ESTIMATED GROUP SIZE OF PEOPLE WHO INJECT DRUG USERS, FEMALE SEX WORKERS, AND MEN WHO HAVE SEX WITH MEN, REPUBLIC OF MOLDOVA, 2025

CHIȘINĂU, 2025

UNIT FOR COORDINATION AND MONITORING OF THE IMPLEMENTATION OF THE NATIONAL HIV/AIDS AND STI PROGRAM
CLINICAL INFECTIOUS DISEASES HOSPITAL "TOMA CIORBĂ"

The exercise to estimate the population size of people who inject drug, female sex workers and men who have sex with men in the Republic of Moldova was carried out within the program "Strengthening tuberculosis control and reducing AIDS-related deaths in the Republic of Moldova", financed by the Global Fund which supports the National Program for the Prevention and Control of HIV/AIDS and sexually transmitted infections (STI) for the years 2022-2025.

The exercise was coordinated by the Coordination Unit of the National Program for the Prevention and Control of HIV/AIDS/STI within the Clinical Hospital for Infectious Diseases "Toma Ciorbă" under the aegis of the Ministry of Health (MoH).

The data used in the exercise were provided by the Clinical Hospital for Infectious Diseases "Toma Ciorbă", the Republican Dispensary of Narcology, the Republican Clinical Hospital in Tiraspol, the General Police Inspectorate, the non-commercial organizations working with the respective groups and IBBS 2024-2025.

The results of the population size estimation exercise were discussed and agreed upon at the joint meeting of the Technical Working Group on HIV Prevention and HIV Monitoring and Evaluation of the National Council for Coordination of National programs for the prevention and control of HIV/AIDS and STI and Tuberculosis control (CNC TB/AIDS on March 13, 2025.

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Technical Support

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Abbreviations and definitions

AIDS	Acquired immunodeficiency syndrome
ART	Antiretroviral therapy
CNC	the National Council for Coordination of National programs for the prevention and control of
TB/AIDS	HIV/AIDS and STI and Tuberculosis control
FSW	Female sex workers
HBV	Hepatitis B virus
HCV	Hepatitis C virus
HIV	Human immunodeficiency virus
IBBS	Integrated bio-behavioral study in groups at high risk of HIV infection
KP	Key populations at higher risk of infection
MSM	Men who have sex with men
NCO	Non-Commercial Organization
PLHIV	People living with HIV
PSE	Population size estimation
PWID	People who inject drugs
RDS	Respondent Driven Sampling
RRP	Risk reduction programs
SS-PSE	Successive sampling population size estimation method
UNAIDS	Joint United Nations Programme on HIV/AIDS
WHO	World Health Organization

SUMMARY

Estimating the number of key populations (KP) at higher risk of Human immunodeficiency virus (HIV) infection, both at national and local levels, is an important strategy for subsequent decision-making regarding the response to the HIV and acquired immunodeficiency syndrome (AIDS) epidemic.

The extent of HIV and AIDS in the Republic of Moldova is not fully reflected in official statistics and relies on only those people who have been detected with HIV following HIV antibody testing. The number of people living with HIV (PLHIV) is higher than that reported in the official statistics. To assess a more accurate situation and increase the effectiveness of the country's HIV response, it is important to obtain reliable data on the population sizes of KP, which include people who inject drugs (PWID), female sex workers (FSW) and men who have sex with men (MSM).

The KP population size estimation (PSE) results will be used to estimate and forecast the HIV/AIDS situation in the country. These results will assist in planning, implementing and evaluating HIV prophylaxis programs, advocating for changes in state HIV and AIDS policies and for calculating sample sizes to conduct epidemiological studies in KP.

This report describes the process to estimate the population sizes of KP in the Republic of Moldova, using the service and unique object multiplier methods, capture-recapture and successive sampling population size estimation (SS-PSE) methods. This report describes the validation and consensus-building workshop to obtain final PSEs of PWID, FSW and MSM.

Previous PSEs for KP come from an integrated biological and behavioral surveillance (IBBS) study conducted in 2020 in the Republic of Moldova among PWID, FSW and MSM, using respondent-driven sampling (RDS). In 2020, PSEs were obtained using the service and unique object multiplier methods and, for the first time, the SS-PSE, which is based on the preliminary estimates of population size, social network size and the order of sampling in the IBBS study. The 2020 PSEs were used to inform the population sizes in 2025.

The current 2024 PSE exercise was guided by the opinions of experts and considered the limitations of the 2020 estimation exercise. The PSE process used literature on estimation methods, triangulation of existing estimates and other data sources. The PSEs were calculated separately for the municipalities of Chișinău and Bălți on the right bank of the Dniester River, the municipality of Tiraspol and the town of Râbnița on the left bank of the Dniester River and for the rest of the districts on both banks. The results of the estimates obtained were discussed with key partners and approved in the HIV and AIDS and sexually transmitted infections (STI) working group.

The final PSE of PWID in the Republic of Moldova is 21,800, with 18,430 thousand for the right bank and 3,370 for the left bank of the Dniester River. The PSE of FSW is 11,560, with 9,550 for the right bank and 2,000 for the left bank. The PSE of MSM is 13,000, with 11,500 on the right bank and 1,500 on the left bank of the Dniester River.

CONTEXT

The Republic of Moldova is located in central Europe in the northeastern Balkans; the capital of the country is the municipality of Chișinău. The Republic of Moldova is divided into 32 districts, 13 municipalities and two regions with special status. The regions with special status are the Autonomous Territorial Unit Gagauzia (which

includes three districts) and the administrative territorial units on the left bank of the Dniester (five districts). The population of the Republic of Moldova, including districts on the left bank of the Dniester, is about 2,874,500. According to Spectrum estimates of the Joint United Nations Program on HIV/AIDS (UNAIDS)[1], about 16,751 adults (15 years and older) were living with HIV at the end of 2024. The Republic of Moldova is classified as having a concentrated HIV epidemic, with a national HIV prevalence of 0.24%.

According to the data of the Clinical Hospital for Infectious Diseases "Toma Ciorbă", on January 1, 2024, 17,914 cases of HIV were registered in the Republic of Moldova (including the left bank of the Dniester) since 1987. There are 11,887 PLHIV out of those detected.

In 2024, 880 new cases of HIV were reported in official statistics, of which 92.8% are transmitted sexually. The epidemic started among PWID, but in the last ten years there has been an increase in heterosexual transmissions. The transmission rate associated with sexual practices between men registers lower values, but in the context of stigmatization and discrimination and self-stigmatization faced by MSM, these figures are likely underestimations.

Biological and behavioral data, as well as PSEs, provide essential information for the design, evaluation and financing of programs to reduce the spread of HIV infection. They are also needed for the Spectrum exercise and the epidemic projection package[2], which estimates many key indicators, including the number of PLHIV by age, new infections, AIDS deaths, the need for antiretroviral therapy (ART) and epidemic projection curves.

Credible PSEs of KP help to document progress to scale up HIV prevention and to secure continued funding for the provision of various services. However, measuring the size of KP is difficult due to their illegal behaviors and associated social stigma and discrimination. These factors motivate KP to remain hidden, leading to increased vulnerability to HIV infection and transmission. Both globally and in the region, PWID, MSM and FSW have a disproportionately high prevalence of HIV and are the central groups contributing to HIV transmission[3].

According to the results of 2024 IBSS among KP, the estimated HIV prevalence among PWID ranged from 4.4% in Râbnița to 18.3% in Tiraspol, with 16.9% and 16.7% respectively recorded in Chișinău and Bălți municipalities. Among FSW, HIV prevalence was 2.7% in Chișinău, 11.3% in Bălți and 8.3% in Tiraspol municipalities.[4] HIV prevalence among MSM in Bălți was 3.3% and 13.2% in Chișinău.[5]

The National Program for the Prevention and Control of HIV/AIDS/STI for the years 2022-2025, is focused on the following strategic directions: reducing new cases of HIV infection, especially in KP; improving access to healthcare and health indicators for PLHIV and STI; and, ensuring effective management of the National Program by setting ambitious targets based on population size data of KP.

This report presents the PSE methodology, calculations (including data sources), assessment, results and consensus exercises of PWID, FSW and MSM on both banks of the Dniester River. Methodological limitations and weaknesses to the PSE methods used are presented.

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[1] SPECTRUM estimates. See: www.unaids.org/sites/default/files/media_asset/QuickStartGuide_Spectrum_en.pdf
[2] IBID.
[3] UNAIDS. (2024). 2024 global AIDS report-The Urgency of Now: AIDS at a Crossroads. Available at: https://www.unaids.org/en/resources/documents/2024/global-aids-update-2024.
[4] IBBS 2024, held for the first time in the FSW group in Tiraspol municipality.
[5] Preliminary date, IBBS 2024 – 2025.

METHODS

Size estimation methods

UNAIDS and the World Health Organization (WHO) recommend using several methods to generate PSEs for KP in select regions.

The methods for estimating the PSEs of KP can be broadly classified into:

- Data collected directly from KP, including official statistical data (i.e., Narcological Service, Treatment Centers, Police, non-commercial organizations [NCO]);
- Methods incorporated into the IBBS surveys conducted among KP: service and unique object multipliers, survey capture-recapture, and SS-PSE);
- Methods from surveys of the general population (i.e., studies in the general population, Network scale-up);
- Knowledgeable estimates from experts.

Definitions for KP may have varied by method and are included in the specifications for international reporting[6].

The final national PSEs were made separately for Chișinău and Bălți municipalities, the rest of the localities on the right bank of the Dniester, Tiraspol municipality, the rest of the localities on the left bank of the Dniester (including the town of Râbnița).

A review of the service and unique object multipliers[7], capture-recapture, and SS-PSE[8] methodologies for PSEs of KP was carried out. Data to calculate these methods were collected from KP during 2024 IBBS studies carried out in the Republic of Moldova. Count data directly from KP using services were also used (e.g., Narcological Service, ART Treatment Centers, police, NCO, etc.).

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[6] Biobehavioural survey guidelines for populations at risk for HIV, 2021. Available at: https://apps. https://www.who.int/publications/i/item/978-92-4-151301-2 (Accessed January 2025).

[7] UNAIDS. Guidelines on Estimating the Size of Populations Most at Risk to HIV. Geneva, Switzerland; 2010. Available from: http://www.unaids.org/en/resources/documents/2011/2011_Estimating_Populations; Johnston LG, Prybylski D, Raymond HF, et al. Incorporating the service multiplier method in respondent-driven sampling surveys to estimate the size of hidden and hard-to-reach populations: case studies from around the world. Sex Transm Dis. 2013; 40(4):304–10. Available from: http://www.ncbi.nlm.nih.gov/pubmed/23486495; Johnston LG, Soe PM, Aung MY, Ammassari S. (2019). Estimating the Population Size of Males Who Inject Drugs in Myanmar: Methods for Obtaining Township and National Estimates. AIDS and Behavior, 23(1), 295–301. https://doi.org/10.1007/s10461-018-2233-z; Johnston LG, Nguyen V, Balakrishnan S, Lwamba C, Khalifa A, Sabin K. (2022). Deriving and interpreting population size estimates for adolescent and young key populations at higher risk of HIV transmission: Men who have sex with men and females who sell sex. PLOS ONE, 17(9), e0269780. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC9473434/;

[8] McLaughlin KR, Johnston LG, Gamble LJ, et al. Population Size Estimates Among Hidden Populations Using Respondent-Driven Sampling Surveys: Case Studies from Armenia. JMIR Public Health Surveillance. 2019 Mar 14; 5(1): E12034. doi:10.2196/12034. PMID: 30869650; PMCID: PMC6437611; Johnston LG, McLaughlin KR, Rhilani HE, et al. Estimating the size of hidden populations using respondent-driven sampling data: Case examples from Morocco. Epidemiology. 2015;26. doi: 10.1097/EDE.0000000000000362; Handcock MS, Gile KJ, Mar CM. Estimating the size of populations at high risk for HIV using respondent-driven sampling data. Biometrics. 2015. 71:258–266. doi:10.1111/biom.12255. Cited: in: PMID: 25585794.

Once all the data sources were calculated and organized, they were presented to the technical working group and stakeholders for synthesis, agreement and validation. The use of several methods provided validity to each of the estimates, provided lower and upper limits of acceptability (i.e., discarding of outliers) and improved overall acceptance of the final estimates.

The exercise to estimate the size of KP was carried out in 2025 and was coordinated by the National Program for the Prevention and Control of HIV/AIDS/STIs within the "Toma Ciorbă" Clinical Hospital of Infectious Diseases, which benefited from the support and technical assistance of Lisa G. Johnston, independent consultant (lsjohnston.global@gmail.com, www.lisagjohnston.com). A very important and active involvement throughout the year was also demonstrated by NCO, which work with KP.

IBBS methods using RDS

The 2024 IBBS study using RDS sampled PWID in Chișinău and Bălți municipalities (right bank of the Dniester River), Tiraspol and Râbnița (left bank of the Dniester River); FSW were sampled in Chișinău and Bălți municipalities and, for the first time, in Tiraspol municipality (left bank of the Dniester River); and, MSM were sampled in Chișinău and Bălți municipalities (right bank of the Dniester River). The study was approved by an ethics committee and each respondent provided consent.

In each location, primary respondents (also known as “seeds”) were selected from different population strata depending on the KP: PWID seeds were selected based on age groups, drug preferences, sex, beneficiaries/non-beneficiaries of harm reduction services, etc.; FSW seeds were selected based on age groups, beneficiaries/non-beneficiaries of harm reduction services, from where clients are solicited, etc.; and, MSM seeds were selected based on age groups, social status, beneficiaries/non-beneficiaries of risk reduction services, etc. One seed for every 100 calculated in the sample size was selected to initiate the IBBS studies. Once the seeds completed the study steps they received up to three recruitment coupons for use to recruit their peers. Coupons had unique numbers which allowed participants to remain anonymous. Recruitment ended when the sample sizes were attained.

All respondents had to complete an electronic questionnaire available in Romanian and Russian. The questionnaire was developed based on the latest recommendations from the WHO guidelines on bio-behavioral surveillance in KP[9] and based on the questionnaire used in the 2020 IBBS. After the questionnaire was completed, each respondent underwent capillary blood testing using rapid tests with pre-test counseling, receipt of results and post-test counseling. The test results were immediately recorded in the electronic test results form. Each respondent was informed about HIV prevention and a list of relevant service providers within the data collection locality and at national level was provided.

Upon completion of all study steps, PWID respondents received a primary incentive of 170 MDL (equivalent to US$ 9.8) and FSW and MSM received a primary incentive of 200 MDL (equivalent to about US$ 11.6). For each eligible recruit who finished the study steps, all KP received a secondary incentive of 100 MDL (equivalent to about US$ 5.8).

[9] UNAIDS. (2019). Biobehavioural Survey Guidelines. https://apps.who.int/iris/bitstream/handle/10665/258924/9789241513012-eng.pdf;jsessionid=FFEBAFCC88DD73A9097CD0F7AC628FDF?sequence=1.

PWID data was collected between October 17, 2024, and December 27, 2024; FSW data was collected between October 22 and December 27, 2024; and MSM data was collected between October 24 and December 18, 2024.

All data from the 2024 IBBS studies were analyzed in RDS Analyst[10], using the Gile successive sampling estimator[11].

ESTIMATES BASED ON MULTIPLIERS

Multiplier data was obtained through the 2024 IBBS study among PWID, FSW and MSM. Two types of multipliers were used: the service multiplier and the unique object multiplier. Each of these methods uses two sources of information, one of which comes from probability-based sampling data. RDS, when conducted correctly is a probability-based sampling method[12], often used in IBBS.

Service multipliers

The service multiplier uses programmatic NCO, health center or medical data (unique counts of visits during a specified time period by a particular KP) and data from KP participating in the IBBS who report having visited a particular NCO during a specified time period (i.e., a specific six month or twelve-month timeframe).

People who inject drugs

For the service multiplier estimates of PWID, the following indicators from the 2024 IBSS study were used:

1. Percentage registered in the narcological service by mid-2024.
2. Percentage receiving syringes and/or condoms under the Risk Reduction Programs (RRP) in the first six months of 2024, separately for each NCO working with PWID.
3. Percentage receiving an HIV test in the first six months of 2024, separately for each NCO working with PWID.
4. Percentage receiving STI testing in the first six months of 2024, separately for each NCO working with PWID.
5. Percentage counselled on HIV within the NCO, separately for each NCO working with PWID.
6. Percentage receiving an HIV test in the first six months of 2024, within medical institutions.

Subsequently, for the estimation of people using opioid drugs, the percentage of respondents who used opioid drugs in the last month and in the last six months for each study location was calculated using service data and 2024 IBBS data.

Female Sex workers

For the service multiplier estimates of FSW, the following indicators from the 2024 IBSS study were used:

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[10] See: www.hpmrg.org

[11] Gile KJ , Handcock MS. (2010). Respondent-driven sampling: an assessment of current methodology. Sociological Methodology, 40(1), 285–327. https://doi.org/10.1111/j.1467-9531.2010.01223.x

[12] Heckathorn DD. (1997). Respondent-driven sampling: a new approach to the study of hidden populations. Social Problems, 44(2), 174–199. https://doi.org/10.1525/sp.1997.44.2.03x0221m; Volz E, Heckathorn DD. (2008). Probability based estimation theory for respondent driven sampling. Journal of Official Statistics, 24(1), 79–97; Heckathorn DD, Cameron CJ. (2017). Network Sampling: From Snowball and Multiplicity to Respondent-Driven Sampling. Annual Review of Sociology, 43(1), 101–119. https://doi.org/10.1146/annurev-soc-060116-053556.

1. Percentage receiving condoms and/or syringes under the RRP in the first six months of 2024, separately for each NCO working with FSW.
2. Percentage receiving an HIV test in the first six months of 2024, separately for each NCO working with FSW.
3. Percentage receiving STI testing in the first six months of 2024, separately for each NCO working with FSW.
4. Percentage counselled on HIV within the NCO, separately for each NCO working with FSW.
5. Percentage detained and documented by the police for providing sexual services for money, drugs or other goods.

Men who have sex with men

For the service multiplier estimates of MSM, the following indicators from the 2024 IBSS study were used:

1. Percentage receiving lubricants and/or condoms under the RRP in the first six months of 2024, separately for each NCO working with MSM.
2. Percentage receiving an HIV test in the first six months of 2024, separately for each NCO working with MSM.
3. Percentage receiving STI testing in the first six months of 2024, separately for each NCO working with MSM.
4. Percentage counselled on HIV within the NCO, separately for each NCO working with MSM.

Unique object multiplier

For all KP, a unique object in the form of a key chain was distributed to as many KP as possible in each location where the IBBS was being conducted. When the objects were distributed, KP were asked to remember the object and not to give it away to anyone else. The objects had no monetary value such that KP would be willing to sell them. The object was unique to each KP. The number of objects distributed were recorded for each KP in each IBBS location. During the study 2024 IBBS study, each KP was asked if they received the appropriate keychain.

Mathematical formula for service and unique object multipliers

The numerator (N) is the number of KP who received a service during the specified dates (provided by service programs) or who received a unique object (distributed just before the study starts). The denominator (P) is the proportion of KP in the RDS study who received a service during the specified dates or who reported receiving a unique object.

The mathematical formula for calculating population size is S = N/P

Where:

S = Estimated Size

P = Proportion of population members in the study who reported receiving services.

N = Number of members of the population to whom the service was provided.

ESTIMATES BASED ON THE SS-PSE

The SS-PSE method uses each participant's social network size data and enrollment time collected during RDS studies to quantify population sizes, assuming that the network size distribution of successive waves reflects population exhaustion. Estimates use a Bayesian framework (i.e., quantify uncertainty about unknown quantities by correlating them with known quantities), incorporating information about an 'assumption' or prior knowledge about the size of the sampled population. The Bayesian framework also allows the calculation of probability intervals.

The SS-PSE was derived in RDS Analyst using imputed visibility.[13] Prior estimates for PSEs were derived from the 2020 IBBS studies of PWID, FSW and MSM. The median output was used as the final SS-PSE results.

ESTIMATES BASED ON CAPTURE RECAPTURE

Capture recapture requires the use of two probability-based sampling surveys. To calculate the capture recapture, the sample size of KP in each 2020 IBBS study was multiplied by the proportion of KP in the 2024 IBBS who reported participating in the 2020 IBBS study. A capture recapture count was collected for each KP and area that had both a 2020 and 2024 IBBS.

DERIVING ESTIMATES BY DISTRICTS, REGIONS AND NATIONALS

After calculating the PSEs using the above methods, they were submitted to the technical working group for validation, discussion and consensus. The technical working group was responsible for approving the final PSEs for each KP in each of the locations where the 2024 IBBS study was carried out and for extrapolating these estimates to obtain district and national level estimates.

Members of the technical working group were divided into three subgroups, each of which was responsible for one KP. The groups evaluated each of the PSE methodologies and results. The technical working group members were instructed to use their experience and knowledge to reach consensus on the most reasonable PSEs for each KP in each location where the 2024 IBBS study was conducted. Once there was consensus each subgroup presented their findings to the entire group for consensus by all.

Extrapolating data to create district and national level size estimations[14]

Density rankings

There were several steps to deriving the district and national level PSEs for PWID, FSW and MSM. First, The final agreed upon PSEs for each KP of each location of the 2024 IBBS study were calculated as counts and then as percentages of the respective adult (i.e., population size of men and women for PWID, population size of women for FSW, population sizes of men for MSM) based on the last census in the Republic of Moldova. Second, the technical working group classified the percentages into 'density rankings' of high, medium and low PSE

[13]McLaughlin KR, Johnston LG, Jakupi X, Gexha-Bunjaku D, Deva E, Handcock MS. (2024). Modeling the visibility distribution for respondent-driven sampling with application to population size estimation. The Annals of Applied Statistics, 18(1). https://doi.org/10.1214/23-aoas1807.

[14] Johnston LG, Soe PM, Aung MY, Ammassari S. (2019). Estimating the Population Size of Males Who Inject Drugs in Myanmar: Methods for Obtaining Township and National Estimates. AIDS and Behavior, 23(1), 295–301. https://doi.org/10.1007/s10461-018-2233-z.

prevalence. High-density, medium-density and low-density districts were based on criteria including whether an area was developed or industrialized, had high mobility, was touristic, had universities or located near the border. The values of the estimates from the SS-PSE were used as reference values for the parameters representing the high-density classification for all KP.

The next step was a 'mapping for density' exercise whereby final density rankings would be used for the PSEs of the districts not sampled in the 2024 IBBS study.

Mapping for density

The technical working subgroups were provided a map of the Republic of Moldova on which they were requested to fill in all geographic areas as having high-density, medium-density or low-density of KP. Each area of the map was colored (i.e., red for high-density, blue for medium-density, and no color for low-density) based on the 'density ranking' estimates described above. Additional data sources were used to inform decision making and all groups participated through an online workshop to verify information, provide opinions and discuss accuracy of the final rankings and densities. The completed maps were presented to all participants for final input and consensus (Figure 1.1., Figure 2.1., Figure 3.1.).

Obtaining district and national level estimates

In an excel spreadsheet, column 1 contained a list of all districts in the Republic of Moldova. In column 2, the corresponding adult population sizes for all KP (i.e., population size of men and women for PWID, population size of women for FSW, population sizes of men for MSM) of all districts based on 2024 census data[15] was listed. Column 3 contained the respective high-density, medium-density or low-density percentages based on the geographic color coding in the maps. Column 4 displayed the calculation of PSE counts for each district by multiplying the district population size by the density percentages. The counts of each KP in each district in column 4 were added up to derive a national PSE.

RESULTS

People Who Inject Drugs

PSEs are based on PWID being defined as having injected drugs in the past 12 months prior to the 2024 IBBS study. The final PSEs of PWID, approved by consensus by the technical working group, was 6400 for Chișinău municipality, 4800 for Bălți municipality, 1700 for Tiraspol municipality and 700 for Râbnița city. The PSE calculations are displayed in Table 1.1 and the color coding based on the mapping exercise is displayed in Figure 1.1.

The values obtained based on some multipliers were lower than NCO statistics and, thus, were excluded from the range of values for estimations. The number of new PWID registered in the narcological service for all sites and the number tested for HIV in medical institutions on the right bank resulted in underestimations due to the small number of PWID reported by those institutions. Only for the capital of Chișinău municipality and in Râbnița city were the narcological records at the end of the first semester of 2024 used for PSEs.

[15] The size of the general reference population for 2024 is based on the 2024 census of the Republic of Moldova. See: https://statistica.gov.md/en/population-and-housing-census-2024-9940.html

The unique object multiplier produced underestimated data, especially in Chișinău and Bălți municipalities, due to the dependence between those who received the objects and those who participated in the 2024 IBBS study and due to an insufficient number of unique objects being distributed.

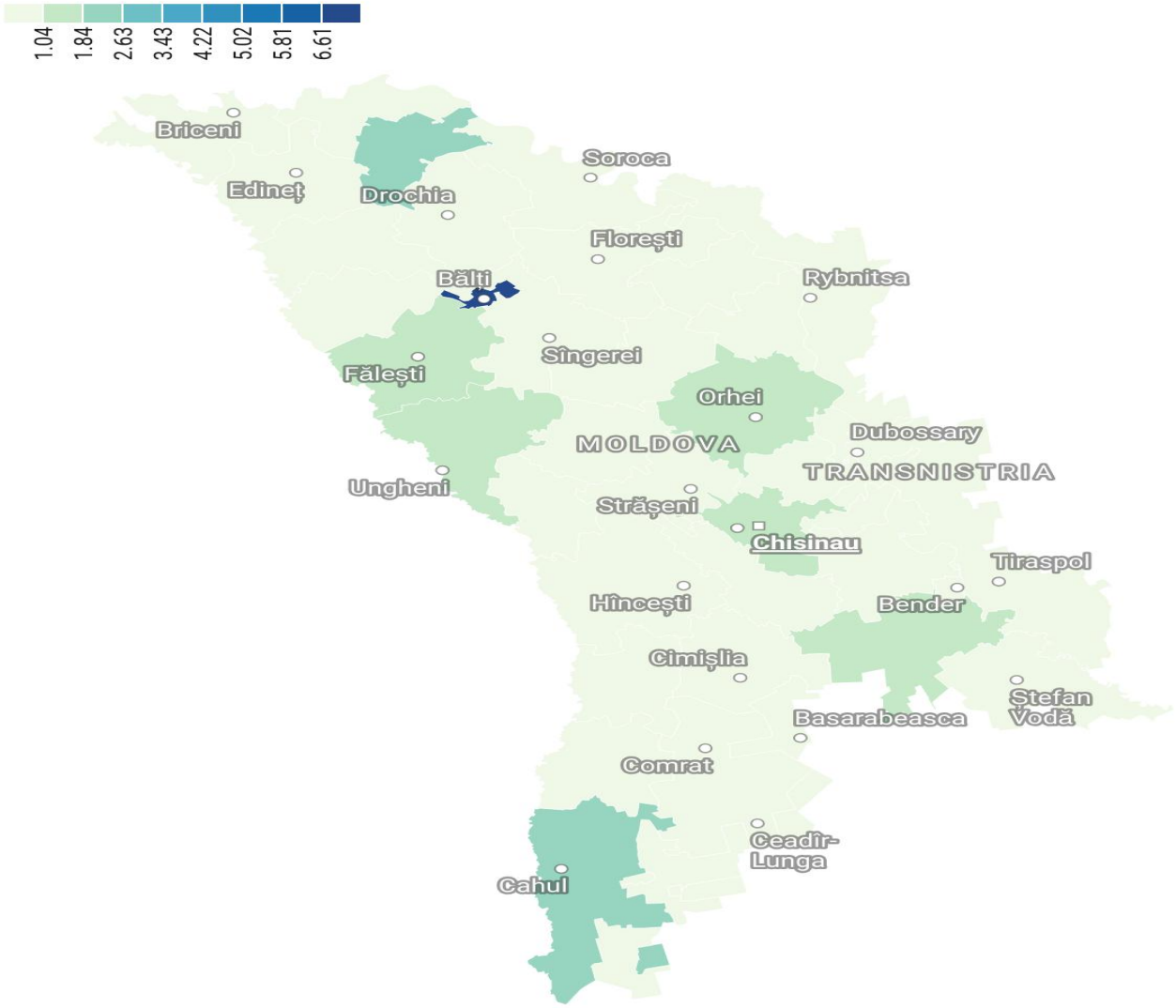
The SS-PSE resulted in PSE percentages ranging from 1.1% in Râbnița city to 7.4% in Bălți municipality.

Table 1.1. Calculated population size estimations for PWID

Chișinău (adult population 490 678)				
Method	**Source I-IBBS % (95% CI)**	**Source II Program counts**	**Estimated size # (95% CI)**	**% of adult population**
1. Tested for STI at ONC «P.P.V»	21.3 (16.9-26.4)	1185	5590 (4489-7012)	1,14
2. Tested for HIV at ONC «P.P.V»	21,3 (1,0-45,0)	1181	5547 (2624-118100)	1,13
3. Narcological records at the end of the first semester of 2024	28,9 (22,0-36,0)	2203	7623 (6119-10014)	1,55
4. Received syringes based on beneficiary card of ONC «P.P.V.»	21.9 (17,4-27,1)	2181	9959 (8048-15579)	2,03
5. Received condoms based on beneficiary card of ONC "P.P.V."	21,6 (17,2-26,8)	2183	10106 (8146-12692)	2,06
6. Capture Recapture II (IBBS 2020)	3,1 (1,3-4,9)	365	11774 (7449-28077)	2,40
7. SS-PSE (median)	--	--	6399 (1029-43747)	1,30
Average value	--	--	8143	1,66
Median	--	--	7623	1,55
CONSENSUS			**6400 (1019-43747)**	**1,30**
Bălți (adult population 64,741)				
1. Counseled on HIV at ONC «U.E.S.»	33,7 (27,6-40,5)	1119	3320 (2763- 4054)	5,13
2. Tested for HIV at ONC «U.E.S»	13,2 (9,0-17,0)	837	6341 (4924- 9300)	9,79
3. Tested for STI at the ONC «U.E.S»	13,8 (9,0-19,0)	824	5971 (4337- 9156)	9,22
4. Received syringes based on beneficiary card of ONC «U.E.S.»	26.8 (21,5-32,8)	1627	6071 (4960-7567)	9,38
5. Received condoms based on the beneficiary card of ONC «U.E.S.»	26,5 (21,3-32,5)	1599	6034 (4920-7507)	9,32
6. Capture Recapture II (IBBS 2020)	12,55 (8,4-18,1)	357	2845 (1972-4250)	4,39
7. SS-PSE (median)			4782 (739- 26742)	7,39
Average value			5052	7,80
Median			5971	9,22
CONSENSUS			**4800 (739-26742)**	**7,41**
Tiraspol (adult population 73,000)				
1. Tested for HIV in medical institutions	10,3 (7,2-16,3)	37	359 (247-617)	0,49
2. Tested for HIV at ONC «Alians Zdorovia»	38,3 (31,0-45,0)	373	974 (829-1203)	1,33
3. Tested for STI at ONC «Alians Zdorovia»	43,8 (37,2-50,7)	376	858 (742-1011)	1,18

4. Received condoms based on beneficiary card of ONC "Alians Zdorovia"	49,3 (42,5-56,1)	423	858 (754-995)	1,18
5. Received syringes based on beneficiary card of ONC «Alians Zdorovia»	48,1 (41,3-54,9)	429	892 (781-1039)	1,22
6. Unique object multiplier	48,0 (41,2-54,9)	350	729 (638 - 850)	1,00
7. Capture Recapture II (IBBS 2020)	17,7 (13,2-23,2)	333	1881 (1435-2523)	2,58
8. SS-PSE (median)			2355 (531-10275)	3,23
Average value			1327	1.67
Median			892	1,22
CONSENSUS			**1700 (531-10275)**	**2.33**
Râbnița (adult pop. 27,375)				
1. Tested for HIV in medical institutions	2,6 (0,7-5,0)	16	615 (320-2286)	2,25
2. Counseled on HIV at ONC Trinity	45,6 (38,5-53,2)	171	375 (321-444)	1,37
3. Tested for STI at ONC «Trinity»	39,5 (32,6-46,9)	290	734 (618-890)	2,68
4. Narcological records at the end of the first semester of 2024	14,1 (10,2-19,5)	109	773 (559-1069)	2,82
5. Tested for HIV at ONC «Trinity»	38,8 (32,0-46,0)	152	392 (330-475)	1,43
6. Received condoms based on beneficiary card of ONC "Trinity"	47,6 (40,3-55,0)	251	527 (456-623)	1,93
7. Received syringes based on beneficiary card of ONC "Trinity"	52,0 (44,4-59,5)	328	631 (551-739)	2,30
8. Unique object multiplier	41,2 (34,2-48,7)	350	850 (719-1023)	3,10
9. Capture Recapture II (IBBS 2020)	8,4 (5,5-12,6)	322	3833 (2556-5855)	14,00
10. SS-PSE (median)			299 (231-6348)	1,09
Average value			970	3.54
Median			631	2,30
CONSENSUS			**700 (231-6348)**	**2.56**

Figure 1.1. Map of distribution of PWID in the Republic of Moldova: high (dark blue), to low (light green)



The SS-PSE values served as reference values for the un-sampled districts, depending on the assigned density classification. Thus, after consultations with all the members of the technical working group, especially the representatives of the NCO engaged in the work with PWID in all districts, it was agreed that high-density districts would receive the range of 1.10% - 1.95%, medium-density districts would be 0.65% and low-density districts would be 0.25% of the adult male and female population. The calculations for the PSEs of PWID for each district are presented in Table 1.2.

Table 1.2. Estimation of the population sizes by density rankings* of PWID by districts

NORTH (adult pop. 400 686)			
Districts	***Adult population***	***Estimated % of adult population***	***Estimated number of PWID***
Sîngerei	44255	0,20%	89
Glodeni	28867	0,20%	58
Rîșcani	34120	0,20%	68
Soroca	43605	0,60%	260

Briceni	34855	0,60%	209
Ocnița	28012	0,60%	168
Drochia	40634	0,60%	244
Edineț	37575	0,60%	225
Florești	43235	0,60%	259
Fălești	44486	1,00%	445
Dondușeni	21042	1,00%	210
			2 236
CENTER (adult pop. 477 780)			
Dubăsari	16836	0,20%	34
Nisporeni	25583	0,20%	51
Telenești	29536	0,20%	59
Soldănești	19703	0,20%	39
Hîncești	48771	0,20%	98
Călărași	31136	0,20%	62
Strășeni	43195	0,20%	86
Anenii Noi	41739	0,20%	83
Ialoveni	49475	0,20%	99
Criuleni	38350	0,20%	77
Rezina	23697	0,60%	142
Orhei	53458	1,00%	530
Ungheni	56301	1,00%	563
			1924
SOUTH (adult pop. 313 301)			
Ștefan Vodă	32110	0,20%	64
Cimișlia	21677	0,60%	130
Cantemir	24218	0,60%	145
Basarabeasca	11433	0,60%	69
Leova	22411	0,60%	134
Vulcănești	21126	1,00%	211
Căușeni	44048	1,00%	440
Taraclia	21736	1,00%	217
Chadîr-Lunga	28334	1,00%	283
Comrat	32311	1,00%	323
Cahul	53897	1,95%	1047
			3065
LEFT BANK OF THE DNIESTER RIVER (adult pop. 167 291)			
Grigoriopol	24713	0,20%	49
Dubăsari	17394	0,20%	35
Râbnița	10931	0,20%	20
Camenca	11216	0,60%	65
Bender	50568	0,60%	303
Dnestrovsc	5513	0,60%	33
Slobozia	46956	1,00%	470
			975

* high-density; * medium density; and * low density.

The PSEs of PWID for the districts where the 2024 IBBS study was not conducted is 7,235 for the districts on the right bank and 975 for the left bank of the Dniester River. Together with Chișinău and Bălți municipalities, the estimated value for the entire region of the Right Bank of the Dniester River is 18,425; The estimated value for the Left Bank region of the Dniester River, including Tiraspol municipality and Râbnița city, is 3375 PWID. In total, the PWID PSE for the Republic of Moldova is **21,800.**

To calculate the PSEs of injectable opiate users, the average of the aggregate percentages of respondents who reported injecting opiates in the last month and last six months in the 2024 IBBS study and the percentage of opiate users in the statistics of the Narcological Service were used. The percentage of injectable opiate users for Chișinău municipality is 43.5% and for Bălți municipality is 44.8%. Applying these percentages to the PSEs for PWID in Chișinău and Bălți municipalities, the number of injectable opiate users is 2,780 in Chișinău municipality and 2,150 in Bălți municipality.

For the remaining districts on the right bank of the Dniester River, the average of Chișinău and Bălți municipalities was considered similar to the aggregate proportion of PWID who injected opiates in the last month and in the last six months based in the 2024 IBBS study and the percentage of injectable opiate users in the statistics of the Narcological Service for the remaining locations. The average of these two values was 42% resulting in a PSE of injectable opiate users of 3,030 for the rest of the districts on the right bank.

For Tiraspol municipality, the percentage of injectable opiate users in the last month and in the last six months based on the 2024 IBBS study is 45.7% resulting in an estimated size of 780. For the remaining districts on the left bank, the aggregate percentage of PWID from Tiraspol and Râbnița who injected opiates in the last month and in the last six months in the 2024 IBBS study was used. This resulted in 38.6% resulting in a PSE of 1675. The PSE of injectable opiate users for the rest of the left bank was 650.

The total PSE of injectable opiate users for the Republic of Moldova is **9,390**.

Female Sex workers

PSEs are based on FSW being defined as females aged 16-49 years who have offered sex for money or drugs at least once in the last 12 months prior to the 2024 IBBS study. The final PSEs of FSW, approved by consensus by the technical working group, was 4200 for Chișinău municipality, 1700 for Bălți municipality, and 500 for Tiraspol municipality. The PSE calculations are displayed in Table 2.1 and the color coding based on the mapping exercise is displayed in Figure 2.1.

Similar to the PWID estimations, the values obtained based on the multipliers which were lower than NCO statistics were excluded from the range of values for estimations. HIV testing data provided by medical institutions was very low for all study sites. Similarly, data provided by the Bălți municipality police was too low to be useful. In Tiraspol municipality, the condom service multiplier and the unique object multiplier resulted in underestimations due to the high percentage of FSW who benefited from the RRP who also participated in the 2024 IBBS study and because of the high overlap of FSW who received a unique object and participated in the 2024 IBBS study. Some condom service data in Chișinău municipality produced overestimations due to too few FSW reporting being beneficiaries verses the high number of beneficiaries reported by NCO.

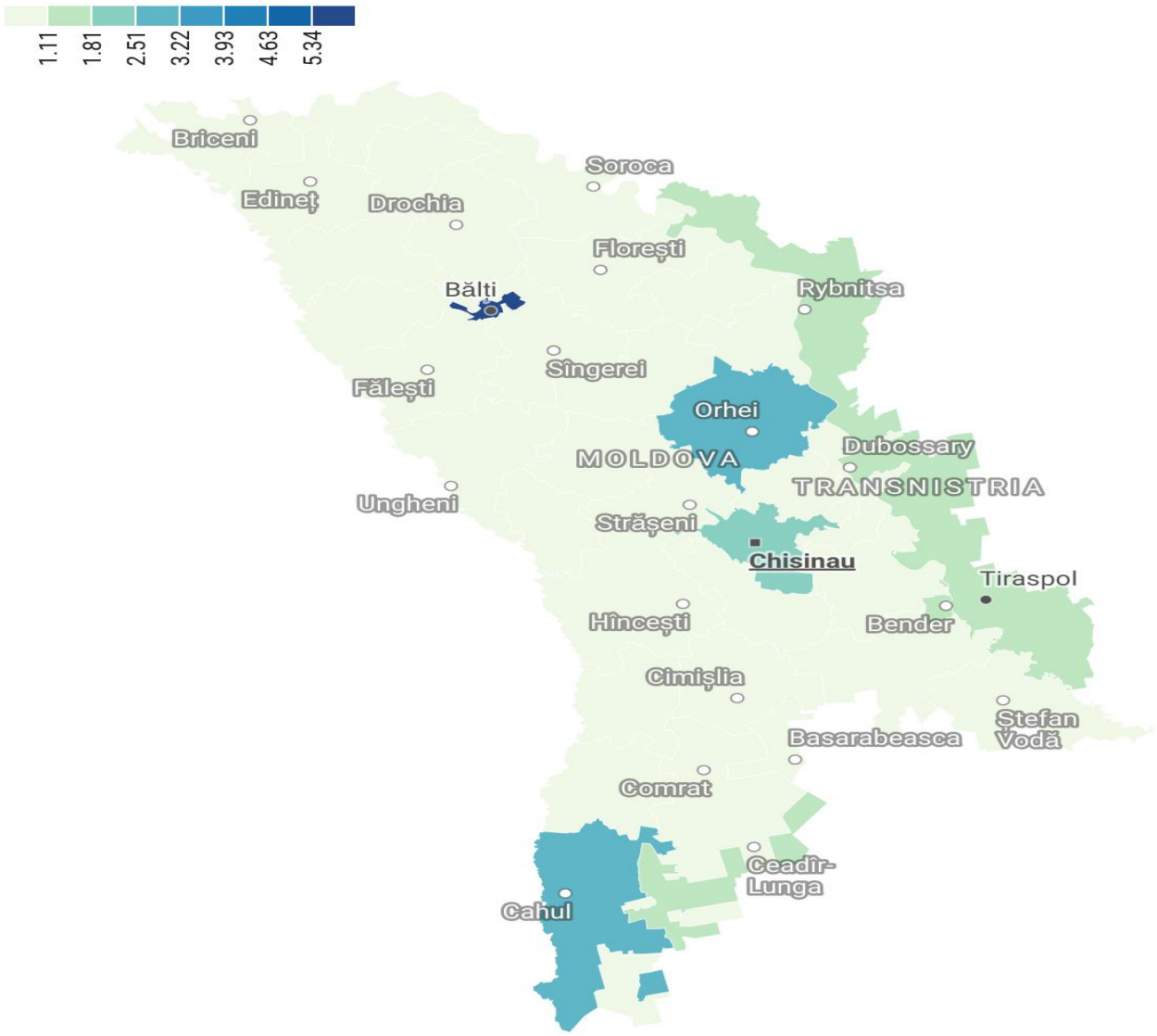
The SS-PSE resulted in PSE percentages ranging from 1.51% in Tiraspol municipality to 4.64% in Bălți Municipality.

Table 2.1. Calculated population size estimations for FSW

Method	Source I-IBBS % (95% CI)	Source II Program counts	Estimated size # (95% CI)	% of adult population
Chișinău (adult female pop. 221 356)				
1. Counseled on HIV at A.O. "A.F.I."	16,3 (10,0-22,0)	2355	14448 (10705-23550)	6,53
2. Detentions/arrests for commercial sex	13,9 (10,0-18,0)	935	6727 (5194-9350)	3,04
3. Tested for HIV in the "AFI" O.O.	15,0 (9,0-20,0)	1927	12855 (9635-21411)	5,81
4. Received condoms based on beneficiary card of A.O. "AFI"	16,6 (11,0-23,0)	2355	4187 (10239-21409)	6,41
5. Received condoms based on beneficiary card of ONC "P.P.V."	6,1 (3,0-9,0)	442	7246 (4911-14733)	3,27
6. Tested for HIV at ONC «P.P.V»	6,5 (3,0-10,0)	262	4031 (2620-8733)	1,82
7. Tested for STI at ONC «P.P.V»	6,1 (3,0-9,0)	262	4295 (2911-8733)	1,94
8. Tested for STI at A.O. "AFI"	15,7 (10,0-21,0)	1912	12178 (9105-19120)	5,50
9. Received syringes based on beneficiary card of ONC	4,7 (2,0-7,0)	267	5681 (3814-13350)	2,57
10. Unique object multiplier	10,4 (6,0-15,0)	354	3404 (2360-5900)	1,54
11. Capture Recapture II (IBBS 2020)	5,7 (3,0-8,0)	323	5667 (4038-10767)	2,56
12. SS-PSE (median)			4170 (627-25978)	1,88
Average value			7709	3,48
Median			5681	2,57
CONSENSUS			**4200 (627-25978)**	**1.88**
Bălți (adult pop. fem. 28 144)				
1. Counseled on HIV at ONC «U.E.S.»	26,2 (21,0-31,0)	735	2805 (2371-3500)	9,97
2. Tested for HIV at ONC «U.E.S»	20,8 (15,0-26,0)	294	1413 (1131-1960)	5,02
3. Received syringes based on beneficiary card of ONC	15,4 (12,0-19,0)	213	1383 (1121-1775)	4,91
4. Received condoms based on beneficiary card of ONC «U.E.S.»	28,3 (23,0-33,0)	943	3332 (2858-4100)	11,84
5. Tested for STI at ONC «U.E.S»	20,5 (14,0-27,0)	268	1307 (993-1914)	4,65
6. Unique object multiplier	13,9 (10,0-17,0)	287	2065 (1688-2870)	7,34
7. Capture Recapture II (IBBS 2020)	15,6 (12,0-19,0)	317	2032 (1668-2642)	7,22
8. SS-PSE (median)			1306 (406-5831)	4,64
Average value			1956	6.95
Median			1723	6,12
CONSENSUS			**1700 (406-5831)**	**6.04**
Tiraspol (adult female pop. 28 532)				
1. Counseled about HIV at ONC «P.M.S..»	1,02 (0,1-2,0)	32	3137 (1600-32000)	11,0
2. Received condoms based on beneficiary card of ONC «Alians Zdorovia»	69,9 (63,0-77,0)	166	237 (216-263)	0,83
3. Tested for STI at ONC «Alians Zdorovia»	61,5 (55,0-68,0)	132	215 (194-240)	0,75

4. Tested for STI at ONC «P.M.S..»	1,01 (0,1-2,0)	8	792 (400-8000)	2,78
5. Tested for HIV at ONC «P.M.S.»	1,4 (0,1-3,0)	9	643 (300-9000)	2,25
6. Unique object multiplier	71,1 (62,0-75,0)	188	264 (251-303)	0,93
7. SS-PSE (median)			430 (167-2651)	1,51
Average value			817	2.86
Median			430	1,51
CONSENSUS			**500 (167-2651)**	**1.75**

Figure 2.1. Map of the distribution of FSW in the Republic of Moldova: high (dark blue), to low (light green).



After consultations with all the members of the technical working group, it was agreed that high-density districts would receive the ranking of 3%, medium-density districts would be 0.9% and low-density districts would be 0.5% of the adult female population. The PSEs of FSW for each district are presented in Table 2.2.

Table 2.2. Estimations of the population sizes by density rankings* of FSW by districts

NORTH (adult female pop. 156 566)			
Districts	***Adult population female***	***Estimated % of adult female population***	***Estimated number of FSW***
Briceni	13697	0,4%	55
Glodeni	11517	0,4%	46
Edineț	14483	0,4%	58
Ocnița	11037	0,4%	44
Fălești	17421	0,4%	70
Rîșcani	12908	0,4%	52
Sîngerei	17049	0,4%	68
Florești	17122	0,4%	68
Soroca	17227	0,4%	69
Drochia	15778	0,4%	63
Dondușeni	8327	0,4%	33
			626
CENTER (adult female pop. 191 132)			
Telenești	11478	0,4%	46
Șoldănești	7790	0,4%	31
Dubăsari	6767	0,4%	27
Nisporeni	10000	0,4%	40
Rezina	9124	0,4%	36
Hîncești	19594	0,4%	78
Strășeni	17189	0,4%	69
Anenii Noi	16423	0,4%	66
Criuleni	15655	0,4%	63
Călărași	12692	0,4%	51
Ialoveni	20524	0,9%	185
Ungheni	22827	0,9%	205
Orhei	21069	3,0%	632
			1 529
SOUTH (adult female pop. 123 315)			
Ștefan Vodă	12337	0,4%	49
Căușeni	17625	0,4%	71
Comrat	12905	0,9%	116
Cimișlia	8796	0,9%	79
Basarabeasca	4485	0,9%	40
Chadîr-Lunga	11316	0,9%	102
Cantemir	9140	0,9%	82
Leova	8468	0,9%	76
Vulcănești	8438	1,4%	118
Taraclia	8318	1,4%	116
Cahul	21487	3,0%	645
			1 495

LEFT BANK OF THE DNIESTER RIVER (adult female pop.[16] 76 085)			
Dubăsari	6799	0,4%	24
Camenca	4384	0,4%	18
Dnestrovsc	2155	1,4%	30
Râbnița	14972	1,4%	210
Slobozia	18353	1,9%	349
Grigoriopol	9659	3,0%	290
Bender	19764	3,0%	590
			1 510

* high-density; * medium density; and * low density.

The PSEs of FSW in the districts where the 2024 IBBS study was not conducted is 3,650 for the districts on the right bank of the Dniester River and 1,510 for the Left Bank region of the Dniester River. The total PSE of FSW for the right bank of the Dniester River is 9,550, for the left bank is 2,010. The total PSE of FSW for the Republic of Moldova is 11,560.

Men who have sex with men

PSEs are based on MSM being defined being ages 16+ years, male and having at least one anal homosexual contact in the last six months prior to the 2024 IBBS study. The final PSEs of MSM, approved by consensus by the technical working group, was 6980 for Chișinău municipality, representing 3.14% of the adult male population, and 650 for Bălți municipality, representing 2.2% of the adult male population. The PSE calculations are displayed in Table 3.1 and the color coding based on the mapping exercise is displayed in Figure 3.1.

As with the PWID and FSW estimations, the values obtained based on the multipliers which were lower than NCO statistics and were excluded from the range of values for estimations. HIV testing data was not provided by the medical institutions. The multipliers for condoms and/or lubricants based on ONC beneficiary cards were not useful due to a low number of recorded services provided through vending machines and because only a small percentage of MSM reported accessing vending machines

Insufficient numbers of unique objects were distributed to MSM before the study started resulting in underestimated sizes. In addition, dependence between those who received an object and participated in the survey was high, also resulting in underestimated sizes.

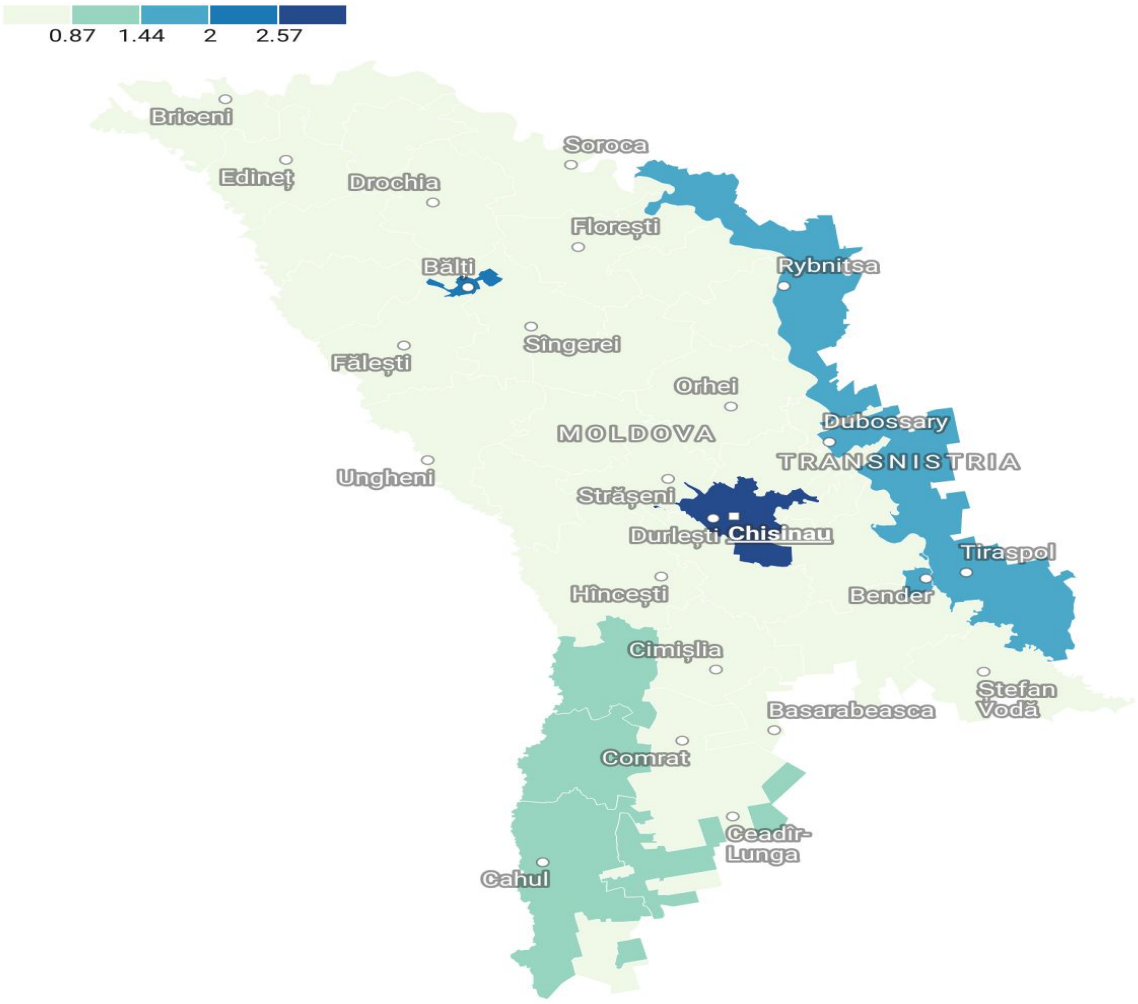
The resulting SS-PSE values for the PSEs of MSM for Chișinău and Bălți municipalities were 2.91% and 5.05%, respectively, of the adult male population.

Table 3.1. Calculated population size estimations for MSM

Chișinău (adult male population 222 018)				
Method	**Source I-IBBS % (95% CI)**	**Source II Program counts**	**Estimated size # (95% CI)**	**% of adult population**
1. Counselled on HIV in ONC «IP»	1,1 (1,0-2,0)	61	5545 (3050-6100)	2,50
2. Counseled on HIV at O.O. "GDM"	58,7 (50,0-68,0)	3790	6457 (5574-7580)	2,91

3. Tested for STI at "GDM" O.O.	32,6 (25,0-40,0)	1989	6101 (4973-7956)	2,75
4. Tested for HIV at "GDM" O.O.	34,5 (27,0-42,0)	2038	5907 (4852-7548)	2,66
5. Received condoms based on beneficiary card of A.O. "GDM"	58,1 (50,0-66,0)	4777	8222 (7238-9554)	3,70
6. Received lubricants based on beneficiary card of O.O. "GDM"	57,7 (49,0-66,0)	4769	8265 (7226-9733)	3,72
7. SS-PSE (median)			6456 (735-38194)	2,91
Anchored multiplier adjusted to Variance			6980 (5932-8086)	3,14
Average value			6708	3,02
Median			6456	2,91
CONSENSUS			**6980 (5932-8086)**	**3,14**
Bălți (adult male pop. 29 540)				
1. Counseled on HIV at CSPT "ATIS"	57,4 (51,0-64,0)	378	659 (591-741)	2,23
2. Received lubricants based on beneficiary card of CSPT "ATIS"	58,1 (51,0-65,0)	378	651 (582-741)	2,20
3. Received condoms based on beneficiary card of CSPT "ATIS"	58.1 (51,0-65,0)	378	651 (582-741)	2,20
4. Tested for HIV at CSPT "ATIS"	31,0 (25,0-37,0)	158	510 (427-632)	1,73
5. Tested for STI at CSPT "ATIS"	31,0 (25,0-37,0)	158	510 (427-632)	1,73
6. Capture Recapture II (IBBS 2020)	45,7 (38,0-53,0)	291	637 (549-766)	2,16
7. SS-PSE (median)			1493 (489-5819)	5,05
Average value			730	2,47
Median			651	2,20
CONSENSUS			**650 (427-5819)**	**2,20**

Figure 3.1. Map of the distribution of MSM in the Republic of Moldova: high (dark blue), to low (light green).



After consultations with all the members of the technical working group, it was agreed that high-density districts would receive the ranking of 2.2%, medium-density districts would be 1.46% and low-density districts would be 0.3% of the adult male population. The PSEs of MSM for each district are presented in Table 3.2.

Table 3.2. Estimation of the population sizes by density rankings* of MSM by districts

NORTH (adult male pop. 193 467)			
Districts	***Adult male population***	***Estimated % of adult male population***	***Estimated number of MSM***
Falesti	21852	0,4%	87
Ocnița	13315	0,4%	53
Briceni	16617	0,4%	66
Drochia	19487	0,4%	76
Donduseni	10084	0,4%	40
Glodeni	13768	0,4%	55

Edinet	18098	0,4%	72
Riscani	16843	0,8%	135
Soroca	20726	0,8%	166
Singer	21876	0,8%	175
Floresti	20801	0,8%	165
			1090
CENTER (adult male pop. 228 080)			
Resina	11779	0,4%	47
Hincesti	22965	0,4%	92
Dubasari	7938	0,4%	32
Criuleni	18276	0,4%	73
Anenii Noi	19911	0,4%	80
Telenești	14118	0,8%	113
Calarasi	14337	0,8%	115
Straseni	20582	0,8%	165
Ialoveni	23279	0,8%	186
Ungheni	27304	0,8%	218
Nisporeni	12402	0,8%	99
Soldanesti	9669	0,8%	77
Orhei	25520	0,8%	203
			1500
SOUTH (adult male pop. 148 899)			
Stefan Voda	15505	0,4%	62
Causeni	20861	0,4%	83
Basarabeasca	5207	0,8%	42
Cimislia	9583	0,8%	76
Chadîr-Lunga	13343	0,8%	107
Vulcanesti	9949	0,8%	80
Comrat	15216	0,8%	120
Leova	11043	1,2%	133
Cantemir	12088	1,2%	145
Taraclia	10721	1,2%	129
Cahul	25384	1,2%	305
			1280
LEFT BANK OF THE DNIESTER RIVER (adult male pop. 127 994)			
Grigoriopol	11818	0,4%	47
Camenca	5363	0,4%	21
Dnestrovsc	2636	0,4%	11
Râbnița	18317	0,8%	147
Dubasari	8318	0,8%	67
Slobozia	22453	1,2%	266
Bender	24181	1,6%	385
Tiraspol	34907	1,6%	555
			1500

* high-density; * medium density; and * low density.

The PSEs of MSM for the districts where the 2024 IBBS study was not conducted are 3,870 for the districts on the right bank of the Dniester River and 1,500 for the districts on the left bank of the Dniester River. For the right bank the PSEs, including the municipalities of Chișinău and Bălți, is 11,500. The final PSE for MSM in the Republic of Moldova is 13,000, representing about 1.37% of the adult male population of the Republic of Moldova.

LIMITATIONS OF CURRENT ESTIMATES

The final calculations for some of the PSE methods showed some obvious overestimations and underestimations. During discussions, the technical working group assessed which estimates seemed the most reasonable and decided on which ones should be eliminated. Criteria for assessing the quality of the service multiplier estimators were based on whether the NCO statistics seemed credible (i.e., too high or too low), whether there appeared to be too much dependence between the method and the sample, and if the NCO data or the responses in the 2024 IBBS study were too low for a proper calculation[17]. Criteria for assessing the quality of the unique object multiplier estimations were based on whether it was found that the unique objects were not sufficiently widely distributed to KP throughout the sampling area, whether there appeared to be too much dependence between those who received the unique objects and those who enrolled in the 2024 IBBS study, and/or whether the unique objects had been distributed to the correct population based on eligibility criteria[18]. Other concerns were whether the sampling area might have been too large for these methodologies to work properly. For example, the SS-PSE and the unique object multiplier generally do not work well in situations where the ratio of population size to sample size is extremely high.

Throughout the PSE process, efforts were made to ensure that the service multiplier data for KP matched the 2024 IBBS study data (e.g., age, behavior definition and geographical catchment area, etc.). When data did not match these criteria, they were not used. Some data sources were not available for the PSEs, including quality data of administrative statistics (impossibility of verifying counts) and data for younger adolescent KP (< 16 years old).[19] Overall, the NCO data on services received by KP were sufficiently accurate-- the Register of Monitoring and Evidence of the NCO services allows for ongoing monitoring of online services, identifying members of KP and minimizing the double counting of individuals. Although the service multipliers using vending machine data for lubricants and condoms were included for MSM, the number of responses and beneficiaries was so small that the results were not credible.

For the most part, the unique object multiplier did not work. The calculations of the unique object multiplier were kept only for PWID in Tiraspol and Râbnița and FSW in all locations. A condition for the proper functioning of this method is to provide as many unique objects as possible to KP just before the study starts. The unique objects were mostly distributed by outreach workers who are more likely to pass them on to members of the

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[17]Abdul-Quader AS, Baughman AL, Hladik W. Estimating the size of key populations: current status and future possibilities. Curr Opin HIV AIDS. 2014 Mar;9(2):107-14. doi: 10.1097/COH.0000000000000041. PMID: 24393694; PMCID: PMC6787402; Johnston L G, Soe PM, Aung MY, Ammassari S. (2019). Estimating the Population Size of Males Who Inject Drugs in Myanmar: Methods for Obtaining Township and National Estimates. AIDS and Behavior, 23(1), 295–301. https://doi.org/10.1007/s10461-018-2233-z; UNAIDS. Guidelines on Estimating the Size of Populations Most at Risk to HIV. Geneva, Switzerland; 2010. Available from: http://www.unaids.org/en/resources/documents/2011/2011_Estimating_Populations.

[18] IBID.

[19] In the IBBS, permanent contracts with no less than 16 years of age, LSC with a minimum age of 16 years, BSB with a minimum age of 16 years were recruited.

population with whom they already had contact. In addition, if the IBBS is located in the same offices as the outreach workers, there is often a lack of independence between data sources. It is best if persons (e.g., members of KP not associated with ONC, owners of clubs where KP spend time, etc.), in addition to outreach workers, distribute the unique objects and/or if study is not conducted in the same place as where the outreach workers are working.

The SS-PSE method is based on previous size estimates, data on the size of the network and the time of enrollment in the study, as well as assumptions related to the successive sampling estimator[20]. As with the other methods, the result of SS-PSE is dependent on the quality of the data collected through RDS and the parameters entered to run the model (i.e., prior size estimation, network size data, etc.). Data quality is assessed to be high given that the samples met convergence, were free of bottlenecks, had low to moderate homophily/heterophily, no coupon numbering errors, met the sample size requirements, and that staff were thoroughly trained to elicit accurate responses for the network size question[21]. For data analysis of the 2024 IBBS study and to run the SS-PSE, previous PSEs were based on the 2020 IBBS study among PWID, FSW and MSM. The SS-PSE provided reasonable estimates for all locations except for PWID in Râbnița.

After stakeholders discussed all PSEs for each KP and their potential biases, an average estimate was calculated using only validated and acceptable estimates. The method of extrapolating PSEs to district and national levels based on density rankings, validated by the technical working groups, including NCO members working with KP, worked well and helped to ensure that the estimates would be accepted by all. The inclusion of the NCO and others with specific knowledge about KP, regions where KP are found, and KP behaviors is invaluable for obtaining usable PSEs. Having final online consensus with all with NCO working in all districts further ensured that these estimations will be incorporated into their KP prevention, intervention and treatment programs.

CONCLUSIONS AND RECOMMENDATIONS

The calculation, presentation and consensus process for the PSEs were meant to be inclusive and transparent. We present all necessary data needed to assess the quality of these estimates in Tables 1.1, 2.1 and 3.1, which show the locations, methods, data sources and calculations.

This exercise used a variety of outside sources to help validate findings in the Republic of Moldova. For instance, previous estimates indicate that Eastern Europe and North America are the two sub-regions with the highest prevalence of PWID (1.3% and 1%, respectively), so the overall PSEs for PWID in the Republic of Moldova should not be much higher than these sub-regions. The regional median prevalence of PWID is estimated to be 1.5% of the adult population (15-49 years). The PSE of PWID in the Republic of Moldova in 2024 is 1.7% of the population 15-49 years.

The regional medians for FSW and MSM PSEs are 0.40% and 1.06%, respectively, of the adult population (15-49 years). In 2020, UNAIDS and WHO recommended that countries adjust PSEs of MSM to ensure that the estimated number of adult MSM is at least 1% and to use revised estimates for planning and monitoring

[20] Gile KJ, Handcock MS. (2010). Respondent-driven sampling: an assessment of current methodology. Sociological Methodology, 40(1), 285–327. https://doi.org/10.1111/j.1467-9531.2010.01223.x.
[21] Gile KJ, Johnston LG, Salganik MJ. (2015). Diagnostics for respondent-driven sampling. Journal of the Royal Statistical Society. Series A: Statistics in Society, 178(1). https://doi.org/10.1111/rssa.12059.

services[22]. The estimated PSE percentages for FSW and MSM in the Republic of Moldova in 2024 are 0.91% and 1%, respectively.

Based on the results of the PSE exercise, the following recommendations are suggested:

- Efforts are needed to improve the quality of programmatic data from providers other than NCO serving KP. The quality of official statistical data directly influences the quality of the PSEs. It is necessary to coordinate the relevant public institutions (Narcological Service, MIA, SCBI "Toma Ciorbă") to ensure that they collect accurate and usable data.
- Some program data was not useful for the multiplier method (i.e., the number of KP receiving services from vending machines). Given that the few KP reported using vending machines, more information about their availability and locations is needed.
- Some data provided by the narcological service, medical institutions or police had values that were too small to calculate reasonable service multiplier estimates. Low numbers may be related to poor classification of KP (i.e., KP not identifying themselves as KP) or that KP avoid these institutions due to high levels of stigma and discrimination. At a minimum, further research is needed to measure the extent of stigma and discrimination experienced by KP and reported by health workers in these institutions. Ongoing training of service providers is needed to ensure that KP feel comfortable accessing services from all institutions.
- The available methods for PSEs in conjunction with IBBS studies may not work well in very large cities where not all KP are captured. Although a study may expect to capture an entire large city and sample size calculations do not consider population sizes, sampling across networks may not represent all areas of the study area. RDS may miss some clusters of KP that are not represented in some areas of a large city. This can influence the final percentages derived from general population census data (e.g., the equivalent male population of a city in reference to the estimated population count of MSM). In such cases, it is recommended to assess which parts of a city an RDS study may have missed when considering final adjustments to PSEs. To help ensure that all areas of a study are captured (or represented in the network), it is useful to direct seeds across geographic areas in an IBBS study using RDS[23].
- More studies are needed to dispel myths and unfounded perceptions around the number of MSM in the Republic of Moldova. More understanding and consensus could be gained by including questions about whether men have had anal sex with men in the previous six or 12 months through a national survey using a probability-based sampling method in the male general population. This could help to better inform PSEs of MSM in districts where the IBBS are not conducted.

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[22] UNAIDS. See: https://www.unaids.org/en/resources/documents/2020/recommended-population-size-estimates-of-men-who-have-sex-with-men#:~:text=Recommended%20population%20size%20estimates%20of%20men%20who%20have%20sex%20with%20men,01%20November%202020&text=Men%20who%20have%20sex%20with%20men%20are%20a%20key%20population,for%20planning%20and%20monitoring%20services.

[23] Johnston LG. (2013). Introduction to Respondent Driven Sampling. In Introduction to HIV/AIDS and sexually transmitted infection surveillance. http://applications.emro.who.int/dsaf/EMRPUB_2014_EN_1686.pdf.

- Transgender women should be included as a separate population in the next round of IBBS studies in the Republic of Moldova. Transgender women are extremely vulnerable to HIV transmission, suffer from discrimination and stigma and are poorly understood. The PSE of transgender women is needed in order to provide them with needed resources and services.

This exercise aimed to provide the best possible PSEs for PWID, FSW and MSM in the Republic of Moldova. The exercise used a mix of recommended methods which were assessed for bias and reliability. In addition, this exercise was inclusive, making use of expert knowledge of stakeholders to assess, validate and accept the final estimates. These results will be presented to relevant Government Agencies involved in community health, home affairs, social assistance, and education, NCO working with KP and active in HIV risk reduction and prevention, the Global Fund, as well as representatives of the communities of PWID, FSW and MSM. These estimates are being used to plan much needed interventions, HIV services, and resource allocation. District level PSEs will help ensure the proper prioritization, volume and coordination of HIV prevention programs throughout the Republic of Moldova. Repeated PSEs, in conjunction with IBBS studies, along with reliable program data will improve the evaluation and quality of program coverage and inform the effective expansion of programs. These estimates will be updated according to needs, availability of resources and access to updated data.