (e.g. via e-mail, Skype, correspondence on social networks);

Or

- **Alternative 2** You should have shared food or drink with such person anywhere during the last 2 years (e.g. at work, restaurant, home), this person might be a family member, coworker, neighbor, etc.;

Question	Total	Only men
How many people do you know who **got married** in 2022?	_____ people	_____ men
How many **school teachers** do you know?	_____ people	_____ men
How many people did you know who **died** in 2022?	_____ people	_____ men
How many people did you know who **died of cancer** in 2022?	_____ people	_____ men
How many people do you know who **were injured or died in a road accident** in 2022?	_____ people	_____ men
How many **higher education students** do you know?	_____ people	_____ men

Appendix N3. Tables

Table A. Socio-demographic characteristics

Characteristics	Total		
	SPSS		RDS
	N	%	%
How old are you?			
≤24	213	32.6	30.7
≥25	440	67.4	69.3
What is the highest level of education you have achieved?			
No education	7	1.1	1.3
Incomplete high school	68	10.4	16.7
Complete high school/college	188	28.8	30.9
Incomplete higher	80	12.3	12.0
Higher	258	39.5	33.4
Student	52	8.0	5.7
How long have you lived in this city?			
≤1 years	33	5.1	3.6
2-10 years	120	18.4	15.4
≥10 years	500	76.6	81.0
Do you have a permanent dwelling?			
Yes	442	67.7	72.4
No, I rent the apartment	152	23.3	17.5
No, I live with someone else	59	9.0	10.2
What is your marital status?			
Married	60	9.2	10.2
Divorced/Separated	84	12.9	14.6
Widower	13	2.0	3.5
Has never been married	496	76.0	71.7
Are you employed?			
Yes, I have permanent job	346	53.0	45.5
Yes, I have temporary job	151	23.1	26.5
No	156	23.9	28.0

What is your monthly income?			
Up to 300 gel	78	11.9	15.4
300-700 gel	105	16.1	19.9
700-1000 gel	159	24.3	22.7
>1000 gel	237	36.3	29.8
Refused to answer	33	5.1	7.7
Missing data	41	6.3	4.5
Did you take a part in the study implied questionnaire filling and blood testing before?			
Yes in 2010	1	0.2	0.1
Yes in 2012	1	0.2	0.5
Yes in 2015	15	2.3	1.0
Yes in 2018	125	19.1	17.1
No	475	72.7	76.5
I don't remember	35	5.4	4.5
Refused to answer	1	0.2	0.3

Table A1. Biomarker component

Characteristics	Total		
	SPSS		CI
	N	%	
Anti-HIV			
Positive	100	15.3	0.15; 0.12-0.18
Negative	553	84.7	
RPR			
Positive	99	15.2	0.15; 0.12-0.18
Negative	554	84.8	
TPHA			
Positive	93	93.9	0.96; 0.91-0.99
Negative	3	6.1	
Anti-HCV			
Positive	51	7.8	0.07; 0.05- 0.10
Negative	602	92.2	
Anti-HBc			
Positive	139	21.3	0.21; 0.18-0.24
Negative	514	78.7	
HBsAg			
Positive	20	3.1	0.03; 0.01-0.04
Negative	633	96.9	

Table B. Alcohol and drug use

Characteristics	Total		
	SPSS		RDS
In the previous month, how frequently did you drink alcohol beverages?			
I did not drink	145	22.2	22.6
Every day	40	6.1	4.6
At least once a week	179	27.4	24.0
At least biweekly	137	21.0	16.5
Once a month	147	22.5	28.9
I don't know	1	0.2	0.3
Refused to answer	4	0.6	3.2
Have you tried any drugs listed below during the last 12 months?			
Heroin	28	4.3	6.5
Opium	18	2.8	5.4
Subutex	36	5.5	7.0
Vint/Jef/Amphetamine	17	2.6	3.4
Desomorphin	0	0.0	0.0
Amphetamine	58	8.9	11.2
Marijuana	282	43.2	38.5
GHB/GBL	11	1.7	0.8
Poppers	65	10.0	7.7
Ecstasy	79	12.1	11.3
Cocaine	54	8.3	7.6
Sedatives	39	6.0	5.4
Bio	27	4.1	3.6
Ephedra ''vint''	5	0.8	0.6
Have you injected any of abovementioned drugs intravenously during the last 12 months?			
Yes	44	6.7	5.8
When you injected drugs for the last time, did you use syringe or needle used by someone else?			
Yes	7	1.1	2.2

No	92	14.1	16.6
I Don't know	7	1.1	2.8
Refused to answer	2	0.3	0.6
Missing data	545	83.5	77.8
Did you have unprotected sex with injecting drug user during last 12 months?			
Yes	24	3.7	5.3
No	511	78.3	77.5
I Don't know	29	4.4	5.0
Refused to answer	1	0.2	0.5
Missing data	88	13.5	11.7

Table C. Sexual history: types and number of partners

Characteristics	Total		
	SPSS		RDS
	N	%	%
In general, what kind of sexual partner are you?			
Penetrated	101	15.5	10.1
Penetrative	182	27.9	33.0
Both penetrated and penetrative	362	55.4	55.0
Refused to answer	8	1.2	1.9
Were you under influence during the last anal sex?			
Yes	193	29.6	27.4
No	460	70.4	72.6
Were you under influence of any of the following during your last anal sex?			
Alcohol	135	69.9	71.1
Heroin	9	4.7	5.4
Opium	1	0.5	0.9
Subutex	8	4.1	4.7
Vint/Jeff/Amphetamin	3	1.5	1.4
Dezomorphine (Crocodile)	0	0.0	0.0
Inhalants	0	0.0	0.0
GHB/GBL	2	1.1	1.8
Poppers	11	5.7	6.3
Amphetamine	8	4.1	6.1
Marijuana	50	25.9	27.7
Ecstasy	3	1.5	2.1
Cocaine	9	4.6	5.3
Number of regular male partners during the last 12 months			
0	69	10.6	14.1
1	252	38.6	41.9
2-3	229	35.1	32.2
>3	82	12.6	8.8

Missing data	21	3.2	3.0
Number of occasional male partners during the last 12 months			
0	130	19.9	22.0
1-3	166	25.4	21.7
>3	355	54.4	55.2
Missing data	2	0.3	1.0
Number of commercial male partners during the last 12 months			
0	539	82.5	80.3
1-5	28	4.3	8.6
>5	7	1.1	1.1
Missing data	79	12.1	10.0
How old were you when you first had anal sexual contact with a man?			
≤10 years old	11	1.7	0.9
11-13 years old	33	5.1	2.7
14-17 years old	220	33.7	30.7
≥18 years old	380	58.2	64.0
Refused to answer	9	1.4	1.7
Whom did you have your last anal sex with?			
One regular partner	364	55.7	49.7
One occasional partner	279	42.7	49.0
Commercial partner	7	1.1	0.7
Several partners (group sex)	1	0.2	0.1
Refused to answer	2	0.3	0.5
The last time you had anal sex, did you and your partner use a condom?			
Yes	462	70.8	63.4
No	183	28.0	34.0
I Don't know	8	1.2	2.5
In general, with what frequency did you and your male partners use a condom during anal sex during the past 12 months?			
Always	308	47.2	39.7
Often	178	27.3	26.2

Sometimes	115	17.6	20.1
Never	52	8.0	13.9
Have you had sex with male partner abroad during last year?			
Yes	135	20.7	23.3
No	518	79.3	76.7
If yes, have you had unprotected sex?			
Yes	88	13.5	11.9
The last time when you had anal sex with a man, in your opinion, what was his HIV status?			
I think he was HIV negative	135	20.7	20.9
I know he was HIV negative	277	42.4	33.5
I think he was HIV positive	12	1.8	3.2
I know he was HIV positive	21	3.2	5.4
I know he does not know exactly his status	10	1.5	2.3
I did not think about this	74	11.3	19.9
I don't know/don't remember	117	17.9	12.6
Refused to answer	7	1.1	2.2
The last time when you had anal sex with a man, did you inform your partner about your HIV status?			
I told him that I did not know my status	11	1.7	1.7
I told I was HIV negative	213	32.6	31.4
I told him I was HIV positive	39	6.0	4.8
I did not tell him anything about my HIV status	334	51.1	49.7
I don't know/don't remember	47	7.2	9.2
Refused to answer	9	1.4	3.0
The last time when you had anal sex with a man:			
He was on PrEP	41	6.3	4.6
He was on PeP	5	0.8	0.8
I don't know/don't remember if he was on PrEP or PeP	106	16.2	17.7
I was on PrEP	60	9.2	4.4
I was on PeP	6	0.9	0.3
I don't know/don't remember	161	24.7	23.8
Refused to answer	59	9.0	13.0

Table D. Sexual history: Regular male sex partners

Characteristics	Total		
	SPSS		RDS
	N	%	%
Number of regular male partners you had anal sex with during the last 12 months			
0	22	3.4	3.6
1	255	39.1	42.0
2-3	224	34.3	28.8
>3	70	10.7	9.5
Missing data	82	12.6	16.0
Did you use condom during the last anal sex with your regular partner?			
Yes	386	59.1	51.3
No	171	26.2	26.3
Missing data	96	14.7	22.4
If no, what was the reason for not using condom?			
Did not have	19	11.1	12.5
Too expensive	1	0.6	1.2
Partner refused to use	11	6.4	5.1
Don't like them	31	18.2	17.3
Didn't think it was necessary	64	37.4	39.3
Didn't think of it	8	4.6	5.4
Other	1	0.6	0.9
I Don't know	1	0.6	1.2
Refused to answer	35	20.5	17.1
In general, how often did you and your regular male partner(s) use condom during the past 12 months?			
Always	243	37.2	31.3
Often	138	21.1	16.6
Sometimes	110	16.8	17.6
Never	68	10.4	12.2
Missing data	94	14.4	22.3

Table E. Sexual history: Occasional male sex partners

Characteristics	Total		
	SPSS		RDS
	N	%	%
Number of occasional male partners you had anal sex with during the last 12 months			
0	142	21.7	23.6
1-5	276	42.3	44.7
>5	226	34.6	29.7
Missing data	9	1.4	2.0
Did you use condom during the last anal sex with your occasional partner?			
Yes	428	65.5	57.5
No	73	11.2	15.7
I don't know/don't remember	11	1.7	2.6
Missing data	141	21.6	24.3
If no, what was the reason for not using condom?			
Did not have	16	27.6	33.7
Too expensive	4	6.9	6.9
Partner refused to use	19	32.8	29.5
Don't like them	12	20.7	17.2
Didn't think it was necessary	7	12.1	12.8
In general, how often did you and your occasional male partner(s) use condom during the past 12 months?			
Always	307	47.0	42.4
Often	96	14.7	11.0
Sometimes	83	12.7	16.5
Never	22	3.4	6.5
Missing data	145	22.2	23.6

Table F. Sexual history: Commercial male sex partners

Characteristics	Total		
	SPSS		RDS
	N	%	%
Number of commercial male partners you had anal sex with during the last 12 months			
0	5	0.8	0.8
1-5	27	4.0	6.2
>5	7	1.1	0.6
Missing data	615	94.2	92.4
Did you use condom during the last anal sex with your commercial partner?			
Yes	26	76.5	79.1
No	8	23.5	20.9
If no, what was the reason for not using condom?			
Did not have	1	12.5	12.6
Don't like them	2	25.0	27.6
Didn’t think it was necessary	1	12.5	11.4
Missing data	4	50.0	48.4
In general, how often did you and your commercial male partner(s) use condom during the past 12 months?			
Always	21	61.8	57.4
Often	3	8.8	12.5
Sometimes	5	14.7	13.6
Never	5	14.7	16.5

Table G. Participation in commercial sex (sex business)

Characteristics	Total		
	SPSS		RDS
	N	%	%
Do you have sex with men for material benefit?			
Yes	71	10.9	6.8
No	582	89.1	93.2
How often did you have sex with men for material benefit during the last 12 months?			
Everyday	8	11.2	6.1
Several times a week	15	21.1	24.7
Once a week	5	7.0	14.2
2-3 times a month	19	26.7	19.7
Once a month	6	8.4	9.8
Once in three months or less	10	14.1	15.9
I Don't know	1	1.4	0.8
Refused to answer	5	7.0	7.4
Missing data	2	2.9	1.4
What kind of material benefit do you usually get for your service?			
Money	68	95.8	97.3
Food	8	11.3	6.6
Apartment/living place	4	5.6	3.0
Other	7	9.9	5.5
How much money do you get for your services per day?			
Less than 10 gel	0	0.0	0.0
11-20 gel	1	1.4	2.6
21-50 gel	9	12.6	11.8
51-100 gel	27	38.0	35.5
More than 100 gel	29	40.8	45.1
Missing data	5	7.1	5.2
What is your monthly income from this service?			
Up to 50 gel	2	2.8	3.2

51-100 gel	3	4.2	4.0
101-200 gel	6	8.4	7.3
201-300 gel	11	15.5	18.4
301-500 gel	11	15.5	14.2
501-1000 gel	6	8.4	10.0
1001 gel and more	17	24.0	25.2
Other	1	1.4	0.8
I Don't know	1	1.4	0.8
Refused to answer	5	7.4	8.1
Missing data	8	11.2	8.0
Do you have any other source of income besides this business (commercial sex)?			
Yes	38	53.5	58.0
No	25	35.3	34.2
Missing data	8	11.2	7.8
Number of clients you had per day during the last 12 months?			
1-2	41	57.7	54.6
>2	14	19.7	21.9
Missing data	16	22.6	23.5
Do you consider yourself as involved in the sex-business?			
Yes	36	50.7	52.4
No	20	28.1	29.6
I don't know	10	14.1	13.7
Missing data	5	7.1	4.3
What is the reason of your involvement in the sex-business?			
To earn money	27	38.1	43.9
I like my occupation and don't want to do anything else	10	14.1	11.6
Missing data	34	47.8	44.5
Did you use condom during the last sexual intercourse for material benefit?			
Yes	54	76.1	78.0
No	10	14.1	13.3

Missing data	7	9.8	8.7
If no, what was the reason for not using condom?			
Did not have	1	1.8	2.2
Don't like them	3	5.6	5.2
Didn’t think it was necessary	3	5.6	4.3
Missing data	47	87.0	88.3
How often did you and your male clients use condoms during the last 12 months?			
Always	40	56.3	49.3
Often	11	15.5	16.0
Sometimes	11	15.5	16.9
Never	3	4.2	8.3
Missing data	6	8.5	9.5
Number of regular male clients			
1-3	19	26.8	27.8
>3	28	39.4	40.0
Missing data	9	33.8	32.2
Was your last commercial male partner your regular client?			
Yes	30	42.2	44.8
No	25	35.2	32.9
Refused to answer	5	7.1	8.1
Missing data	11	15.5	14.2
Did you use condom during the last sexual intercourse with regular partner?			
Yes	21	70.0	73.0
No	5	16.7	17.5
I don’t know	2	6.7	3.7
Refused to answer	1	3.3	3.0
Missing data	1	3.3	2.8
If no, what was the reason for not using condom?			
Did not have	1	20.0	21.2
Don't like them	1	20.0	18.7
Didn’t think it was necessary	2	40.0	42.6

Refused to answer	1	20.0	17.5
In general, how often did you and your regular client(s) use condom during the anal sexual intercourse in the past 12 months?			
Always	21	44.7	41.9
Often	10	21.2	13.5
Sometimes	8	17.1	21.2
Never	2	4.2	12.7
Refused to answer	1	2.2	1.9
Missing data	5	10.6	8.8

Table H. Sexual behavior with women

Characteristic	Tbilisi		Batumi		Kutaisi		Total		
	SPSS		SPSS		SPSS		SPSS		RDS
	N	%	N	%	N	%	N	%	%
Have you had sexual intercourse with a woman during the last 12 months?									
Yes	86	28.5	65	32.3	67	44.7	218	33.4	39.9
No	193	63.9	121	60.2	72	48.0	386	59.1	53.4
Refused to answer	1	0.3	0	0	1	0.7	2	0.3	0.2
Missing data	22	7.3	15	7.5	10	6.7	47	7.2	6.5
How many regular female partners have you had during the last 12 month?									
None	31	36.0	29	44.6	10	14.9	70	32.1	26.6
1	28	32.6	25	38.5	24	35.8	77	35.3	36.3
2-4	15	17.4	8	12.3	26	38.8	49	22.5	24.1
>4	5	5.8	2	3.1	4	6.0	11	5.0	8.1
Missing data	7	8.1	1	1.5	3	4.5	11	5.0	4.9
How many occasional female partners have you had during the last 12 month?									
None	19	22.1	16	24.6	18	26.9	53	24.3	26.9
1	11	12.8	12	18.5	6	9.0	29	13.3	12.8
2-4	20	23.3	21	32.3	21	31.3	62	28.4	25.2
>4	33	38.4	15	23.1	19	28.4	67	30.7	31.3
Missing data	3	3.5	1	1.5	3	4.5	7	3.2	3.9
How many commercial female partners have you had during the last 12 month?									
None	60	69.8	50	76.9	49	73.1	159	72.9	66.1
1	2	2.3	9	13.8	2	3.0	13	6.0	3.2
2-4	1	1.2	1	1.5	10	14.9	12	5.5	11.6
>4	1	1.2	0	0	2	3.0	3	1.4	6.6
Missing data	22	25.6	5	7.7	4	6.0	31	14.2	12.4
Did you use condom the last time you had sex with female sex partner?									

Yes	66	76.6	42	64.6	41	61.2	149	68.3	65.0
No	17	19.8	17	26.2	21	31.3	55	25.2	29.3
I don't know	0	0	3	4.6	2	3.0	5	2.3	2.5
Missing data	3	3.5	3	4.6	3	4.5	9	4.1	3.2
In general, with what frequency did you use condom with your regular female partner during the last 12 months?									
Always	24	50.0	17	48.6	27	50.0	68	49.6	44.0
Often	4	8.3	5	14.3	2	3.7	11	8.0	16.7
Sometimes	6	12.5	8	22.9	9	16.7	23	16.8	15.4
Never	13	27.1	4	11.4	16	29.6	33	24.1	21.7
Don't know	1	2.1	0	0	0	0	1	0.7	1.1
Missing data	0	0	1	2.9	0	0	1	0.7	1.1
In general, with what frequency did you use condom with your occasional female partners during the last 12 months?									
Always	43	67.2	29	60.4	30	65.2	102	64.6	58.9
Often	6	9.4	8	16.7	3	6.5	17	10.8	7.6
Sometimes	8	12.5	7	14.6	9	19.6	24	15.2	18.4
Never	5	7.8	3	6.3	4	8.7	12	7.6	11.5
Don't know	0	0	1	2.1	0	0	1	0.6	0.4
Missing data	2	3.1	0	0	0	0	2	1.3	3.2
In general, with what frequency did you use condom with your commercial female partners during the last 12 months?									
Always	1	25.0	7	70.0	13	92.9	21	75.0	77.2
Often	0	0	1	10.0	0	0	1	3.6	5.6
Sometimes	0	0	1	10.0	0	0	1	3.6	5.4
Never	2	50.0	1	10.0	0	0	3	10.7	4.9
Missing data	1	25.0	0	0	1	7.1	2	7.1	6.9

Table I. Group sexual practice

Characteristic	Tbilisi		Batumi		Kutaisi		Total		
	SPSS		SPSS		SPSS		SPSS		RDS
	N	%	N	%	N	%	N	%	%
Did you have group sex during the last 12 months?									
Yes	120	39.7	71	35.3	21	14.0	212	32.5	28.5
No	180	59.6	124	61.7	124	82.7	428	65.5	69.3
Don't know	1	0.3	0	0	0	0	1	0.2	0.1
Refused to answer	0	0	2	1.0	0	0	2	0.3	0.2
Missing data	1	0.3	4	2.0	5	3.3	10	1.5	2.0
Were those groups only male groups, only female groups or mixed (male and female) groups?									
Only males	88	73.3	48	67.6	12	57.1	148	69.8	71.2
Only females	4	3.3	3	4.2	1	4.8	8	3.8	5.5
Mixed	27	22.5	18	25.4	6	28.6	51	24.1	21.2
Don't know	1	0.8	0	0	0	0	1	0.5	0.3
Missing data	0	0	2	2.8	2	9.5	4	1.9	1.8
Last time you took part in the group sex, did you use condoms with all partners?									
Yes	99	82.5	60	84.5	16	76.2	175	82.5	84.4
No	18	15.0	6	8.5	1	4.8	25	11.8	10.2
Don't know	2	1.7	3	4.2	0	0	5	2.4	1.5
Missing data	1	0.8	2	2.8	4	19.0	7	3.3	3.9

Table J. Condoms and lubricants

Characteristic	Tbilisi		Batumi		Kutaisi		Total		
	SPSS		SPSS		SPSS		SPSS		RDS
	N	%	N	%	N	%	N	%	%
Do you know of any place or person from which you can purchase/obtain condoms?									
Yes	298	98.7	199	99.0	145	96.7	642	98.3	92.9
No	4	1.3	2	1.0	4	2.7	10	1.5	3.2
Refused to answer	0	0	0	0	1	0.7	1	0.2	0.4
Which place or person do you know where you can purchase/obtain condoms?									
Shop	152	51.0	65	32.3	91	62.8	271	42.2	36.6
Pharmacy	212	70.2	186	92.5	124	85.5	522	81.3	80.4
Market	3	1.0	7	3.5	3	2.1	13	2.0	2.4
Clinic	11	3.6	2	1.0	5	3.4	18	2.8	2.5
Bar/guest house/hotel	24	7.9	36	18.1	11	7.6	71	11.1	10.8
Peer educator	65	21.8	16	8.0	27	18.6	108	16.8	10.9
Friend	44	14.6	62	31.2	30	20.7	136	21.2	24.8
Non-governmental organizations	169	56.5	112	56.3	50	34.4	331	51.4	50.6
During the last 3 months have you received condoms and lubricants from social worker or at health cabinet or from peer educator?									
Yes	129	42.7	93	46.3	37	24.7	259	39.7	33.0
No	167	55.3	105	52.2	111	74.0	383	58.7	65.3
Don't know	0	0	3	1.5	0	0	3	0.5	0.6
Missing data	6	2.0	0	0	2	1.3	8	1.2	1.1
During the last 12 months have you received condoms and lubricants from social worker or at health cabinet or from peer educator?									
Yes	173	57.3	127	63.2	47	31.3	347	53.1	48.4
No	129	42.7	74	36.8	103	68.7	306	46.9	51.6

Have you used lubricants during anal intercourse with men in the past 3 months?									
Always	93	30.8	69	34.3	15	10.0	177	27.1	19.8
Often	92	30.5	85	42.3	16	10.7	193	29.6	27.0
Sometimes	70	23.2	25	12.4	42	28.0	137	21.0	22.5
Never	32	10.6	16	8.0	68	45.3	116	17.8	25.9
Don't know what is lubricant	2	0.7					2	0.3	0.2
Refused to answer	1	0.3			3	2.0	4	0.6	2.0
Missing data	12	4.0	6	3.0	6	4.0	24	3.7	2.6

Table W. Other sex practices

Characteristic	Tbilisi		Batumi		Kutaisi		Total		
	SPSS		SPSS		SPSS		SPSS		RDS
	N	%	N	%	N	%	N	%	%
Do you use any of the following items during sex?									
Sex toys (dildo, faloimitator)									
Yes	40	13.2	21	10.4	8	5.3	69	10.6	7.9
No	258	85.4	178	88.6	137	91.3	573	87.7	88.2
Refused to answer	2	0.7	1	0.5	3	2.0	6	0.9	1.9
Missing data	2	0.7	1	0.5	2	1.3	5	0.8	2.0
Fingering (anal finger penetration)									
Yes	105	34.8	71	35.3	71	35.3	182	27.9	24.6
No	191	63.2	125	62.2	125	62.2	455	69.7	71.9
Refused to answer	4	1.3	2	1.0	2	1.0	9	1.4	1.3
Missing data	2	0.7	3	1.5	3	1.5	7	1.1	2.1
Fisting (anal fist penetration)									
Yes	23	7.6	5	4.5	9	4.5	33	5.1	2.4
No	274	90.7	185	92.0	185	92.0	604	92.5	92.8
Refused to answer	4	1.3	3	1.5	3	1.	9	1.4	2.7
Missing data	1	0.3	4	2.0	4	2.0	7	1.1	2.1
Other (rimming, BDSM, rings, anal vegetable penetration)									
Yes	13	4.3	4	2.0	4	2.0	21	3.2	2.1

Table K. Sexually transmitted infections (STI)

Characteristics	Total		
	SPSS		RDS
	N	%	%
Have you ever heard of sexually transmitted diseases (so called venereal diseases)?			
Yes	631	96.6	92.0
No	22	3.4	8.0
Can you describe any symptoms of STIs in men?			
Discharge from penis or anus	198	44.5	43.5
Burning or pain during urination	131	29.4	32.4
Rush or ulcer on penis or anus	116	26.1	24.1
Have you had anal or genital discharge, or rash or ulcer during the past 12 months?			
Yes	114	17.5	18.4
No	539	82.5	81.6
Have you ever been tested for STIs?			
Yes	492	75.3	71.5
No	161	24.7	28.5
If yes, when was the last time you were tested on STIs?			
Durin the last 3 months	155	23.7	22.3
Durin the last 3-12 months	194	29.7	22.1
During 1-2 year	79	12.1	13.0
>2 years ago	63	9.6	18.9
Missing data	162	24.8	23.6
Why did you decide to get tested?			
For prophylaxis	329	66.8	67.7
After discovering symptoms	88	17.9	15.2
Sexual partner had an STI	22	4.4	5.6
I was asked to	12	2.4	2.9
Other	31	6.3	7.1
Missing data	10	2.1	1.5

L: STI treatment and other health services

Characteristics	Total		
	SPSS		RDS
	N	%	%
What did you do when you had genital or anal discharge or ulcer/rush last time?			
Self-treatment	17	14.9	15.8
Traditional healer or a wise man	8	7.1	6.9
Health clinic or hospital	74	64.9	67.4
Medical doctor's service privately	9	7.9	8.4
Drugstore	19	16.6	17.8
Did you tell your partner about your STI symptoms?			
Yes	62	54.3	57.2
No	26	22.8	21.3
Missing data	565	22.8	21.5
Did you stop having sex during the symptoms?			
Yes	75	65.7	66.6
No	15	13.2	12.5
Missing data	24	21.1	20.9
Did you use condom when you had symptoms?			
Yes	40	35.1	36.3
No	18	15.6	14.5
Refused to answer	9	7.9	9.1
Missing data	47	41.2	40.1
Have you referred to a proctologist during the last 12 months?			
Yes	29	4.4	3.6
No	76	11.6	13.8
Missing data	548	83.9	82.6
Have you been circumcised?			
Yes	20	3.1	1.8
No	84	12.9	15.4
Missing data	549	84.1	82.8

Table M. Knowledge, attitude and practice towards HIV infection

Characteristics	Total		
	SPSS		RDS
	N	%	%
Have you ever heard of HIV or the disease called AIDS?			
Yes	643	98.5	97.2
No	10	1.5	2.8
Does having one uninfected and reliable sexual partner reduces the risk of HIV infection?			
Yes	537	82.2	78.6
No	76	11.6	11.3
I don't know	29	4.4	7.0
Refused to answer	11	1.7	3.1
Does condom use during each sexual intercourse reduce risk of HIV infection?			
Yes	590	90.4	86.7
No	38	5.8	8.3
I don't know	14	2.1	1.9
Missing data	11	1.7	3.1
Do you think that healthy looking person can be infected?			
Yes	497	76.1	70.8
No	120	18.4	19.6
I don't know	25	3.8	6.5
Missing data	11	1.7	3.1
Can HIV be transmitted by mosquito bite?			
Yes	155	23.7	23.8
No	377	57.7	49.5
I don't know	107	16.4	23.0
Missing data	14	2.1	3.7
Can HIV be transmitted by sharing meal with HIV infected person?			
Yes	106	16.2	15.2

No	495	75.8	72.6
I don't know	38	5.8	7.7
Missing data	14	2.1	4.7
Can HIV be transmitted by sharing needles/syringes?			
Yes	614	94.0	90.0
No	21	3.2	5.2
I don't know	3	0.5	0.1
Missing data	15	2.3	4.6
Can HIV be transmitted from infected woman to her fetus or child?			
Yes	384	58.8	52.5
No	94	14.4	19.2
I don't know	161	24.7	24.1
Missing data	14	2.1	4.2
Do you know where you can receive service if you want to get tested for HIV?			
Yes	589	90.2	87.8
No	51	7.8	10.2
Missing data	13	2.0	2.0
Have you ever been tested for HIV?			
Yes	525	80.4	80.6
No	118	18.1	16.6
Missing data	10	1.5	2.8
When was the last time you got tested for HIV?			
During the last 3 months	187	35.6	36.1
During the last 3-12 months	196	37.3	37.3
During the last 1-2 years	84	16.0	15.1
2 years ago	56	10.6	11.5
Do you know your HIV status?			
Yes	520	99.0	98.3
No	5	1.0	1.7
You may not tell me, but what was your HIV status?			
Positive	58	11.1	11.4

Negative	439	83.7	82.1
Indeterminate	5	0.9	1.5
Refused to answer	19	3.6	4.1
Missing data	4	0.8	0.9
How you evaluate your risk for HIV?			
High risk	44	6.7	3.9
Medium risk	163	25.0	20.7
Low risk	229	35.1	33.7
No risk	38	5.8	10.0
I Don't know	14	2.1	3.8
Missing data	165	25.3	27.9

Table N. Knowledge, attitude and practice towards HCV and HBV

Characteristics	Total		
	SPSS		RDS
	N	%	%
Have you ever been tested for HCV			
Yes	423	64.8	62.2
No	89	13.6	9.2
I don't know	21	3.2	1.7
Missing data	120	18.4	26.9
If yes, what was the result?			
First positive, second negative	8	1.8	5.4
Both positive	39	9.2	10.6
Negative	362	85.6	82.4
I Don't know	7	1.7	1.1
Refused to answer	7	1.7	0.5
Have you ever been treated for HCV?			
Yes	28	71.8	74.8
No	11	28.2	25.2
Have you ever heard about HCV elimination program?			
Yes	334	51.1	50.6
No	141	21.6	15.2
I don't know	27	4.1	3.6
Missing data	151	23.1	30.5
Do you think HCV diagnostic and treatment is free in Georgia?			
Yes, completely	310	47.5	47.0
Yes, partially	71	10.9	7.2
No	22	3.4	1.9
I don't know	100	15.3	13.2
Missing data	150	23.0	30.6
If you were HCV positive, would you treat within the HCV elimination program?			
Yes	450	68.9	59.8

No	2	0.3	0.5
I don't know	31	4.7	3.4
Missing data	170	26.0	36.2
Is HCV vaccine available?			
Yes	93	14.2	9.9
No	222	34.0	32.6
I don't know	211	32.3	26.7
Missing data	127	19.4	30.8
HCV transmission routes:			
Food and water	31	4.7	5.0
Handshaking	11	1.7	2.4
Unprotected sexual contact	420	64.3	58.7
Blood transfusion	464	71.1	65.7
Air	11	1.7	0.7
Health/dental service	355	54.4	49.9
Used needles/syringes	414	63.4	56.6
From infected mother to child during the pregnancy	159	24.3	21.4
From infected mother to child during delivery	160	24.5	19.8
Sharing the personal equipment	200	30.6	25.6
I don't know	24	3.7	2.1
Missing data	3	0.5	0.6
HBV transmission routes:			
Food and water	35	5.4	7.9
Handshaking	10	1.5	1.4
Unprotected sexual contact	386	59.1	53.7
Blood transfusion	409	62.2	60.7
Air	8	1.2	0.4
Health/dental service	315	48.2	45.4
Used needles/syringes	380	58.2	53.4
From infected mother to child during the pregnancy	157	24.0	17.2
From infected mother to child during delivery	157	24.0	19.1

Sharing the personal equipment	200	30.6	22.9
I don't know	80	12.3	8.1
Missing data	2	0.3	0.1
Have you ever been tested for HBV?			
Yes	346	53.0	41.8
No	146	22.4	27.1
I don't know	39	6.0	4.1
Missing data	122	18.7	27.1
If yes, what was the result?			
Negative	325	93.9	92.5
Positive, current infection	5	1.5	1.2
Positive, the past infection	8	2.3	2.9
I don't know	4	1.1	1.8
Refused to answer	3	0.9	0.5
Are you taking HBV treatment medications?			
Yes	4	80.0	86.5
No	1	20.0	13.5
Do HBV antiviral medications exist?			
Yes	244	37.4	38.9
No	44	6.7	6.8
I don't know	238	36.4	37.0
Missing data	127	19.4	17.3
Is HBV vaccine available?			
Yes	250	38.3	34.6
No	70	10.7	12.3
I don't know	208	31.9	25.2
Missing data	125	19.1	17.9
Are you vaccinated against HBV?			
Yes	87	13.3	7.5
No	381	58.3	58.0
I don't know	55	8.4	6.7
Missing data	130	19.9	27.7

Would you get vaccinated against HBV if offered?			
Yes	278	42.6	39.6
No	55	8.4	6.0
I don't know	115	17.6	20.1
Missing data	205	31.4	34.4
If yes, where would you like to get vaccinated?			
Medical facility	232	35.5	35.8
Community organization	50	7.7	4.9
Other	17	2.6	0.8
I don't know	8	1.2	2.3
Missing data	346	53.0	56.1

Table H.H.1. Stigma and discrimination

Characteristic	Tbilisi		Batumi		Kutaisi		Total		
	SPSS		SPSS		SPSS		SPSS		RDS
	N	%	N	%	N	%	N	%	%
During the past 12 months have you been refused to get medical service because you are MSM?									
Yes	7	2.3	6	3.0	1	0.7	14	2.1	1.5
No	295	97.7	192	95.5	144	96.0	631	96.6	96.4
Don't know	0	0	1	0.5	4	2.7	5	0.8	1.4
Refused to answer	0	0	1	0.5	0	0	1	0.2	0.4
Missing data	0	0	1	0.5	1	0.7	2	0.3	0.3
During the past 12 months have you been refused being employed because you are MSM?									
Yes	17	5.6	11	5.5	8	5.3	36	5.5	4.4
No	283	93.7	189	94.0	137	91.3	609	93.3	93.9
Don't know	2	0.7	0	0	4	2.7	6	0.9	1.4
Missing data	0	0	1	0.5	1	0.7	2	0.3	0.3
During the past 12 months have you been refused to rent an apartment or were released from an apartment because you were MSM?									
Yes	5	1.7	5	2.5	3	2.0	13	2.0	1.1
No	2	296	193	96.0	141	94.0	630	96.5	97.0
Don't know	1	0.3	2	1.0	5	3.3	8	1.2	1.5
Missing data	0	0	1	0.5	1	0.7	2	0.3	0.4
During the past 12 months have you been refused to get help from police because you were MSM?									
Yes	17	5.6	7	3.5	2	1.3	26	4.0	2.4
No	283	93.7	190	94.5	145	96.7	618	94.6	95.1
Don't know	2	0.7	2	1.0	0	0	4	0.6	0.2
Refused to answer	0	0	1	0.5	0	0	1	0.2	0.1
Missing data	0	0	1	0.5	3	2.0	4	0.6	2.2

Table H.H.2. Violence

Characteristic	Tbilisi		Batumi		Kutaisi		Total		
	SPSS		SPSS		SPSS		SPSS		RDS
	N	%	N	%	N	%	N	%	%
During the last 12 months, have you been a victim of violence?									
Yes	77	22.5	39	19.4	12	8.0	128	19.6	20.5
No	215	71.2	158	78.6	137	91.3	510	78.1	78.3
Don't know	2	0.7	0	0	0	0	2	0.3	0.1
Missing data	8	2.6	4	2.0	1	0.7	13	2.0	1.1
Among those who were victims of violence: what type of violence was perpetrated on you?									
Verbal	76	98.7	39	100.0	10	83.3	125	97.6	98.2
Physical	32	41.5	25	64.1	5	41.6	62	48.4	52.2
Sexual	11	14.2	2	5.1	2	16.6	15	11.7	13.4
Economic	10	12.9	9	23.0	0	0	19	14.8	16.5
Among those who were victims of verbal violence: who perpetrated verbal violence on you?									
Stranger	51	67.1	22	56.4	6	60.0	79	63.2	66.4
Acquaintance	12	15.7	7	17.3	1	10.0	20	16.0	16.8
Family member/Relative	8	10.5	5	12.8	3	30.0	16	12.8	11.4
Police	0	0	1	2.5	0	0	1	0.8	0.5
Other	4	5.2	4	10.2	0	0	8	6.4	4.4
Refused to answer	1	1.3	0	0	0	0	1	0.8	0.5
Among those who were victims of physical violence: who perpetrated physical violence on you?									
Stranger	22	68.7	12	48.0	4	80.0	38	61.2	59.4
Acquaintance	6	18.7	5	20.0	0	0	11	17.7	16.4
Family member/Relative	2	6.2	4	16.0	1	20.0	7	11.2	9.2
Police	0	0	1	4.0	0	0	1	1.6	1.1
Other	2	6.2	3	12.0	0	0	5	8.0	13.9

Among those who were victims of sexual violence: who perpetrated sexual violence on you?									
Stranger	3	27.2	0	0	0	0	3	20.0	18.8
Acquaintance	8	72.7	1	50.0	2	100.0	11	73.3	74.9
Other	0	0	1	50.0	0	0	1	6.7	6.3
Among those who were victims of economic violence: who perpetrated economic violence on you?									
Stranger	3	20.0	3	33.3	0	0	6	31.5	34.9
Acquaintance	5	50.0	1	11.1	0	0	6	31.5	32.2
Family member/Relative	0	0	2	22.2	0	0	2	10.5	14.5
Client	0	0	2	22.2	0	0	2	10.5	7.4
Other	1	10.0	1	11.1	0	0	2	10.5	7.4
Don't know	1	10.0	0	0	0	0	1	5.2	3.7
Among those who were victims of violence: Did you notify police about this case of violence?									
Yes	22	28.5	10	25.6	2	16.6	34	26.5	22.1
No	55	71.5	23	58.9	6	50.0	87	68.0	70.9
Missing data	0	0	6	15.4	4	33.3	7	5.5	7.0
If you have not notified police about the case of violence, why?									
Makes no sense, there will be no adequate reaction	28	50.9	8	34.7	4	66.6	39	44.8	42.2
I am embarrassed to say that I have sex with men	10	18.1	5	21.7	1	16.6	13	14.9	16.5
I thought it was unnecessary	6	10.9	1	4.3	0	0	10	11.4	12.4
I managed by myself	4	7.3	2	8.7	0	0	6	6.9	8.9
Other	7	12.7	1	4.3	0	0	8	9.2	8.7
Don't know	1	1.8	2	8.7	0	0	4	4.5	4.6
Refused to answer	3	5.4	4	17.4	2	33.3	7	8.0	6.7

Table Q. Sources of information

Characteristic	Tbilisi		Batumi		Kutaisi		Total		
	SPSS		SPSS		SPSS		SPSS		RDS
	N	%	N	%	N	%	N	%	%
From which sources have you received information about STI/AIDS?									
TV/Radio	68	22.5	37	18.4	72	48.0	177	27.1	29.2
Friends	84	27.8	79	39.3	78	52.0	241	36.9	38.7
Clients	1	0.3	3	1.5	3	2.0	7	1.1	2.1
Family members	8	2.6	4	2.0	9	6.0	21	3.2	5.4
NGO "Tanadgoma"	56	18.5	69	34.3	23	15.3	148	22.7	19.9
Internet	148	49.0	134	66.7	72	48.0	354	54.2	51.1
Community organizations	42	13.9	78	38.8	22	14.7	142	21.7	19.8
AIDS center	9	3.0	13	6.5	3	2.0	25	3.8	3.6
Other	40	13.2	6	3.0	5	3.3	51	7.8	5.6
Refused to answer	0	0	0	0	1	0.7	1	0.2	0.5
Which is the most reliable source of information for you?									
TV/Radio	42	13.9	20	10.0	53	35.3	115	17.6	19.8
Internet	144	47.7	89	44.3	70	46.7	303	46.4	48.7
Special booklets	46	15.2	61	30.3	25	16.7	132	20.2	21.6
Friends, relatives	40	13.2	26	12.9	50	33.3	116	17.8	19.8
Homo/bisexual men	14	4.6	18	9.0	8	5.3	40	6.1	7.6
NGOs	141	46.7	103	51.2	49	32.7	293	44.9	49.8
Other	18	6.0	4	2.0	4	3.4	26	4.0	5.5

Table H1. Sexual practice with women by different characteristics

Characteristic	Had sexual contact with a woman in the past 12 months		Didn't have sexual contact with a woman in the past 12 months		P value	OR; 95% CI
	N	%	N	%		
Age						
<25 years	54	28.1	138	71.9	0.006	1.6 (1.1-2.4)
≥25 years	164	39.6	250	60.4		
HIV infection						
Positive	34	37.0	58	63.0	0.8	1.0 (0.6-1.6)
Negative	184	35.8	330	64.2		
Syphilis						
Positive	34	37.8	56	62.2	0.6	1.0 (0.6-1.7)
Negative	184	35.7	332	64.3		

Table H2. Condom use at last sex with a woman by different characteristics

Characteristic	Used condom at last sex with a woman		Didn't use condom at last sex with a woman		P value	OR; 95% CI
	N	%	N	%		
Age						
<25 years	36	69.2	16	30.8	0.7	1.1 (0.5-2.2)
≥25 years	113	72.0	44	28.0		
HIV infection						
Positive	28	84.8	5	15.2	0.06	2.5 (0.9-6.9)
Negative	121	68.8	55	31.3		
Syphilis						
Positive	20	60.6	13	39.4	0.1	0.5(0.2-1.2)
Negative	129	73.3	47	26.7		
Alcohol consumption is the last 1 month						
Never/Rarely	99	75.6	32	24.4	0.07	0.5 (0.3-1.0)
Frequently	50	64.1	28	35.9		
Used condom at last anal sex with a man						
Yes	126	84.0	24	16.0	<0.0001	8.2 (1.1-16.2)
No/Don't know	23	39.0	36	61.0		

Table I1. Group sex practice by different characteristics

Characteristic	Had group sex in the past 12 months		Didn't have group sex in the past 12 months		P value	OR; 95% CI
	N	%	N	%		
Age						
<25 years	77	37.2	130	62.8	0.1	0.7 (0.5-1.0)
≥25 years	135	31.0	301	69.0		
HIV infection						
Positive	42	42.4	57	57.6	0.03	1.6 (1.1-2.5)
Negative	170	31.3	374	68.8		
Syphilis						
Positive	35	36.1	62	62.9	0.4	1.2 (0.7-1.8)
Negative	177	32.4	369	67.6		
Alcohol consumption is the last 1 month						
Never/Rarely	128	30.0	299	70.0	0.02	1.4 (1.1-2.1)
Frequently	84	38.9	132	61.1		

Table I2. Condom use at last group sex by different characteristics

Characteristic	Used condom at last group sex		Didn't use condom at last group sex		P value	OR; 95% CI
	N	%	N	%		
Age						
<25 years	61	81.3	14	18.7	0.2	1.6 (0.7-3.5)
≥25 years	114	87.7	16	12.3		
HIV infection						
Positive	35	87.5	5	12.5	0.6	1.2 (0.4-3.4)
Negative	140	84.8	25	15.2		
Syphilis						
Positive	22	71.0	9	29.0	0.01	0.3 (0.1-0.8)
Negative	153	87.9	21	12.1		
Alcohol consumption is the last 1 month						
Never/Rarely	111	88.8	14	11.2	0.08	0.5 (0.2-1.1)
Frequently	64	80.0	16	20.0		

Table O. Age groups by different factors

Characteristics	≤24		≥25		*p* value
	N	%	N	%	
Anti-HIV					
Positive	49	8.9	81	18.4	<0.01
Negative	194	91.1	359	81.6	
Anti-HCV					
Positive	3	1.4	77	17.5	<0.001
Negative	210	98.6	363	82.5	
RPR					
Positive	23	10.8	76	17.3	<0.05
Negative	190	89.2	364	82.7	
Anti-HBc					
Positive	21	9.9	118	26.8	<0.001
Negative	192	90.1	322	73.2	
HBsAg					
Positive	2	0.9	18	4.1	<0.05
Negative	211	99.1	422	95.9	
Do you have a permanent dwelling?					
Yes	148	69.5	294	66.8	0.53

No, I rent/I live with someone else	65	30.5	146	33.2	
Education level					
No education/incomplete high school	18	8.5	57	13.0	0.09
Complete high school/College	98	46.0	170	38.6	
University/Student	97	45.5	213	48.4	
What is your marital status?					
Married	4	1.9	56	12.7	<0.001
Divorced/Separated	2	0.9	82	18.6	
Widower	0	0.0	13	3.0	
Has never been married	207	97.2	289	65.7	
Are you employed?					
Yes, I have permanent job	105	49.3	241	54.8	0.31
Yes, I have temporary job	50	23.5	101	23.0	
No	58	27.2	98	22.3	
What is your monthly income?					
≤1000 Gel	109	59.2	233	59.0	1.00
>1000 Gel	75	40.8	162	41.0	

What kind of sexual partner are you?					
Penetrated	47	22.3	54	12.4	<0.001
Penetrative	43	20.4	139	32.0	
Both penetrated and penetrative	121	57.3	241	55.5	
Were you under influence during the last anal sex?					
Yes	58	27.2	135	30.7	0.41
No	155	72.8	305	69.3	
Number of male commercial sex partners during the last 12 months					
0	166	93.8	374	94.2	0.27
1-5	7	4.0	20	5.0	
>5	4	2.3	3	0.8	
How old were you when you first had anal sexual contact with a man?					
≤10 years old	4	1.9	7	1.6	<0.001
11-13 years old	13	6.1	20	4.5	
14-17 years old	102	47.9	118	26.8	
≥18 years old	94	44.1	295	67.0	
Whom did you have your last anal sex with?					
One regular partner	123	59.1	241	55.4	0.39
One occasional partner	85	40.9	194	44.6	
The last time you had anal sex, did you and your partner use a condom?					

Yes	155	74.5	307	70.3	0.30
No	53	25.5	130	29.7	
In general, with what frequency did you and your male partners use a condom during anal sex during the past 12 months?					
Always	94	44.1	214	48.6	0.53
Often/Sometimes	102	47.9	191	43.4	
Never	17	8.0	35	8.0	
Number of regular male partners you had anal sex with during the last 12 months					
0	8	4.2	14	3.7	0.24
1	75	39.7	180	47.1	
>1	106	56.1	188	49.2	
Did you use condom during the last anal sex with your regular partner?					
Yes	122	66.3	264	70.8	0.28
No	62	33.7	109	29.2	
How often did you and your regular male partner(s) use condom during the past 12 months?					
Always/Often	116	62.7	265	70.9	0.05
Sometimes/Never	69	37.3	109	29.1	
Number of casual male partners you had anal sex with during the last 12 months					
0	48	22.5	94	21.8	0.65
1-5	86	40.4	190	44.1	

>5	79	37.1	147	34.1	
Did you use condom during the last anal sex with your casual partner?					
Yes	140	83.8	288	83.5	1.00
No	27	16.2	57	16.5	
How often did you and your casual male partner(s) use condom during the past 12 months?					
Always	95	56.9	212	62.2	0.19
Often/Sometimes	67	40.1	112	32.8	
Never	5	3.0	17	5.0	
Did you use condom during the last anal sex with your commercial partner?					
Yes	7	63.6	19	82.6	0.38
No	4	36.4	4	17.4	
How often did you and your commercial male partner(s) use condom during the past 12 months?					
Always	2	18.2	19	82.6	<0.001
Often/Sometimes	7	63.6	1	4.3	
Never	2	18.2	3	13.0	
Do you have sex with men for material benefit?					
Yes	23	10.8	48	10.9	1.00
No	190	89.2	392	89.1	
How often did you have sex with men for material benefit during the last 12 months?					

Often	7	38.9	21	45.7	0.78
Rarely	11	61.1	25	54.3	
How much money do you get for your services?					
≤50	5	26.3	5	10.6	0.13
>50	14	73.7	42	89.4	
What is your monthly income from this service?					
≤500	9	64.3	24	57.1	0.75
>500	5	35.7	18	42.9	
Number of clients you had per day during the last 12 months?					
1-2	11	73.3	30	75.0	1.00
>2	4	26.7	10	25.0	
Have you ever heard of sexually transmitted diseases (so called venereal diseases)?					
Yes	207	97.2	424	96.4	0.65
No	6	2.8	16	3.6	
Can you describe any symptoms of STIs in men?					
Discharge from penis or anus	50	42.4	148	45.3	0.60
Burning or pain during urination	39	33.1	92	28.1	
Rush or ulcer on penis or anus	29	24.6	87	26.6	
Have you had anal or genital discharge, or rash or ulcer during the past 12 months?					
Yes	34	16.0	80	18.2	0.51

No	179	84.0	360	81.8	
Have you ever been tested for STIs?					
Yes	154	72.3	338	76.8	0.21
No	59	27.7	102	23.2	
When was the last time you got tested for STI?					
During the last 3 months	64	41.0	91	27.2	<0.001
During the last 3-12 months	68	43.6	126	37.6	
>1 years ago	24	15.4	118	35.2	
Have you ever heard of HIV or the disease called AIDS?					
Yes	209	98.1	434	98.6	0.73
No	4	1.9	6	1.4	
Do you know where you can receive service if you want to get tested for HIV?					
Yes	197	94.7	392	90.7	0.08
No	11	5.3	40	9.3	
Have you ever been tested for HIV?					
Yes	177	84.7	348	80.2	1.19
No	32	15.3	86	19.8	
When was the last time you got tested for HIV?					
≤3 months ago	74	42.3	113	32.5	<0.001
3-12 months ago	75	42.9	121	34.8	

>1 years ago	26	14.9	114	32.8	
Do you know your HIV status?					
Yes	177	100	343	98.3	0.18
No	0	0.0	6	1.7	
You may not tell me, but what was your HIV status?					
Positive	14	8.0	44	13.6	0.07
Negative	160	92.0	279	86.4	
How you evaluate your risk for HIV?					
High risk	11	7.0	33	11.8	0.001
Medium risk	45	28.7	118	42.3	
Low risk	101	64.3	128	45.9	
Have you ever been tested for HCV					
Yes	124	72.5	299	87.7	<0.001
No	47	27.5	42	12.3	
Have you ever heard about HCV elimination program?					
Yes	86	47.5	248	77.3	<0.001
No/I don't know	95	52.5	73	22.7	
Is HCV vaccine available?					
Yes	34	18.9	59	17.1	0.17
No	66	36.7	156	45.1	
I don't know	80	44.4	131	37.9	

Have you ever been tested for HBV					
Yes	117	71.8	229	69.6	0.67
No	46	28.2	100	30.4	
Are you taking HBV treatment medications?					
Yes	87	48.1	157	45.5	0.58
No/I don't know	94	51.9	188	54.5	
Is HBV vaccine available?					
Yes	89	49.4	161	46.3	0.52
No/I don't know	91	50.6	187	53.7	
Are you vaccinated against HBV?					
Yes	33	22.1	54	16.9	0.20
No	116	77.9	265	83.1	

Table P. Associations By cities

Characteristics	Tbilisi		Batumi		Kutaisi		*p* value
	N	%	N	%	N	%	
Anti-HIV							
Positive	47	15.6	37	18.4	16	10.7	0.13
Negative	255	84.4	164	81.6	134	89.3	
Anti-HCV							
Positive	7	2.3	13	6.5	31	20.7	<0.001
Negative	295	97.7	188	93.5	119	79.3	
RPR							
Positive	46	15.2	24	11.9	29	19.3	0.16
Negative	256	84.8	177	88.1	121	80.7	
Anti-HBc							
Positive	44	14.6	47	23.4	48	32.0	<0.001
Negative	258	85.4	154	76.6	102	68.0	
HBsAg							
Positive	5	1.7	9	4.5	6	4.0	0.14
Negative	297	98.3	192	95.5	144	96.0	
Education level							
No education/incomplete high school	20	6.6	10	5.0	45	30.0	<0.001

Complete high school/College	101	33.4	99	49.3	68	45.3	
University/Student	181	59.9	92	45.8	37	24.7	
What is your marital status?							
Married	8	2.6	7	3.5	45	30.0	<0.001
Divorced/Separated	26	8.6	27	13.4	31	20.7	
Widower	1	0.3	0	0.0	12	8.0	
Has never been married	267	88.4	167	83.1	62	41.3	
Are you employed?							
Yes, I have permanent job	202	66.9	96	47.8	48	32.0	<0.001
Yes, I have temporary job	24	7.6	67	33.3	60	40.0	
No	76	25.2	38	18.9	42	28.0	
How long have you lived in this city?							
≤1 years	17	5.6	14	7.0	2	1.3	<0.001
2-10 years	73	24.2	33	16.4	14	9.3	
≥10 years	212	70.2	154	76.6	134	89.3	
Do you have a permanent dwelling?							
Yes	183	60.6	145	72.1	114	76.0	<0.01
No, I rent/I live with someone else	119	39.4	56	27.9	36	24.0	
What is your monthly income?							
≤1000 Gel	116	43.8	116	63.0	110	84.6	<0.001

>1000 Gel	149	56.2	68	37.0	20	15.4	
How often did you drink alcohol during the last month?							
I did not drink	74	24.5	38	18.9	33	22.8	0.10
Often	98	32.5	81	40.3	40	27.6	
Less often	130	43.0	82	40.8	72	49.7	
What kind of sexual partner are you?							
Penetrated	51	17.1	35	17.6	15	10.2	<0.001
Penetrative	66	22.1	43	21.6	73	49.7	
Both penetrated and penetrative	182	60.9	121	60.8	59	40.1	
Were you under influence during the last anal sex?							
Yes	84	27.8	70	34.8	39	26.0	0.133
No	218	72.2	131	65.2	111	74.0	
Number of male commercial sex partners during the last 12 months							
0	246	98.0	170	93.4	124	87.9	<0.01
1-5	3	1.2	9	4.9	15	10.6	
>5	2	0.8	3	1.6	2	1.4	
How old were you when you first had anal sexual contact with a man?							
≤10 years old	7	2.3	3	1.5	1	0.7	<0.05
11-13 years old	21	7.0	10	5.0	2	1.3	
14-17 years old	100	33.1	77	38.3	43	28.7	

≥18 years old	174	57.6	111	55.2	104	69.3	
Whom did you have your last anal sex with?							
One regular partner	182	60.7	121	61.4	61	41.8	<0.001
One occasional partner	118	39.3	76	38.6	85	146	
The last time you had anal sex, did you and your partner use a condom?	228	75.5	146	74.9	88	59.5	<0.01
Yes	228	75.5	146	74.9	88	59.5	<0.01
No	74	24.5	49	25.1	60	40.5	
In general, with what frequency did you and your male partners use a condom during anal sex during the past 12 months?							
Always	161	53.3	81	40.3	66	44.0	<0.01
Often/Sometimes	116	38.4	111	55.2	66	44.0	
Never	25	8.3	9	4.5	18	12.0	
Have you had sex with male partner abroad during last year?							
Yes	70	23.2	29	14.4	36	24.0	<0.05
No	232	768	172	85.6	114	76.0	
Number of regular male partners you had anal sex with during the last 12 months							
0	7	2.6	11	5.9	4	3.6	<0.05
1	120	44.0	72	38.3	63	57.3	
>1	146	53.5	105	55.9	43	39.1	

Did you use condom during the last anal sex with your regular partner?							
Yes	202	75.7	116	64.8	68	61.3	<0.01
No	65	24.3	63	35.2	43	38.7	
How often did you and your regular male partner(s) use condom during the past 12 months?							
Always/Often	184	68.9	135	75.0	62	55.4	<0.01
Sometimes/Never	83	31.1	45	25.0	50	44.6	
Number of casual male partners you had anal sex with during the last 12 months							
0	82	27.3	30	15.0	30	20.8	<0.001
1-5	110	36.7	71	35.5	95	66.0	
>5	108	36.0	99	49.5	19	13.2	
Did you use condom during the last anal sex with your casual partner?							
Yes	191	86.4	152	88.4	85	71.4	<0.001
No	30	13.6	20	11.6	34	28.6	
How often did you and your casual male partner(s) use condom during the past 12 months?							
Always	143	65.3	111	64.9	53	44.9	<0.001
Often/Sometimes	69	31.5	58	33.9	52	44.1	
Never	7	3.2	2	1.2	13	11.1	
Did you use condom during the last anal sex with your commercial partner?							

Yes	4	100	8	66.7	14	77.8	0.38
No	0	0	4	33.3	4	22.2	
How often did you and your commercial male partner(s) use condom during the past 12 months?							
Always	3	75.0	3	27.3	15	78.9	<0.05
Often/Sometimes	1	25.0	6	54.5	1	5.3	
Never	0	0.0	2	18.2	3	15.8	
Do you have sex with men for material benefit?							
Yes	27	8.9	34	16.9	10	6.7	<0.01
No	275	91.1	167	83.1	140	93.3	
How often did you have sex with men for material benefit during the last 12 months?							
Often	11	52.4	12	36.4	5	50.0	0.46
Rarely	10	47.6	21	63.6	5	50.0	
How much money do you get for your services?							
≤50	3	13.6	6	17.6	1	10.0	0.81
>50	19	86.4	28	82.4	9	90.0	
What is your monthly income from this service?							
≤500	7	46.7	22	66.7	4	50.0	0.36
>500	8	53.3	11	33.3	4	50.0	
Number of clients you had per day during the last 12 months?							
1-2	10	66.7	23	76.7	8	80.0	0.69

>2	5	33.3	7	23.3	2	20.0	
Number of regular male clients							
0	4	23.5	4	13.8	1	10.0	0.83
1-3	5	29.4	11	37.9	3	30.0	
>3	8	47.1	14	48.3	6	60	
Have you ever heard of sexually transmitted diseases (so called venereal diseases)?							
Yes	297	98.3	198	98.5	136	90.7	<0.001
No	5	1.7	3	1.5	14	9.3	
Can you describe any symptoms of STIs in men?							
Discharge from penis or anus	106	50.7	42	33.1	50	45.9	<0.05
Burning or pain during urination	52	24.9	46	36.2	33	30.3	
Rush or ulcer on penis or anus	51	24.4	39	30.7	26	22.4	
Have you had anal or genital discharge, or rash or ulcer during the past 12 months?							
Yes	43	14.2	37	18.4	34	22.7	0.07
No	259	85.8	164	81.6	116	77.3	
Have you ever been tested for STIs?							
Yes	238	78.8	154	76.6	100	66.7	<0.05
No	64	21.2	47	23.4	50	33.3	
Have you ever heard of HIV or the disease called AIDS?							
Yes	299	99.0	198	98.5	146	97.3	0.39

No	3	1.0	3	1.5	4	2.7	
Do you know where you can receive service if you want to get tested for HIV?							
Yes	281	94.3	185	93.9	123	84.8	<0.01
No	17	5.7	12	6.1	22	15.2	
Have you ever been tested for HIV?							
Yes	245	81.9	169	85.4	111	76.0	0.08
No	54	18.1	29	14.6	35	24.0	
When was the last time you got tested for HIV?							
During the last 3 months	116	47.3	53	31.7	18	16.2	<0.001
During the last 3-12 months	81	33.1	82	49.1	33	29.7	
>1 years ago	48	19.5	32	19.2	60	54.1	
Do you know your HIV status?							
Yes	244	99.2	166	98.8	110	98.2	0.72
No	2	0.8	2	1.2	201.8		
You may not tell me, but what was your HIV status?							
Positive	26	11.1	24	15.0	8	7.8	0.19
Negative	208	88.9	136	85.0	95	92.2	
How you evaluate your risk for HIV?							
High risk	18	8.5	20	13.8	6	7.7	0.32
Medium risk	77	47.2	52	35.9	34	43.6	

Low risk	118	55.4	73	50.3	38	48.7	
Have you ever been tested for HCV							
Yes	194	80.5	135	83.9	94	85.5	0.46
No	47	19.5	26	16.1	16	14.5	
Have you ever been treated for HCV?							
Yes	1	33.3	4	80.0	23	69.7	0.36
I'm currently involved in treatment program	2	66.7	1	20.0	10	30.3	
Have you ever heard about HCV elimination program?							
Yes	152	60.8	119	73.0	63	70.8	<0.05
No/I don't know	98	39.2	44	27.0	26	29.2	
Do you think HCV diagnostic and treatment is free in Georgia?							
Yes, completely	167	67.1	93	56.7	50	55.6	0.05
Yes, partially	27	10.8	26	15.9	18	20.0	
No	13	5.2	4	2.4	5	5.6	
I don't know	42	16.9	41	25.0	17	18.9	
Is HCV vaccine available?							
Yes	51	20.4	25	15.0	17	15.6	0.53
No	98	39.2	74	44.3	50	45.9	
I don't know	101	40.4	68	40.7	42	38.5	
Have you ever been tested for HBV							
Yes	166	72.5	120	77.9	60	55.0	<0.001
No	63	27.5	34	22.1	49	45.0	
Are you taking HBV treatment medications?							

Yes	133	53.8	67	40.4	44	38.9	<0.01
No/I don't know	114	46.2	99	59.6	69	61.1	
Is HBV vaccine available?							
Yes	140	55.8	80	48.5	30	26.8	<0.001
No/I don't know	111	44.2	85	51.5	82	73.2	
Are you vaccinated against HBV?							
Yes	61	28.2	23	15.6	3	2.9	<0.001
No	155	71.8	124	84.4	102	97.1	

Table Q. Service beneficiaries and non beneficiaries

Chacacteristics	Have you received condom and lubricant from social workers or at healthcare cabinet?				*p* value
	Yes		No		
	N	%	N	%	
Anti-HIV					
Positive	83	24.0	17	5.8	<0.001
Negative	263	76.0	278	94.2	
RPR					
Positive	68	19.7	29	9.8	<0.01
Negative	279	80.4	275	89.9	
Anti-HBc					
Positive	87	25.1	51	17.3	<0.05
Negative	259	74.9	244	82.7	
How often did you use condom during the past 12 months?					
Always	154	44.4	154	50.3	<0.001
Often/Sometimes	179	51.6	114	37.3	
Never	14	4.0	38	12.4	
Did you use condom during the last anal sex?					
Yes	255	74.6	198	67.8	0.06
No	87	25.4	94	32.2	

Did you use condom during the last anal sex with your regular partner?					
Yes	209	70.1	170	68.0	0.64
No	89	29.9	80	32.0	
Did you use condom during the last anal sex with your casual partner?					
Yes	247	84.6	173	81.6	0.39
No	45	15.4	39	18.4	
Did you use condom during the last anal sex with your commercial partner?					
Yes	13	72.2	12	80.0	0.69
No	5	27.8	3	20.0	
Did you use condom during the last anal sex for material remunerator?					
Yes	44	88.0	10	71.4	0.20
No	6	12.0	4	28.6	
Did you use condom during the last group sex?					
Yes	109	85.2	65	91.5	0.26
No	19	14.8	6	8.5	
Have you been refused do receive medical service during the last 12 months?					
Yes	38	11.0	24	8.1	0.23
No	308	89.0	271	91.9	
Have you been victim of violence during the last 12 months?					
Yes	91	27.2	33	11.2	<0.001
No	243	72.8	261	88.8	