Methods and results of 2016 size estimation exercise in Kyrgyzstan: service multipliers to estimate the size of People Who Inject Drugs, Female Sex Workers and Men having Sex with Men

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Acronyms

ES – Estimated size
FSW – Female Sex Worker
HIV – Human Immunodeficiency Virus
HVC – Hepatitis C virus
IBBS – Integrated Bio-Behavioural Survey
MSM – Men having sex with men
NGO – Nongovernmental organization
OST – Opiate substitution therapy
PWID – People Who Inject Drugs
RDS – Respondent Driven Sampling

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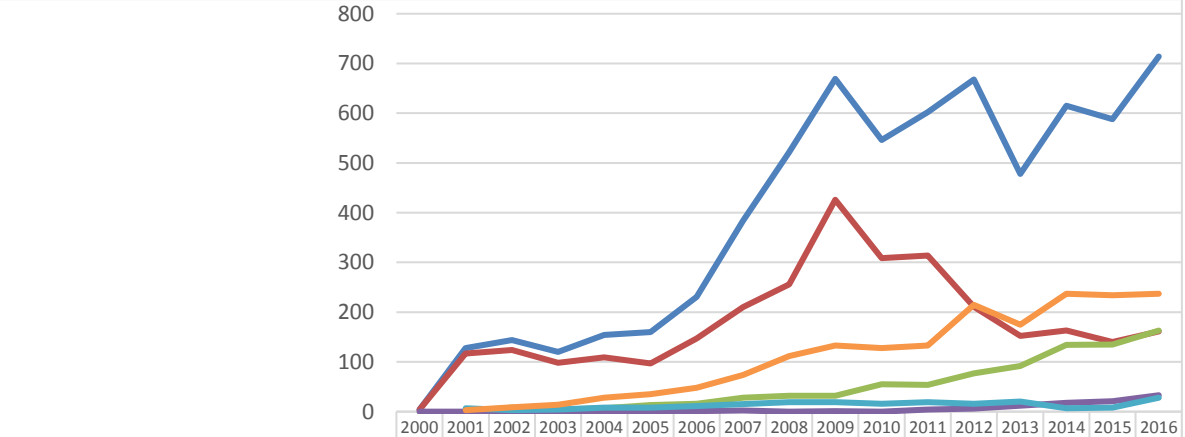
Background

The first HIV case in Kyrgyzstan was registered in 1987. Until late '90 the number of newly registered HIV cases has been low. Since 2001 the number of newly registered HIV cases has increased, mainly being reported the injecting drug use as probable route of HIV transmission. The number of newly registered HIV cases with injecting drug use as route of transmission has reached the pick in 2009 – 445 newly registered HIV cases (Figure 1).

Figure 1 Number of newly registered HIV cases, 2000-2016, Kyrgyzstan, disaggregated by gender and route of transmission



	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Newly registered HIV cases, all cases	4	128	144	120	154	160	231	384	522	669	546	602	668	478	615	588	714
Men, drug injecting route	4	117	124	98	109	97	147	210	256	426	309	314	211	152	163	140	161
Men, sexual route (sex between man and woman)		1	8	4	7	13	16	28	32	32	55	54	77	92	134	135	163
Men (same sex intercourse)	0	0	0	0	0	0	1	2	0	1	0	4	6	12	18	21	33
Women, drug injecting route		7	3	4	8	8	11	15	19	19	16	19	16	20	7	8	28
Women, sexual route (sex between man and woman)		3	9	14	28	35	48	74	112	133	128	133	215	175	237	234	237

(Data source: Republican AIDS Centre, Kyrgyz Republic)

By the end of 2016 there has been registered a cumulative number of 7170 HIV cases, of them 3518 cases reported injection of drugs as probable route of transmission and 2843 cases reported sexual route of transmission (sex between man and woman)[1].

Since 2010 there is a decreasing trend in the number of newly registered HIV cases with reported injection of drugs use probable route of transmission and an increase in the number of newly registered HIV cases with reported sexual route of transmission (sex between man and woman), mainly among women (Figure 1).

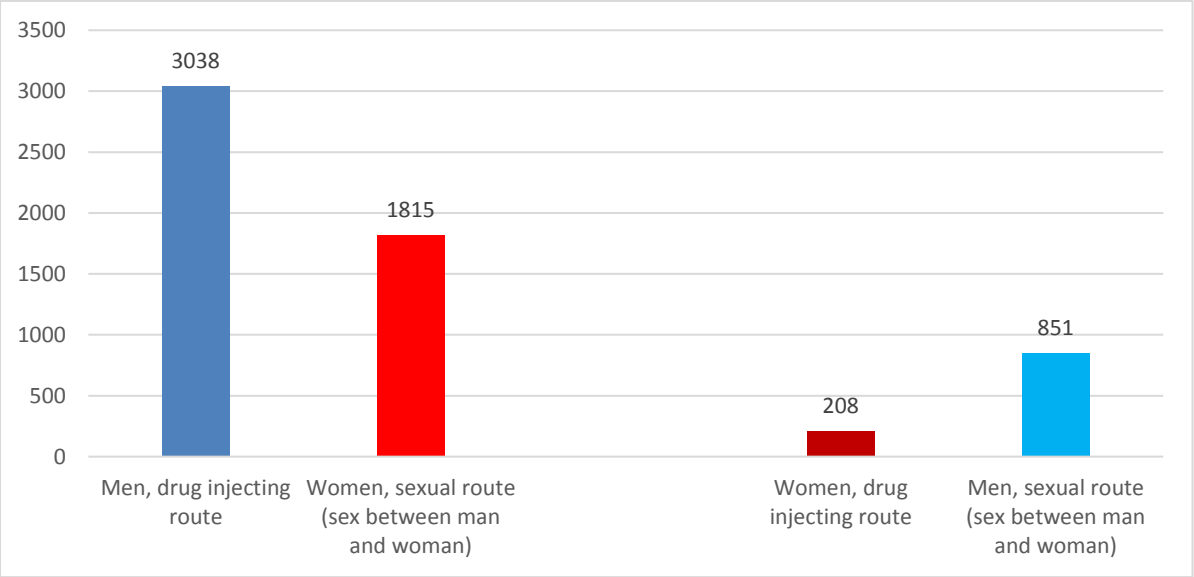
Men constitute 93.6% of the cumulative number of newly registered HIV cases with reported injection of drugs as probable route of transmission registered between 2000 and 2016 (Figure 1). The lowest share of men in 2016 IBBS samples collected among PWID is 79%. In Narcology data the share of men is 87%.

Injecting drug use among men has largely driven the HIV epidemic in Kyrgyzstan. In such an epidemic, it would be expected that sexual transmission of HIV would occur among the sexual partners of PWID. Over time, it would be expected that the number of HIV positive women would

[1] https://ecdc.europa.eu/sites/portal/files/documents/20171127-Annual_HIV_Report_Cover%2BInner.pdf

rise. Men infected sexually are largely homosexual men or the sex partners of females who injecting drugs. According to the Figure 2 women who inject drugs transmitted the virus to much many male sex partners than men who inject drugs transmitted the virus to female sex partners. This is unusual for such an epidemic as it is in Kyrgyzstan. The increasing trend of newly registered HIV cases in men reporting sexual route of transmission (sex between man and woman) suggests an underreporting of same sex experience among men (Figure 1). Further investigations are needed.

Figure 2 Cumulative number of registered HIV cases, by gender and route of transmission, 2000-2016



(Data source: Republican AIDS Centre, Kyrgyz Republic)

The estimated HIV prevalence in general population is low - 0.2% [0.2%- 0.3%][2].

PWID are disproportionally affected by HIV epidemic. According to 2016 IBBS data the HIV prevalence across sites vary between 9.5% and 24% (Table 1).

Table 1 HIV, HCV and syphilis antibodies prevalence in PWID, IBBS data collection sites, 2016

IBBS sites	HIV prevalence	HCV prevalence	Syphilis antibodies
Sokuluk	24%	46.9%	6.9%
Osh	19.1%	61%	22.1%
Jalal-Abad	12.9%	26.7%	8.9%
Kara-Suu	12.9%	48.5%	17.8%
Bishkek	10.4%	79.4%	14.2%
Tokmok	9.5%	52.1%	7.9%

The highest HIV prevalence in FSW has been registered in Osh site (5%), the HCV prevalence is equal or exceeding the HIV prevalence in all sites (Table 2). In other countries from Eastern Europe with similar epidemic it was found that FSW with HIV positive result are more likely to have a lifetime drug injecting experience and an HCV positive status[3]. This can be the situation in Kyrgyzstan too.

Table 2 HIV, HCV and syphilis antibodies prevalence in FSW, IBBS data collection sites, 2016

IBBS sites	HIV prevalence	HCV prevalence	Syphilis antibodies

[2] http://aidsinfo.unaids.org/
[3] https://www.ncbi.nlm.nih.gov/pubmed/23539186

Bishkek	0.8%	5%	29.7%
Tokmok	1%	1%	23%
Osh	5%	8.5%	12%
Jalal-Abad	2%	2%	37%

Despite the low number of newly registered HIV cases among men reporting sex with men, there is an increasing trend of such reported new HIV cases (Figure 1) which is in line with the HIV prevalence data from IBBS samples.

Table 3 HIV, HCV and syphilis antibodies prevalence in MSM, IBBS data collection sites, 2016

IBBS sites	HIV prevalence	HCV prevalence	Syphilis antibodies
Bishkek	10.1%	5%	29.7%
Osh	1.5%	1%	23%

The size of populations disproportionally affected by HIV epidemic directly contributes to the understanding of the HIV burden in the country and its geographical distribution as well as to the assessment of the coverage with relevant interventions.

In Kyrgyzstan there were several rounds of estimating the size of PWID, FSW and MSM. The results and methods applied in previous rounds of size estimations are provided in the Table 4 (based on the available information).

Table 4 Previous experiences in estimating the size of populations in Kyrgyzstan: methods and results

Sites	2003	2006	2007	2010/2011	2013
PWID					
Bishkek	-	6,000	-	-	8050 (7,801 – 8,274)
Sokuluk	-	-	-	-	3100 (2,548 – 3,569)
Tokmok	-	-	-	-	2900 (1,542 – 4,183)
Osh	-	980	-	-	3800 (3,083 – 4,531)
Jalal-Abad	-	-	-	-	650 (338 - 938)
Kara-Suu	-	-	-	-	700 (456 - 864)
National estimates	-	25,000	-	-	25,000 (20,300 – 29,200)
Methods used	-	Local estimates - multiplier, unknown recruitment method. Extrapolation – direct imputation.	-	-	RDS studies conducted in 6 sites. Local estimates: multiplier method, capture-recapture with the 2013 regular IBBS samples in data collection sites. Extrapolation – based on narcology data - the proportion of PWID living outside of the localities where estimates have been conducted was added to the summation of size estimates in the localities where the data collection has been conducted.

MSM					
Bishkek	-	-	6,250	458	1,151- 6,960
Osh	-	-	-	273	349 – 4,731
Karabalta	-	-	-	797	-
Talas	-	-	-	32	-
National estimates	-	18,000 – 36,000	-	-	22,000
Methods used	-	1% of the male population	Rapid assessment, qualitative method	The cumulative number of MSM who used the services of NGOs during 1 year.	Local estimates - multiplier[4], nomination method[5], indirect multiplier. Extrapolation – direct imputation of the prevalence from data collection sites.[6]
FSW					
Bishkek	2200	-	-	2107	578-2,859
Sokuluk	-	-	-	-	45-334
Tokmok	-	-	-	-	56-218
Osh	830	-	-	581	197-1,431
Jalal-Abad	At least 400	-	-	590	92-431
Kyzyl-Kiya	120-130	-	-	267	59-297
Balykchy	66	-	-	1,000	115-361
Talas	-	-	-	-	23-46
Karakol	30	-	-	310	93-990
Naryn	-	-	-	-	60-136
National estimates	-	-	7,000-10,500	8,535	7,103[7]
Methods used	Expert opinion	-	Local estimates – census, extrapolation – imputation to the population from main cities.	Cumulative data – the number of codes of clients who received at least one service from an NGO during the	Expert opinion, capture-recapture with direct contact, multiplier.[8] [9]

[4] In the report is mentioned also the capture-recapture as method used, but from the description of the process applied it is actually a unique object multiplier method, the calculation formula is taken from capture-recapture method.

[5] Per information provided in the report the calculations consisted in multiplying the average number of MSM the respondents knew by the number of surveyed MSM. Actually, the nomination method is not recommended for size estimation purpose. The results that have been close to any of the benchmarks have not been removed from the size estimation intervals. No details are provided to explain why other methods gave lower estimates than any of the benchmarks – either it is an implementation problem or there are local contextual characteristics of the population that limit the applicability of methods.

[6] M-Vector, Analytical report. Estimating the number of men having sex with men in the Kyrgyz Republic. Bishkek 2013

[7] Summation of local estimates. No extrapolation applied.

[8] The results that have been close to any of the benchmarks have not been removed from the size estimation intervals. For example: one of the benchmarks was about 2400 (HIV prevention data, condom distribution) in Bishkek, whereas the estimation interval was 578 – 2859. The maximum values of estimated interval have been taken as mid-point estimated size for all sites. Compared to other methods, the service multiplier gave the highest estimated sizes, whilst the respective proportion of coverage in the survey samples was at least 90%. This suggest an underestimation of the size of FSW in 2013. The results from other methods should not enter the estimation interval.

[9] M-Vector, Analytical report. Estimating the number of sex workers in the Kyrgyz Republic. Bishkek 2013

				project life time.	

UNAIDS offered technical support in estimating the size of People Who Inject Drugs in 2011, which was used as lessons learned for 2013 exercise[10]. The results are presented in the Table 4.

Methods

In 2016-2017 Kyrgyzstan conducted a regular round of IBBS in PWID, FSW and MSM as part of the national HIV surveillance agenda. These surveys linked anonymously individual level behavioural data with results of dry blood spot testing to antibodies to HIV, HCV and syphilis.

For size estimation purpose the service multipliers related questions were integrated into the questionnaires. As well, in the data collection tools for 2 groups (PWID, FSW) there were integrated questions on participation in the previous round of IBBS back in 2013 and size estimation behavioural survey in PWID conducted back in 2013[11]. This was a trial to apply the capture-recapture method, acknowledging the limitation and bias related to two years' time distance between two independent samples.

Not all the size estimation methods listed in the protocol and recommended as part of the technical support (such as enumeration and census and capture-recapture with direct contact for estimating the size of FSW population, unique object and unique event multiplier for estimating the size of MSM population) have been applied for various reasons, including funding constraints.

The survey was funded from the GFATM grant and UNAIDS provided technical support. The national protocol of IBBS in key populations at higher risk for HIV was approved by the National Ethical Committee under the Ministry of Health of Kyrgyz Republic.

IBBS sampling methods

The IBBS have been conducted in PWID in 5 sites, in MSM in 2 sites and in FSW in 4 sites of Kyrgyz Republic. The samples of PWID and MSM have been recruited through Respondent Driven Sampling. In case of FSW a "take all" sampling in population concentration points was applied.

The selection of IBBS data collection sites was based on the review of available data on HIV burden, drug addiction and drug trafficking at subnational level and the results of the formative research. Within the formative research the sampling methods, the data collection logistics, the geographical limits of the data collection sites have been defined and the data collection tools have been piloted. The following essential methodological requirements for an RDS study have been followed in recruiting the 7 samples (5 in PWID and 2 in MSM) – maximum 3 coupons to recruit peers, individual level data on respondents' social network size, unique identifiers for tracing the link between recruiters and recruited, adequate incentives for participation and recruited peers' participation, long recruitment chains. The requirement of diversity of seeds and first wave respondents has not been achieved in many sites. Additional efforts are needed to implement this essential requirement.

[10] Report: Общественный фонд «Центр анализа политики здравоохранения», Оценка численности лиц, употребляющих инъекционные наркотики (ЛУИН), в Кыргызской Республике. Бишкек 2014, ISBN 978-9967-466-16-6.

[11] Report: Общественный фонд «Центр анализа политики здравоохранения», Оценка численности лиц, употребляющих инъекционные наркотики (ЛУИН), в Кыргызской Республике. Бишкек 2014, ISBN 978-9967-466-16-6.

The interviews were conducted face to face using the target group specific questionnaires. The analysis of sample recruited trough RDS used RDS-A software. The FSW samples were analysed in EpiInfo.

Table 5 Sample sizes, IBBS sites, 2016

IBBS sites	PWID		FSW	MSM	
	Sample size	#waves	Sample size	Sample size	#waves
Sokuluk	175	9	-	-	-
Osh	272	11	200	265	8
Jalal-Abad	101	6	100	-	-
Kara-Suu	101	7	-	-	-
Bishkek	472	16	360	375	11
Tokmok	190	8	100	-	-

The survey targeted PWID who injected drugs at least once in last 12 months, 18 years or older and who lived in last 6 months within the geographical limits of the respective data collection sites. The MSM representatives who were accepted in the study had to had anal or oral intercourse with another man in last 12 months, to be 18 years or older and lived in last 6 months within the geographical limits of the respective data collection sites. The eligible FSW were 18 years or older, had to have a commercial sexual intercourse with a man in last 12 months. The repeated participation in the survey within the same target group was an exclusion criterion. Participation in the survey targeting a different group was not an exclusion criterion.

Service multipliers

The multiplier method requires two independent data sources on the same population: one has to result from a random recruitment of representatives from target population and the second one – from a non-random recruitment of the same population. Ideally, the definition of the target population, the geographic area where this population lives and the time period the data reflect should be the same or close to in both sources.

The mathematical formula for calculating the estimated size per each multiplier is the following N=M/P, where:

> **M** - the count of the population representatives who attended the services in a specified period of time within the defined geographic area
>
> **P** - the proportion of the sample that reported the use of respective services in the same specified period of time within the defined geographic area.

In case of this size estimation exercise as random data source served the IBBS and as the second non-random data source served the programme data on number of target population covered from HIV related services.

While assessing the potential data sources of service multipliers, the lessons learnt from previous PWID size estimation rounds have been taken into account.

The service multipliers have been assessed for compliance between definitions and arrangements applied within IBBS and programme data according to the following criteria:

- the target populations' definitions,

- programme data catchment areas,
- estimated double counting,
- clients based, or contact based aggregated data,
- reporting timeframe.

The data for the selected for this exercise service multipliers come from two sources: HIV prevention programme funded by GFATM grant and Narcology service. The summary of the assessment is presented per service multiplier (Table 6 and Table 7).

Service multipliers related questions have been integrated within the IBBS questionnaires and adjusted to reflect the available services within the geographic areas covered by the IBBS data collection. An agreement was reached with service providers (HIV prevention programme funded by GFATM grant and Narcology service) on retrospective data collection and database extraction of benchmarks to ensure the compliance as much as possible in terms of definition, catchment areas and timeframe between programme data (benchmarks) and IBBS data.

During the preparatory phase there have been explored and other opportunities for additional service multipliers as HIV testing apart from referral from the Narcology service. Because of the impossibility to exclude the duplications from multiple data sources they were not showing to be applicable for current exercise.

Data sources for service multipliers

Narcology service multipliers (registry of people who inject drugs)

The service multipliers from this data source and the respective questions integrated into the data collection tool are presented in the Table 6.

The police (patients tested for the presence of drug metabolites in urine at the request of the police) and the health care system (voluntary entrance into the treatment or accidental detection during prophylactic check-ups) serve as main sources of detection. The person, suspected or invoking to be a drug user, is referred to the narcological expertise. Once the person is considered to be drug user by the narcological expertise, s/he is registered (entered into the database called “Narcologic registry”) in a compulsory way, regardless of his/her will. The “Narcologic registry” covers all regions of Kyrgyzstan. There is a probability different from zero for any drug user in Kyrgyzstan to become “registered”.

The “Narcology registry” is a patient records based system using confidential information, because of that the probability of duplication of records is very low. The permanent residence stated in the ID card at registration time is used to assign to the administrative unit in Narcology service reports. The route of drug administration and type of used drugs at the registration time is part of the data set collected per each patient and entered into the registry. The person can be removed from the registry in case s/he did not use drugs for at least 3 years confirmed by periodic paraclinical and clinical check-ups conducted by the Narcology service.

The registry allows distinguishing the injecting and non-injecting drug users. The Narcology service uses the ICD 11. On annual basis the list of patients in the registry is updated based on best knowledge of the health care workers. If the patient is not known to be left the country definitively, died or treated s/he still stay in the registry.

According to the formative research conducted before the launch of quantitative data collection the fact of being or not in the “Narcologic registry” is well known to the drug users.

Per national regulation, the person who injects drugs should be referred for HIV testing twice per year and this is applicable to patients of the Narcology service.

The migration factor has been controlled by asking separate non-mutual exclusive questions of being in the “Narcology registry” in the IBBS data collection site, in other localities within the same region as of the IBBS data collection site, in another region of Kyrgyzstan or outside of the country. The proportion of those who reported being “registered” in the respective IBBS data collection site was used for calculations.

Also, the narcology service runs the methadone and naloxone programme in Kyrgyzstan. Individual records on methadone users are available. Injecting drug use is one of the eligibility criteria for enrolment in methadone treatment.

The naloxone programme is using anonymous unique identifiers as other HIV prevention programmes. Programme data reflect the numbers of clients who benefited from services in the IBBS data collection sites as there is only one implementer per IBBS data collection site.

The law prohibits to proactively search for patients in case if s/he does not come for a regular check-up, unless there is a written informed consent provided by patient. This positive change in legal framework to protect confidentiality and privacy affected the national representativeness of Narcology service data. However, it is still one of the key source of benchmarks for size estimation of the population of people who inject drugs and within current size estimation exercise served as reference for extrapolation. For this purpose, the narcology service provided with programme data outside of data collection sites per each region of Kyrgyzstan disaggregated by gender, age group and urban versus rural.

Table 6 Service multipliers provided by the Narcology service and respective questions integrated into the data collection tools

Service multiplier benchmarks	Assessment of the service multiplier programme data	Service multiplier related questions
The number of PWID 18+ who were under medical surveillance at the Narcologic service within the geographic limits of each IBBS data collection site at the end of 2016 (per each data collection site).	The definition of the person who inject drugs under medical surveillance – a person who has been diagnosed with drug dependency and used injecting drugs at the registration time or informed the narcologist on starting injecting drugs while under medical surveillance. The "Narcology registry" may be outdated if the registered person who inject drugs left the country or died, or stopped injecting drugs and the Narcology service is not aware of. Data have been provided according to the geographical limits of the IBBS data collection sites. The question Q72 was designed to control the migration factor. Confidential information is used to identify and follow up patients. The duplication is assessed as being very low, if any. The data provided are client based aggregated. Data represent the number of those who were under medical surveillance on 31st of December 2016. The IBBS data collection took place from October 2016 to January 2017.	**Q71. Are you registered at the narcology service?** (with the following options for answering: "yes", "no", "don't know" and "no answer"). If the answer is "yes", then the respondent was asked all the questions below: **Q72: Where are you registered at the narcology service?** Q72.1 In the locality where the data are collected (with the following options for answering: "yes", "no", "don't know" and "no answer") Q72.2 In another locality of our region (with the following options for answering: "yes", "no", "don't know" and "no answer") Q72.3 In another region of Kyrgyzstan (with the following options for answering: "yes", "no", "don't know" and "no answer") Q72.4 In another country (with the following options for answering: "yes", "no", "don't know" and "no answer"). The sub-questions under Q72 were not mutual exclusive.
The number of PWID 18+ who received methadone during 2016 and are registered as beneficiaries of methadone programme in the locality where IBBS data collection site was located (per each data collection site).	Injecting drug use is an eligibility criterion for initiation of methadone treatment. IBBS had as exclusion criterion – reporting being on methadone treatment without injecting drugs in last 30 days. If the potential respondent reported any injection of drugs in last 30 days and being on methadone treatment at the interview time – the person became eligible for sampling. Data are covering exclusively PWID who benefited from services in the respective administrative unit, regardless of permanent residence stated in the ID	**Q80. Have you received methadone in last 12 months?** If the answer is "yes", then the respondent was asked all the questions below: **Q81: Where have you received methadone in last 12 months?** Q81.1 In the locality where the data are collected (with the following options for answering: "yes", "no", "don't know" and "no answer") Q81.2 In another locality of our region (with the following options for answering: "yes", "no", "don't know" and "no answer") Q81.3 In another region of Kyrgyzstan (with the following options for answering: "yes", "no", "don't know" and "no answer") Q81.4 In another country (with the following options for answering: "yes", "no", "don't know" and "no answer").

	card. The programme data have been collected to comply with IBBS data collection sites geographical areas as much as possible. The question Q81 was designed to control the migration factor. Confidential information is used to identify and follow up patients enrolled in methadone programme. The duplication is assessed as being very low, if any. The methadone is procured from GFATM grant and the implementers provide the HIV programme implementation unit with client based aggregated reports. Data reflect the number of beneficiaries of methadone treatment throughout 2016. The IBBS data collection took place from October 2016 to January 2017.	The sub-questions under Q81 were not mutual exclusive.
The number of PWID 18+ who received naloxone during 2016 and are registered as beneficiaries of naloxone programme in the locality where IBBS data collection site was located (per each data collection site).	If a person shows symptoms of drug overdose, based on self-reporting, s/he is eligible for naloxone. Taking into account the drug situation in Kyrgyzstan, it was assumed that PWID have a much higher probability to approach and request for a naloxone dose. This service is advertised through the network of services targeting PWID. Anonymous unique identifier is used to record beneficiaries of naloxone programme. The probability of duplication is low, unless there is an intentional duplication – multiple unique identifiers for the same beneficiary are entered into the data base. The naloxone is procured from GFATM grant and the implementers provide the HIV programme implementation unit with client based aggregated reports. Data are covering exclusively PWID who benefited from services in the respective administrative unit,	**Q77. Have you received naloxone in last 12 months?** If the answer is "yes", then the respondent was asked all the questions below: **Q78: Where have you received naloxone in last 12 months?** Q78.1 In the locality where the data are collected (with the following options for answering: "yes", "no", "don't know" and "no answer") Q78.2 In another locality of our region (with the following options for answering: "yes", "no", "don't know" and "no answer") Q78.3 In another region of Kyrgyzstan (with the following options for answering: "yes", "no", "don't know" and "no answer") Q78.4 In another country (with the following options for answering: "yes", "no", "don't know" and "no answer"). The sub-questions under Q2 were not mutual exclusive. **Q79 How many times have you received naloxone in last 12 months?**

	regardless of permanent residence stated in the ID card. The programme data have been collected to comply with IBBS data collection sites geographical areas as much as possible. The question Q78 was designed to control the migration factor. Data reflect the number of beneficiaries of naloxone throughout 2016. The IBBS data collection took place from October 2016 to January 2017.	
The number of PWID 18+ who were under medical surveillance at the Narcology service within the geographic limits of each IBBS data collection site and were tested to HIV upon the narcologist's referral during 2016.	The assessment results combine the results presented for the first service multiplier from the Narcology service and the results presented for the service multiplier from methadone programme. The blood collection is taking place in the same health care unit where the narcologist is located. The fact of HIV testing is recorded by the narcologist. The main reason for PWID to visit the narcologist is if s/he wants to start a drug-free treatment, the number of tested reflect more the number of those enrolled in methadone programme. PWID in methadone programme are more adherent to HIV testing twice per year.	**Q74. Have you been tested to HIV following the narcology service referral in last 12 months?** (with the following options for answering: "yes", "no", "don't know" and "no answer") If the answer is "yes", then the respondent was also asked: **Q75 How many times have you been tested to HIV following the narcology service referral in last 12 months?**
		Q62. Have you been tested to HIV in last 12 months? (with the following options for answering: "yes", "no", "don't know" and "no answer") If the answer is "yes", then the respondent was asked: **Q63. Where did you get tested to HIV?** There were the following options (multiple answers): "Private clinic", "AIDS Centre", "Friendly service", "Primary care institution", **"Narcology service"**, "Prison", "Needle Exchange Points", "Mobile clinic", "Other", "Don't know", "No answer". The proportion of respondents who answered the option "Narcology service" has been taken for analysis.

HIV prevention programmes for key populations

The HIV prevention programmes in key populations in Kyrgyzstan are mainly funded by the GFATM grant. A representative of key populations can be enrolled in the programme if s/he is 18 years or older.

These services are offered on site and through social workers/peer consultants. At his/her first contact with the NGOs personnel on site or in the field, the key population representative is given a unique anonymous identifier which is generated through a formula that does not allow direct or indirect identification of the person. There is a software in place that uses individual records and data are entered by each implementer in the local data base. It's done on cumulative basis, but there are filters for obtaining data for any time interval. The number of clients is available per implementing NGO. There is one implementer per locality where IBBS data collection took place, the only exception being Bishkek city, Osh city and Chui oblast for each target group, where there are many implementers. For this size estimation exercise the number of clients in 2016 per each IBBS data collection site has been generated. In case of implementers offering services and reporting clients from outside of the geographical limits of the IBBS data collection sites, the number of clients according to requested geographical limits was roughly estimated.

On annual basis, for national coverage calculations purpose the national data base is cleaned from duplicating unique identifiers across implementers, without affecting the number of clients per each implementer.

The migration factor has been controlled by asking separate non-mutual exclusive questions on benefiting of services of interest for this estimation exercise in the data collection site, in other localities within the same region as the IBBS data collection site and outside of the region or outside of the country.

Still, during the formative research it was found that there are cases when the same beneficiary may have several different unique identifiers. The same concern has been expressed during the size estimation exercise conducted in 2013[12]. This is more likely happening in administrative units where there are many implementers working with same target group. There is no quantification available that may document any correction of programme data for the current exercise. Further documented research is recommended to properly quantify the proportion of "intentional" duplications and reasons for doing that.

Across the country there is a network of so called "Friendly doctors" where the key populations can access the STIs related services on anonymous basis. These "Friendly doctors" are funded by the GFATM grant. This network of "Friendly doctors" substituted 2 years ago the network of "Friendly rooms" that existed for long time in the country. In the data collection tool, the questions were asking about visiting "Friendly rooms". During the piloting of the data collection tool there were not registered misunderstandings, "Friendly room" being a better-known definition than "Friendly doctors". However, this should be considered as a potential limitation and needs further assessment in the next round of estimates, if this service multiplier will be still relevant. The

[12] Report: Общественный фонд «Центр анализа политики здравоохранения», Оценка численности лиц, употребляющих инъекционные наркотики (ЛУИН), в Кыргызской Республике. Бишкек 2014, ISBN 978-9967-466-16-6.

network of “Friendly doctors” is using the same system of unique identifiers as other providers of HIV prevention services described above.

Apart from the GFATM funded projects, in 2016 a Populations Services International[13] (international NGO) run programme providing with HIV testing and counselling, referral to OST and syringes exchange programmes targeting PWID has been launched. Because the this programme started only in June 2016, it was assumed that the number of clients reached before the IBBS data collection started was not so significant. However, it should be acknowledged as a limitation. For future rounds of estimates the potential of making use of various implementers multipliers should be explored.

[13] http://www.psi.org/about/at-a-glance/

Table 7 Service multipliers provided by the HIV prevention programmes and respective questions integrated into the data collection tools

<table>
<tr><th>Benchmarks</th><th>Assessment of the service multiplier</th><th>Service multiplier related questions</th></tr>
<tr><td colspan="3">PWID</td></tr>
<tr><td>The number of PWID 18+ who received syringes for free during 2016 and are registered as beneficiaries in the locality where IBBS data collection site was located (per each data collection site).</td><td rowspan="4">The distribution of syringes is funded by GFATM exclusively where all the reports concentrate and where the data base is cleaned to reduce duplications per implementer.
There are other sources in the country distributing condoms and information materials on HIV, targeting mainly general population. When the preparation for IBBS data collection started the contribution of other sources in reaching the PWID with condoms and information materials on HIV was assessed as insignificant. Still, it is acknowledged as a potential limitation.
A person is eligible for benefiting from HIV prevention programme if s/he is willing to get syringes and is 18+.
Data have been provided according to the geographical limits of the IBBS data collection sites as much as possible.
If many implementers in the same area, data have been cleaned to reduce duplication for the assigned IBBS data collection site.
The implementers are using a unique identifier system to exclude duplication of identifiers per implementer.
The question Q17 was designed to control the migration factor in case of syringe distribution.
The data provided are client based aggregated.
Data represent the number of those who benefited from HIV prevention services throughout 2016. The IBBS data collection took place from October 2016 to January 2017.</td><td>Q16. Have you received syringes for free in last 12 months?
If the answer is “yes”, then the respondent was asked all the questions below:
Q17: Where have you received syringes for free in last 12 months?
Q17.1 In the locality where the data are collected (with the following options for answering: “yes”, “no”, “don’t know” and “no answer”)
Q17.2 In another locality of our region (with the following options for answering: “yes”, “no”, “don’t know” and “no answer”)
Q17.3 In another region of Kyrgyzstan (with the following options for answering: “yes”, “no”, “don’t know” and “no answer”)
Q17.4 In another country (with the following options for answering: “yes”, “no”, “don’t know” and “no answer”).
The sub-questions under Q17 were not mutual exclusive.</td></tr>
<tr><td></td><td>Q15. In last 12 months, where did you get sterile syringes? (with the following options for answering, multiple answers: “For free in pharmacies”, “Bought in pharmacies”, “Syringes exchange points”, “Outreach workers”, “Other drug users”, “Other source”, “don’t know” and “no answer”). The proportion of those who got syringes from exchange points or from outreach workers (a new variable was created) has been used for analysis.</td></tr>
<tr><td>The number of PWID 18+ who received condoms for free during 2016 and are registered as beneficiaries in the locality where IBBS data collection site was located (per each data collection site).</td><td>Q57. Have you received condoms for free in last 12 months? (with the following options for answering: “yes”, “no”, “don’t know” and “no answer”)</td></tr>
<tr><td>The number of PWID 18+ who received information materials on HIV for free during 2016 and are registered as beneficiaries</td><td>Q58: From where have you received information on HIV and AIDS in last 12 months?
Q58.1 Mass media (with the following options for answering: “yes”, “no”, “don’t know” and “no answer”)</td></tr>
</table>

in the locality where IBBS data collection site was located (per each data collection site).		**Q58.2 Syringes exchange points (with the following options for answering: "yes", "no", "don't know" and "no answer")** Q58.3 Internet (with the following options for answering: "yes", "no", "don't know" and "no answer") Q58.4 Health care workers (with the following options for answering: "yes", "no", "don't know" and "no answer"). Q58.5 Friendly rooms (with the following options for answering: "yes", "no", "don't know" and "no answer"). **Q58.6 Outreach workers and volunteers (with the following options for answering: "yes", "no", "don't know" and "no answer").** Q58.7 Friends (with the following options for answering: "yes", "no", "don't know" and "no answer"). Q58.8 Education institutions (with the following options for answering: "yes", "no", "don't know" and "no answer"). Q58.9 Other sources (with the following options for answering: "yes", "no", "don't know" and "no answer"). The proportion of those who answered "yes" to at least one of the options "Syringes exchange points" or "Outreach workers and volunteers" (new variable was created) has been used for analysis.
The number of PWID 18+ who were referred to HIV testing by the implementing NGO during 2016 and are registered as beneficiaries in the locality where IBBS data collection site was located (per each data collection site).	Referral to HIV testing is part of the package provided by implementers of the GFATM grant. All beneficiaries are eligible for referral to HIV testing twice per year. The implementers are using a unique identifier system to exclude duplication of identifiers per implementer. The question Q60 was designed to control the migration factor. The data provided are client based aggregated. Data represent the number of those who benefited from service throughout 2016. The IBBS data collection took place from October 2016 to January 2017.	**Q59. Have you been referred to HIV testing by the implementing NGO in last 12 months?** If the answer is "yes", then the respondent was asked all the questions below: **Q60: Where have you been referred to HIV testing by the implementing NGO in last 12 months?** Q60.1 In the locality where the data are collected (with the following options for answering: "yes", "no", "don't know" and "no answer") Q60.2 In another locality of our region (with the following options for answering: "yes", "no", "don't know" and "no answer") Q60.3 In another region of Kyrgyzstan (with the following options for answering: "yes", "no", "don't know" and "no answer") Q60.4 In another country (with the following options for answering: "yes", "no", "don't know" and "no answer"). The sub-questions under Q60 were not mutual exclusive.

The number of PWID 18+ who got a rapid saliva HIV test during 2016 and are registered as beneficiaries in the locality where IBBS data collection site was located (per each data collection site).	Rapid saliva based HIV testing is provided exclusively by implementers of the GFATM grant. All beneficiaries are eligible for rapid saliva test and are referred to once per year. If needed/had a risky behavior there is a possibility to test many times. The implementers are using a unique identifier system to exclude duplication of identifiers per implementer. The question Q70 was designed to control the migration factor. The data provided are client based aggregated. Data represent the number of those who benefited from service throughout 2016. The IBBS data collection took place from October 2016 to January 2017.	**Q68. Have you been tested to HIV by making use of rapid saliva test in last 12 months?** If the answer is "yes", then the respondent was asked all the questions below: **Q69 How many times have you been tested to HIV by making use of rapid saliva test in last 12 months?** **Q70: Where have you been tested to HIV by making use of rapid saliva test in last 12 months?** Q70.1 In the locality where the data are collected (with the following options for answering: "yes", "no", "don't know" and "no answer") Q70.2 In another locality of our region (with the following options for answering: "yes", "no", "don't know" and "no answer") Q70.3 In another region of Kyrgyzstan (with the following options for answering: "yes", "no", "don't know" and "no answer") Q70.4 In another country (with the following options for answering: "yes", "no", "don't know" and "no answer"). The sub-questions under Q70 were not mutual exclusive.
FSW		
The number of FSW 18+ who received condoms for free during 2016 and are registered as beneficiaries in the locality where IBBS data collection site was located (per each data collection site).	There are other sources in the country distributing condoms and information materials on HIV, targeting mainly general population. When the preparation for IBBS data collection started the contribution of other sources in reaching the FSW with condoms and information materials on HIV was assessed as insignificant. Still, it is acknowledged as a potential limitation. A person is eligible for benefiting from HIV prevention programme if s/he reports commercial sex and is 18+. Data have been provided according to the geographical limits of the IBBS data collection sites as much as possible. If many implementers in the same area, data have been cleaned to reduce duplication for the assigned IBBS data collection site. The implementers are using a unique identifier system to exclude duplication of identifiers per implementer. The question Q55 was designed to control the migration factor in case of syringe distribution. The data provided are client based aggregated.	**Q54. Have you received condoms for free in last 12 months?** If the answer is "yes", then the respondent was asked all the questions below: **Q55: Where have you received condoms for free in last 12 months?** Q55.1 In the locality where the data are collected (with the following options for answering: "yes", "no", "don't know" and "no answer") Q55.2 In another locality of our region (with the following options for answering: "yes", "no", "don't know" and "no answer") Q55.3 In another region of Kyrgyzstan (with the following options for answering: "yes", "no", "don't know" and "no answer") Q55.4 In another country (with the following options for answering: "yes", "no", "don't know" and "no answer"). The sub-questions under Q55 were not mutual exclusive.

	Data represent the number of those who benefited from HIV prevention services throughout 2016. The IBBS data collection took place from January to February 2017.	
The number of FSW 18+ who received referral to HIV testing during 2016 and are registered as beneficiaries in the locality where IBBS data collection site was located (per each data collection site).	Apart from NGOs implementing HIV prevention programme funded by GFATM grant, there are also other service providers, mainly targeting general population, who can provide FSW with HIV testing referral. It was assumed that the contribution of other sources in reaching FSW was assessed as not significant. Still, it is acknowledged as a potential limitation. Referral to HIV testing is part of the package provided by implementers of the GFATM grant. All beneficiaries are eligible for referral to HIV testing twice per year. The implementers are using a unique identifier system to exclude duplication of identifiers per implementer. The data provided are client based aggregated. Data represent the number of those who benefited from service throughout 2016. The IBBS data collection took place from January to February 2017.	**Q53.4. In last 12 months have you received referral to HIV testing for free**? (with the following options for answering: "yes", "no", "don't know" and "no answer")
The number of FSW 18+ who were tested for HIV by the implementing NGO by making use of rapid saliva test during 2016 and are registered as beneficiaries in the locality where IBBS data collection site was located (per each data collection site).	Rapid saliva based HIV testing is provided exclusively by implementers of the GFATM grant. All beneficiaries are eligible for rapid saliva test and are referred to once per year. If needed/had a risky behavior there is a possibility to test more times. In 2016 there were no referrals anymore for saliva based HIV testing because this service is available at NGO level. Because of that it was assumed that the coverage with referral to rapid HIV testing saliva-based captured by the sample is the same as the testing itself. The implementers are using a unique identifier system to exclude duplication of identifiers per implementer. The question Q57 was designed to control the migration factor. The data provided are client based aggregated.	**Q56. Have you been referred to rapid saliva based HIV testing by the implementing NGO in last 12 months?** If the answer is "yes", then the respondent was asked all the questions below: **Q57: Where have you been referred to rapid saliva based HIV testing by the implementing NGO in last 12 months?** Q57.1 In the locality where the data are collected (with the following options for answering: "yes", "no", "don't know" and "no answer") Q57.2 In another locality of our region (with the following options for answering: "yes", "no", "don't know" and "no answer") Q57.3 In another region of Kyrgyzstan (with the following options for answering: "yes", "no", "don't know" and "no answer") Q57.4 In another country (with the following options for answering: "yes", "no", "don't know" and "no answer"). The sub-questions under Q57 were not mutual exclusive.

	Data represent the number of those who benefited from service throughout 2016. The IBBS data collection took place from January to February 2017.	
The number of FSW 18+ who visited "Friendly doctors" during 2016 and are registered as beneficiaries in the locality where IBBS data collection site was located (per each data collection site).	"Friendly doctors" are funded by GFATM grant exclusively. No other contributions to the "Friendly doctors" have been registered in 2016. Reports on number of clients are submitted to the GFATM grant. The implementers are using a unique identifier system to exclude duplication of identifiers per implementer. If many implementers were operating in the same area, data have been cleaned to reduce duplication for the assigned IBBS data collection site.	**Q58. Have you visited Friendly rooms in last 12 months?** If the answer is "yes", then the respondent was asked all the questions below: **Q59: Where have you visited Friendly rooms in last 12 months?** Q59.1 In the locality where the data are collected (with the following options for answering: "yes", "no", "don't know" and "no answer") Q59.2 In another locality of our region (with the following options for answering: "yes", "no", "don't know" and "no answer") Q59.3 In another region of Kyrgyzstan (with the following options for answering: "yes", "no", "don't know" and "no answer") Q59.4 In another country (with the following options for answering: "yes", "no", "don't know" and "no answer"). The sub-questions under Q59 were not mutual exclusive.
The number of FSW 18+ who have been tested to HIV by "Friendly doctors" during 2016 and are registered as beneficiaries in the locality where IBBS data collection site was located (per each data collection site).	The question Q59 was designed to control the migration factor. The data provided are client based aggregated. Data represent the number of those who benefited from service throughout 2016. The IBBS data collection took place from January to February 2017.	**Q 60 Have you been tested to HIV in last 12 months?** (with the following options for answering: "yes", "no", "don't know" and "no answer") If the answer is "yes", then the respondent was asked: **Q61 Where did you get tested to HIV?** There were the following options (multiple answers): "Private clinic", "AIDS Centre", **"Friendly rooms"**, "Primary care institution", "Narcology service", "Prison", "Needle Exchange Points", "Mobile clinic", "Other", "Don't know", "No answer". The proportion of respondents who answered the options "Friendly rooms" has been taken for analysis (a new variable was created).
MSM		
The number of MSM 18+ who received condoms for free during 2016 and are registered as beneficiaries in the locality where IBBS data collection site was located (per each data collection site).	There are other sources in the country distributing condoms, targeting mainly general population. As well, there is another NGO targeting MSM, also distributing condoms, but their contribution to overall distribution of condoms has been assessed as being insignificant. Still, it is acknowledged as a potential limitation. A person is eligible for benefiting from HIV prevention programme if he reports sex with man and is 18+.	**Q75. Have you received condoms for free in last 12 months?** If the answer is "yes", then the respondent was asked all the questions below: **Q76: Where have you received condoms for free in last 12 months?** Q76.1 In the locality where the data are collected (with the following options for answering: "yes", "no", "don't know" and "no answer") Q76.2 In another locality of our region (with the following options for answering: "yes", "no", "don't know" and "no answer") Q76.3 In another region of Kyrgyzstan (with the following options for answering: "yes", "no", "don't know" and "no answer")

	Data have been provided according to the geographical limits of the IBBS data collection sites as much as possible. If many implementers in the same area, data have been cleaned to reduce duplication for the assigned IBBS data collection site. The implementers are using a unique identifier system to exclude duplication of identifiers per implementer. The question Q76 was designed to control the migration factor. The data provided are client based aggregated. Data represent the number of those who benefited from HIV prevention services throughout 2016. The IBBS data collection took place from October 2016 to February 2017.	Q76.4 In another country (with the following options for answering: "yes", "no", "don't know" and "no answer"). The sub-questions under Q76 were not mutual exclusive. **Q65. In last 12 months, where did you get condoms?** (with the following options for answering, multiple answers: "Markets", "Pharmacies", "Friendly rooms", "Trust points", **"Outreach workers"**, "Gay clubs", "Sex partner", "Did not get and did not buy condoms", **"NGOs",** "Other source", "don't know" and "no answer"). The proportion of those who got condoms from NGOs or outreach workers/volunteers (a new variable was created) has been used for analysis.
The number of MSM 18+ who received lubricants for free during 2016 and are registered as beneficiaries in the locality where IBBS data collection site was located (per each data collection site).	Lubricants are funded by GFATM grant exclusively. Reports on number of clients are submitted to the GFATM grant. The implementers are using a unique identifier system to exclude duplication of identifiers per implementer. The question Q78 was designed to control the migration factor. The data provided are client based aggregated. Data represent the number of those who benefited from service throughout 2016. The IBBS data collection took place from October 2016 to February 2017.	**Q77. Have you received lubricants for free in last 12 months?** If the answer is "yes", then the respondent was asked all the questions below: **Q78: Where have you received lubricants for free in last 12 months?** Q78.1 In the locality where the data are collected (with the following options for answering: "yes", "no", "don't know" and "no answer") Q78.2 In another locality of our region (with the following options for answering: "yes", "no", "don't know" and "no answer") Q78.3 In another region of Kyrgyzstan (with the following options for answering: "yes", "no", "don't know" and "no answer") Q78.4 In another country (with the following options for answering: "yes", "no", "don't know" and "no answer"). The sub-questions under Q78 were not mutual exclusive.
The number of MSM 18+ who received referral to HIV testing during 2016 and are registered as beneficiaries in the locality where IBBS data collection site was located (per each data collection site).	Apart from NGOs implementing HIV prevention programme funded by GFATM grant, there are also other service providers, mainly targeting general population, who can provide the target group with HIV testing referral. It was assumed that the contribution of other sources in reaching the target group was assessed as not significant. Still, it is acknowledged as a potential limitation. Referral to HIV testing is part of the package provided by implementers of the GFATM grant. All beneficiaries are eligible for referral to HIV testing twice per year.	**Q74.4. Have you received referral to HIV testing in last 12 months**? (with the following options for answering: "yes", "no", "don't know" and "no answer")

	The implementers are using a unique identifier system to exclude duplication of identifiers per implementer. The data provided are client based aggregated. Data represent the number of those who benefited from service throughout 2016. The IBBS data collection took place from October 2016 to February 2017.	
The number of MSM 18+ who were tested to HIV rapid saliva based testing by the implementing NGO during 2016 and are registered as beneficiaries in the locality where IBBS data collection site was located (per each data collection site).	Rapid saliva based HIV testing is provided exclusively by implementers of the GFATM grant. Reports on number of clients are submitted to the GFATM grant. All beneficiaries are eligible for rapid saliva test and are referred to once per year. If needed/had a risky behavior there is a possibility to test many times. In 2016 there were no referrals anymore for saliva based HIV testing because this service is available at NGO level. Because of that it was assumed that the coverage with referral to rapid HIV testing saliva-based captured by the sample is the same as the testing itself. The implementers are using a unique identifier system to exclude duplication of identifiers per implementer. The question Q80 was designed to control the migration factor. The data provided are client based aggregated. Data represent the number of those who benefited from service throughout 2016. The IBBS data collection took place from October 2016 to February 2017.	**Q79. Have you been referred to HIV rapid saliva based testing in last 12 months?** If the answer is "yes", then the respondent was asked all the questions below: **Q80: Where have you been referred to HIV rapid saliva based testing in last 12 months?** Q80.1 In the locality where the data are collected (with the following options for answering: "yes", "no", "don't know" and "no answer") Q80.2 In another locality of our region (with the following options for answering: "yes", "no", "don't know" and "no answer") Q80.3 In another region of Kyrgyzstan (with the following options for answering: "yes", "no", "don't know" and "no answer") Q80.4 In another country (with the following options for answering: "yes", "no", "don't know" and "no answer"). The sub-questions under Q80 were not mutual exclusive.
The number of MSM 18+ who visited "Friendly doctors" during 2016 and are registered as beneficiaries in the locality where IBBS data collection site was located (per each data collection site).	"Friendly doctors" are funded by GFATM grant exclusively. No other contributions to the "Friendly doctors" have been registered in 2016. Reports on number of clients treated are submitted to the GFATM grant. The implementers are using a unique identifier system to exclude duplication of identifiers per implementer. If many implementers are offering services in the same area, data have been cleaned to reduce duplication for the assigned IBBS data collection site.	**Q81. Have you visited Friendly rooms in dermato-venereal dispensaries or in NGOs in last 12 months?** If the answer is "yes", then the respondent was asked all the questions below: **Q82: Where have you visited Friendly rooms in dermato-venereal dispensaries in last 12 months?** Q82.1 In the locality where the data are collected (with the following options for answering: "yes", "no", "don't know" and "no answer") Q82.2 In another locality of our region (with the following options for answering: "yes", "no", "don't know" and "no answer")

	The questions Q82 and 83 were designed to control the migration factor. The data provided are client based aggregated. Data represent the number of those who benefited from service throughout 2016. The IBBS data collection took place from October 2016 to February 2017.	Q82.3 In another region of Kyrgyzstan (with the following options for answering: “yes”, “no”, “don’t know” and “no answer”) Q82.4 In another country (with the following options for answering: “yes”, “no”, “don’t know” and “no answer”). The sub-questions under Q82 were not mutual exclusive. **Q83: Where have you visited Friendly rooms in NGOS in last 12 months?** Q83.1 In the locality where the data are collected (with the following options for answering: “yes”, “no”, “don’t know” and “no answer”) Q83.2 In another locality of our region (with the following options for answering: “yes”, “no”, “don’t know” and “no answer”) Q83.3 In another region of Kyrgyzstan (with the following options for answering: “yes”, “no”, “don’t know” and “no answer”) Q83.4 In another country (with the following options for answering: “yes”, “no”, “don’t know” and “no answer”). The sub-questions under Q83 were not mutual exclusive. The proportion of those who reported visiting Friendly room within NGOs or within dermato-venereal dispensary (a new variable was created) has been used for analysis.
The number of MSM 18+ with STIs symptoms who have been treated by “Friendly doctors”.		**Q 68 Have you had any of STIs symptoms (listed above) in last 12 months?** (with the following options for answering: “yes”, “no”, “don’t know” and “no answer”) If the answer was “yes”, then the respondent was asked: **Q69 Where did you get treated for STIs?** There were the following options (multiple answers): “Private clinic”, “Dermato-venereal dispensary”, **“Friendly rooms”**, “Friends who are not dermato-venereal doctors”, “Self-treatment”, “Other”, “Don’t know”, “No answer”. The proportion of respondents with “Friendly rooms” option has been used for analysis.

Selection of estimation intervals and mid-point of estimates

For the selection of size estimation intervals, the outliers have been removed. As outliers were considered:

- the results with a value close to the highest value of any of the benchmarks for the respective site.
- the results with a value that was considered unreasonably high for the respective IBBS data collection site.

In case when for the same service multiplier in the questionnaire were integrated several questions, the average of resulted values was considered for the series of values for the respective site, if the values are close to each other. In case when there was significant difference between the resulted values, they were treated as independent results.

If in the series of values for the respective site where an uneven number of results, the median value was selected as mid-point estimate. If in the series of values for the respective site where an even number of results, the mid-point between two central values was selected as mid-point estimates.

Extrapolation

By making use of estimation methods, described above, there were generated estimates of the population living within the geographical area of the IBBS data collection sites, to which the benchmark data have been aligned.

Extrapolation was applied to calculate the national estimated size of the populations of interest. The selection of the method for extrapolation was based on data available on each key population outside of the IBBS data collection sites.

PWID

There were identified two sources of data that may serve as reference for extrapolation –HIV prevention programme data and narcology data. After assessing both data sources the narcology data were taken as reference for extrapolation, because they capture data from all regions and, also, the geographical disparities across regions. It was assumed that narcology data represent the distribution of PWID who live outside and within the data collection sites in the country. Hence, the proportion of PWID who live outside of IBBS data collection sites according to narcology data, has been added to the summation of the estimated size of the PWID population living in IBBS data collection sites. According to Narcology service data, 89% of PWID live in IBBS data collection sites.

FSW

There was identified only one source of data that may serve as reference for extrapolation - HIV prevention programme data. However, the HIV prevention data cover only areas where these services are available. For estimating the size of FSW living in areas where HIV prevention services are available it was applied the same approach as in case of PWID - the proportion of FSW who live outside of IBBS data collection sites according to HIV prevention data, has been added to the summation of the estimated size of the FSW population living in IBBS data collection sites.

Small size general female population areas make difficult to find a commercial partner for FSW, are highly stigmatizing and with strong social control. These two factors are causing migration of FSW to

sell sex – temporary or permanent. Because of that a direct imputation of prevalence with different deduction factors for urban and rural areas female population living outside of IBBS data collection sites has been applied. In case of female population living in urban areas outside of IBBS data collection sites it was applied half of the weighted by age prevalence calculated for female population living in IBBS data collection sites. In case of female population living in rural areas outside of IBBS data collection sites it was applied third of the weighted by age prevalence calculated for female population living in IBBS data collection sites.

MSM

No other data sources have been identified that may serve as reference for extrapolation. HIV prevention programmes targeting MSM population are mainly concentrated in two big cities and localities around where the IBBS data collection has been conducted. Based on experts' opinion and data collected during the formative research it was assumed that MSM population mainly concentrates around two big cities – Bishkek in the Northern part of the country and Osh in the Southern part of the country. Small general male population size areas make difficult to find a sex partner for an MSM, are highly homophobic and with strong social control. These two factors are causing migration – temporary or permanent. Because of that a direct imputation of prevalence with different deduction factors for urban and rural areas for male population living outside of IBBS data collection sites has been applied. In case of male population 18-49 living in urban areas outside of Bishkek and Osh IBBS sites it was applied half of the weighted by age prevalence calculated for male population 18-49 living in IBBS data collection sites. In case of male population 18-49 living in rural areas outside of IBBS data collection sites it was applied third of the weighted by age prevalence calculated for male population 18-49 living in Bishkek and Osh IBBS data collection sites.

Summary of results

In the Table 8 the results per site per group and national estimated data are presented.

Table 8 Summary of results

PWID						
	Bishkek	Djalal-Abad	Kara-Suu	Osh	Tokmok	Sokuluk
Size estimation interval per data collection site	9,500-14,300	500-1,300	950	4,500 – 5,750	1,400 – 3,800	950 – 3,800
Mid-point of the estimated size per data collection site	11,400	900	950	4,900	3,300	2,500
National estimates	26,700					
FSW						
Size estimation interval per data collection site	3,300 – 3,400	600-800	1,000-2,000			
Mid-point of the estimated size per data collection site	3,350	700	1,300			
Size estimation of FSW living in areas where services are provided	8,400					
National estimates	10,600					
MSM						
Size estimation interval per data collection site	4,300 - 8,300			1,600 -2,000		
Mid-point of the estimated size per data collection site	5,200			1,800		
National estimates	16,900					

Conclusions and recommendations

The current round of estimating the size of PWID, FSW and MSM identified several issues that should be addressed in the next round of IBBS and size estimation exercise:

1. By now, the service multiplier method remains the one that shows high level of applicability in Kyrgyzstan context for all 3 target groups. However, additional methods, that have been recommended as part of the technical assistance should be explored for implementation. Each method has its own particular strengths and weaknesses and triangulating multiple population size estimates will allow for cross-checks and validation. Please consult the new recommendations available at http://apps.who.int/iris/bitstream/10665/258924/1/9789241513012-eng.pdf?ua=1 . This recommendation is applicable for all target groups.
2. Accurate estimates are dependent on the quality of the RDS sampling method. It is critical to ensure the diversity of seeds which is an essential methodological requirement for an RDS study[14]. The high coverage rates with HIV prevention programmes suggest that this requirement has not been followed within 2016 IBBS. This recommendation is applicable for target groups recruited through RDS.
3. Either 2013[15] or 2016 sampling methods applied to reach FSW resulted in high coverage rates (90% and more) with HIV prevention programmes in the surveyed samples, which are assessed as not reliable. High coverage rate leads to underestimation of the population size. The service multiplier results are the only ones to be considered for size estimation intervals in 2013. Other applied methods resulted in size estimation results lower than available benchmarks. In the 2013 report there are no technical details available clarifying why other methods gave underestimated results - either it was a problem related to the field work or it was related to the contextual characteristics of the target population in the surveyed areas. No extrapolation has been applied. The national estimated size of FSW presented in the 2013 report embody the summation of the upper level estimation interval values (service multiplier results) from all data collection sites, hence do not represent a national estimation.
4. The results of the formative research conducted in 2016 emphasized that there is a social network in the population that may make feasible an RDS in FSW. Because of the budget constrains it was decided to apply the same sampling method as in previous rounds. Hence, it was decided not to go deeper with this assessment tool and the chapter on social network was excluded from the formative research data collection tool. RDS has been successfully applied in sampling FSW in other countries from Eastern Europe[16] which context may serve as a proxy for the Kyrgyz context. The applicability of an RDS sampling in FSW should be further explored and budget secured for future integrated bio-behavioural surveys rounds.

[14] http://applications.emro.who.int/dsaf/EMRPUB_2013_EN_1539.pdf
[15] M-Vector, Analytical report. Estimating the number of sex workers in the Kyrgyz Republic. Bishkek 2013
[16] https://www.ncbi.nlm.nih.gov/pubmed/23539186

5. There is an improvement of the quality of programme data when comparing with 2013[17] round among PWID. There are processes in place contributing to the reduction of duplication of unique identifiers of clients of HIV prevention programmes. During the assessment of service multipliers, as well as in 2013, the implementers mentioned that there are situations when the duplication is done "intentionally" by clients. Overestimated programme data result in overestimation of the size of the population. There is no documentation in place that would allow to take an evidence based decision on the reduction factor to be applied to programme data within current exercise. It is recommended to conduct a research to estimate the rate of "intentional" duplications and find out why it happens. This recommendation is applicable for all target groups.
6. In the context of new services and new providers that became available just before or during the implementation of the 2016 IBBS, it is recommended to explore and other opportunities for making use of additional service multipliers. This recommendation is applicable for all target groups.
7. The migration factor affected the estimation results for FSW in IBBS Tokmok site because of police rides across the country. For other target groups and other IBBS sites data did not register any significant impact. The control of the migration factor should be done in next rounds of size estimates and it is imbedded in the recommended design of service multiplier questions.

Detailed results

PWID

In the Table 9 the data used for calculation and the results per each service multiplier are presented. The IBBS data collection sites from Jalal-Abad, Osh and Kara-Suu register the highest coverage rate across service multipliers coming from HIV prevention programmes. This suggests a displacement of the IBBS samples towards the beneficiaries of services and led to the exclusion of resulted estimates from the interval because of the closeness to the benchmarks.

[17] Report: Общественный фонд «Центр анализа политики здравоохранения», Оценка численности лиц, употребляющих инъекционные наркотики (ЛУИН), в Кыргызской Республике. Бишкек 2014, ISBN 978-9967-466-16-6.

Table 9 Results per service multiplier, PWID

Data collection site	Benchmark	Proportion row, mid-point	Proportion weighted, mid-point	Proportion weighted, lower bound	Proportion weighted, upper bound	ES, mid-point	ES, lower bound	ES, upper bound
Service multiplier: PWID 18+ who received syringes for free during 2016 (Q15)								
Bishkek	5592	0.46	0.40	0.34	0.45	**14143**	16643	12298
Djalal-Abad	250	0.82	0.85	0.75	0.95	**293**	333	262
Kara-Suu	486	0.96	0.98	0.90	1.06	**496**	539	459
Osh	3320	0.80	0.78	0.72	0.84	**4260**	4622	3951
Tokmok	777	0.38	0.21	0.09	0.34	**3660**	8813	2309
Sokuluk	592	0.06	0.04	0.01	0.06	**15695**	40300	9743
Service multiplier: PWID 18+ who received syringes for free during 2016 (Q17.1)								
Bishkek	5592	0.45	0.39	0.32	0.45	**14450**	17274	12379
Djalal-Abad	250	1.00	1.00	1.00	1.00	**250**	250	250
Kara-Suu	486	0.96	0.99	0.97	1.00	**493**	501	486
Osh	3320	0.75	0.70	0.63	0.76	**4770**	5257	4371
Tokmok	777	0.38	0.20	0.09	0.31	**3866**	8783	2477
Sokuluk	592	0.13	0.10	0.05	0.15	**5980**	12885	3887
Service multiplier: PWID 18+ who received condoms for free during 2016 (Q57.4)								
Bishkek	5221	0.24	0.20	0.15	0.24	**26570**	33925	21836
Djalal-Abad	250	0.62	0.59	0.48	0.70	**425**	525	357
Kara-Suu	777	0.82	0.82	0.72	0.92	**947**	1072	848
Osh	3295	0.74	0.67	0.59	0.76	**4895**	5618	4338
Tokmok	592	0.41	0.18	0.12	0.24	**3337**	5021	2500
Sokuluk	485	0.13	0.13	0.06	0.19	**3828**	7496	2572
Service multiplier: PWID 18+ who received information materials on HIV for free during 2016 (Q58.2 or Q58.6)								
Bishkek	4343	0.50	0.45	0.39	0.51	**9709**	11211	8563
Djalal-Abad	220	0.94	0.91	0.88	0.95	**241**	251	232
Kara-Suu	301	0.96	0.98	0.90	1.06	**307**	334	284
Osh	2060	0.92	0.90	0.87	0.93	**2295**	2371	2224
Tokmok	649	0.38	0.18	0.06	0.29	**3667**	10262	2232
Sokuluk	216	0.47	0.42	0.33	0.51	**513**	646	425
Service multiplier: PWID 18+ who were referred to HIV testing by the implementing NGO during 2016 (Q60)								
Bishkek	555	0.20	0.15	0.09	0.21	**3700**	6304	2610

Djalal-Abad	155	0.33	0.31	0.21	0.42	**495**	752	369
Kara-Suu	77	0.50	0.45	0.33	0.56	**173**	231	138
Osh	490	0.50	0.44	0.38	0.49	**1126**	1278	1006
Tokmok	187	0.27	0.12	-0.02	0.27	**1500**	-11885	705
Sokuluk	-	0.41	0.38	0.28	0.48	**-**	-	-
Service multiplier: PWID 18+ who were tested to HIV by rapid saliva test during 2016 (Q70)								
Bishkek	1143	0.20	0.21	0.16	0.26	**5469**	7033	4466
Djalal-Abad	-	0.09	0.08	0.06	0.11	**-**	-	-
Kara-Suu	178	0.60	0.53	0.39	0.67	**336**	456	266
Osh	1140	0.49	0.43	0.35	0.51	**2639**	3234	2227
Tokmok	475	0.71	0.69	0.61	0.78	**684**	780	610
Sokuluk	-	0.03	0.02	0.00	0.03	**-**	-	-
Service multiplier: PWID 18+ who were under medical surveillance at the Narcologic service (Q72)								
Bishkek	2174	0.28	0.23	0.17	0.29	**9493**	12844	7549
Djalal-Abad	51	0.30	0.21	0.08	0.35	**241**	675	147
Kara-Suu	217	0.41	0.33	0.22	0.44	**652**	977	488
Osh	1010	0.36	0.30	0.20	0.40	**3389**	5037	2553
Tokmok	258	0.32	0.15	0.00	0.29	**1749**	161857	879
Sokuluk	366	0.22	0.18	0.11	0.24	**2080**	3413	1498
Service multiplier: PWID 18+ who received naloxone during 2016 (Q78)								
Bishkek	2117	0.15	0.12	0.08	0.15	**17642**	25080	13674
Djalal-Abad	45	0.01	0.02	-0.02	0.07	**2045**	-2100	688
Kara-Suu	130	0.75	0.68	0.54	0.81	**192**	239	160
Osh	884	0.27	0.24	0.16	0.32	**3730**	5611	2786
Tokmok	104	0.25	0.10	-0.04	0.23	**1074**	-2754	449
Sokuluk	77	0.10	0.08	0.04	0.13	**951**	2130	608
Service multiplier: PWID 18+ who received methadone during 2016 (Q81)								
Bishkek	514	0.26	0.23	0.17	0.29	**2245**	3024	1792
Djalal-Abad	28	0.11	0.11	0.03	0.20	**246**	1022	139
Kara-Suu	21	0.30	0.26	0.16	0.36	**82**	135	59
Osh	44	0.35	0.31	0.23	0.39	**141**	191	112
Tokmok	65	0.30	0.13	-0.01	0.28	**492**	-4428	233
Sokuluk	44	0.14	0.12	0.06	0.17	**376**	688	258
Service multiplier: PWID 18+ who were under medical surveillance at the Narcologic service and were tested to HIV upon the narcologist's referral during 2016 (Q63.5)								
Bishkek	1160	0.12	0.09	0.04	0.14	**13182**	32983	8278

Djalal-Abad	0	0.03	0.02	-0.03	0.07	**-**	-	-
Kara-Suu	25	0.00	0.00	0.00	0.00	**-**	-	-
Osh	694	0.00	0.01	0.00	0.01	**138800**	-153032	49095
Tokmok	137	0.03	0.01	-0.09	0.10	**17125**	-1595	1347
Sokuluk	338	0.01	0.01	-0.01	0.02	**48286**	-58885	17114
Service multiplier: PWID 18+ who were under medical surveillance at the Narcologic service and were tested to HIV upon the narcologist's referral during 2016 (Q 74)								
Bishkek	1160	0.05	0.04	0.0	0.1	**25821**	-94286	11355
Djalal-Abad	0	0.18	0.13	0.0	0.2	**-**	-	-
Kara-Suu	25	0.20	0.18	0.1	0.3	**140**	276	94
Osh	694	0.18	0.12	0.0	0.2	**5749**	20004	3357
Tokmok	137	0.25	0.10	0.0	0.2	**1370**	-5217	605
Sokuluk	338	0.15	0.12	0.1	0.2	**2882**	5720	1926

The selection of size estimation interval and the mid-point for each of the IBBS data collection site is presented in the Table 11. The results of capture-recapture are integrated in the respective table.

Compared to 2013 results[18], in PWID 2016 round the results from service multipliers from HIV prevention programme entered the size estimation interval in Bishkek site. In 2013 this was not the case because the resulted estimates there were unreasonably high (about 20,000), while the coverage rate was almost the same (39%) as in 2016 (40%). This suggest that the programme data in 2013 were containing duplications and it was acknowledged by the implementers during presentation of results.

Narcology data remain a potential source of service multipliers. The coverage rate in 2013 was about 40% in Bishkek and the benchmark was 3144. When comparing to 2016 there is both a decrease in the benchmark and in coverage rate.

According to 2016 IBBS data the shares of PWID who are "new entries" into the population (first injection in last 3 years) (Table 10) do not support the hypothesis of decreasing size of the PWID population suggested by Narcology data.

Table 10 Length of injecting drug use experience, PWID, IBBS 2016

	Bishkek	Jalal-Abad	Kara-Suu	Osh	Tokmok	Sokuluk
Less than 1 year	0.73%	0.0%	0.0%	10.68%	19.92%	3.67%
1-3 years	20.05%	27.02%	13.94%	19.66%	28.73%	34.83%
4-6 years	17.17%	36.67%	31.21%	16.20%	17.94%	18.68%
7-10 years	15.02%	26.59%	27.53%	18.30%	8.67%	16.99%
11 and more	47%	9.71%	27.33%	35.16%	24.72%	25.80%

The highest share of respondents who reported benefiting from services in last 12 months in other localities from the same region where data have been collected was registered in Tokmok (4.7% received referral to HIV testing), Sokuluk (11.7% received methadone) and Kara-Suu (3.6% received methadone). Other coverage rates with respective services outside of the respective region where the IBBS site was located have not been registered in recruited samples. We assume that the migration factor did not impact the local estimates based on the respective multipliers.

[18] Report: Общественный фонд «Центр анализа политики здравоохранения», Оценка численности лиц, употребляющих инъекционные наркотики (ЛУИН), в Кыргызской Республике. Бишкек 2014, ISBN 978-9967-466-16-6.

Table 11 Size estimation interval, PWID

Service multiplier	Bishkek		Djalal-Abad		Kara-Suu		Osh		Tokmok		Sokuluk	
	ES	Selected	ES	Selected	ES	Selected	ES	Selected	ES	Selected	ES	Selected
PWID 18+ who received syringes for free during 2016 (Q15)	14143	14300	293		496		4260	4500	3660	3660	15695	
PWID 18+ who received syringes for free during 2016 (Q17.1)	14450		250		493		4770		3866	3866	5980	
PWID 18+ who received condoms for free during 2016 (Q57.4)	26570		425		947	947	4895	4895	3337	3337	3828	3828
PWID 18+ who received information materials on HIV for free during 2016 (Q58.2 or 58.6)	9709	9709	241		307		2295		3667	3667	513	
PWID 18+ who were referred to HIV testing by the implementing NGO during 2016 (Q60)	3700		495	495	173		1126		1500	1500	-	
PWID 18+ who were under medical surveillance at the Narcologic service and were tested to HIV upon the narcologist's referral during 2016 (Q63.5)	13182	13182	-		-		138800		17125		48286	
PWID 18+ who got a rapid saliva HIV test for free during 2016 (Q 70)	5469		-		336		2639		684		-	
PWID 18+ who were under medical surveillance at the Narcologic service (Q72)	9493	9493	241		652		3389		1749		2080	2080
PWID 18+ who were under medical surveillance at the Narcologic service and were tested to HIV upon the narcologist's referral during 2016 (Q74)	25821		-		140		5749	5749	1370	1370	2882	2882
PWID 18+ who received naloxone during 2016 (Q78)	17642		2045		192		3730		1074		951	951

PWID 18+ who received methadone during 2016 (Q 81)	**2245**		**246**		**82**		**141**		**492**		**376**	
Capture-recapture with 2013 IBBS (Q88)	**2311**		**1263**	**1263**	**-**		**895**		**576**		**-**	
Capture-recapture with 2013 size estimation survey (Q88)	**4464**		**1263**		**316**		**623**		**406**		**-**	
Size estimation interval per data collection site	**9500-14300**		**500-1300**		**950**		**4500 - 5750**		**1400 - 3800**		**950 - 3800**	
Mid-point of the size estimation per data collection site	**11400**		**900**		**950**		**4900**		**3300**		**2500**	

According to the Narcology service data at the end of 2016 there were 5607 PWID living in the country, 89% them are living in the IBBS data collection sites. The estimated size of PWID living in IBBS data collection sites is of 22,300, hence they constitute 89%. The remaining PWID living outside of the IBBS data collection sites constitute 11%. After calculations, the estimated number of PWID living in the country is of 26,700.

FSW

In the Table 12 data used for calculation and the results per each service multiplier are presented. Because the IBBS sampling applied the “take all” approach and it was conducted in concentration points where several HIV prevention services are provided (distribution of condoms and information materials), these resulted in the removal of the HIV prevention service multipliers from the size estimation interval as being considered underestimated. The methodological requirement of independency of data sources was broken.

Table 12 Results per service multiplier, FSW

Data collection site	Benchmark	Proportion, mid-point	Proportion, lower bound	Proportion, upper bound	ES, mid-point	ES, lower bound	ES, upper bound
Service multiplier: FSW 18+ who received referral to HIV testing in 2016 (Q53.4)							
Bishkek	1471	0.56	0.51	0.61	**2622**	2896	2400
Djalal-Abad	14	0.87	0.79	0.93	**16**	18	15
Osh	995	0.78	0.72	0.84	**1276**	1390	1192
Tokmok	204	0.94	0.87	0.98	**217**	233	209
Service multiplier: FSW 18+ who received condoms for free during 2016 (Q55.1)							
Bishkek	2316	0.70	0.65	0.75	**3294**	3547	3088
Djalal-Abad	415	0.98	0.93	1.00	**423**	446	416
Osh	486	0.92	0.87	0.95	**528**	557	509
Tokmok	323	0.94	0.87	0.98	**344**	370	330
Service multiplier: FSW 18+ who were referred to HIV saliva based rapid testing during 2016 (Q57)							
Bishkek	445	0.49	0.43	0.54	**916**	1025	826
Djalal-Abad	195	0.72	0.62	0.81	**271**	314	242
Osh	330	0.67	0.60	0.73	**496**	555	452
Tokmok	62	0.00	0.00	0.04	**-**	-	1722
Service multiplier: FSW 18+ who visited "Friendly rooms" during 2016 (Q59)							
Bishkek	756	0.22	0.18	0.27	**3405**	4177	2810
Djalal-Abad	**255**	0.42	0.32	0.52	**607**	792	488
Osh	**501**	0.50	0.43	0.57	**1002**	1168	877
Tokmok	**105**	0.25	0.17	0.35	**420**	621	303
Service multiplier: FSW 18+ who have been tested to HIV in "Friendly rooms" during 2016 (Q61)							
Bishkek	615	0.26	0.22	0.31	**2330**	2795	1965
Djalal-Abad	206	0.25	0.17	0.35	**824**	1219	594
Osh	393	0.20	0.15	0.26	**1965**	2673	1500
Tokmok	86	0.02	0.00	0.07	**4300**	43000	1229

The selection of size estimation interval and the mid-point for each of the IBBS data collection site is presented in the Table 12. The result of capture-recapture is integrated in the respective table.

Because no one of the resulted values for Tokmok IBBS data collection site was selected for the estimation interval, this site has been removed from the list of sites where IBBS data has been collected. The IBBS data collection in FSW was postponed until beginning of 2017 because of the police rides and it had to wait until the target group will concentrate again to make feasible the sampling. Because of the police rides there was observed a migration of FSW population to this site and this might impact the estimation results. Tokmok was the only site where the respondents reported benefiting from services in last 12 months in other localities from the same region (35% received condoms for free, 11% received referral for rapid HIV testing, 4% visited a “Friendly room”) or in another region of Kyrgyzstan (7.0% received condoms). Also, some migration has been seen in Jalal-Abad site (9% received condoms and 6% received referral to HIV rapid testing in another region).

Table 13 Size estimation interval, FSW

Service multiplier	Bishkek		Djalal-Abad		Osh		Tokmok	
	ES	Selected	ES	Selected	ES	Selected	ES	Selected
FSW 18+ who received condoms for free during 2016 (Q55)	2622		16		1276	1276	217	
FSW 18+ who were referred by the implementing NGO to HIV rapid testing (Q57)	3294	3294	423		528		344	
FSW 18+ who visited Friendly rooms during 2016 (Q59)	916		271		496			
FSW 18+ who have been tested to HIV in Friendly rooms during 2016 (Q61)	3405	3405	607	607	1002	1002	420	
FSW 18+ who received condoms for free during 2016 (Q55)	2330		824	824	1965	1965	4300	
Capture-recapture with IBBS 2013 (Q68)	1907		294		449			
Estimated size interval per data collection site	3300 - 3400		600-800		1000-2000		-	
Mid-point of the estimated size per data collection site	3350		700		1300		-	

The data and calculations applied for estimation of FSW living in areas where HIV prevention programmes are available are presented in the Table 14. This extrapolation method uses the same approach as in case of PWID. The estimated extrapolated size is limited to the areas where data on HIV prevention programme are available.

Table 14 Extrapolation, estimated size living in areas where HIV prevention programmes are available, FSW

	Estimated size in IBBS data collection sites	Total number of clients of HIV prevention programmes	Number of clients in the IBBS data collection sites	Number of clients outside of the IBBS data collection sites	Proportion of clients living in IBBS data collection sites out of the total number of clients of HIV prevention programmes	Estimated size of FSW per service multiplier in areas where HIV prevention programmes are available	Average proportion of clients living in IBBS data collection sites	Estimated size of FSW living in areas where HIV prevention programme are available
FSW 18+ who received referral for HIV testing by the implementing NGO	5300	3909	2480	1429	0.63	8354	**0.63**	**8,400**
FSW 18+ who were tested for HIV by the implementing NGO by making use of rapid saliva	5300	1839	970	869	0.53	10048		
FSW 18+ who received condoms for free during 2016	5300	5991	3958	2033	0.66	8022		
FSW 18+ who visited Friendly rooms during 2016	5300	2539	1512	1027	0.60	8900		
FSW 18+ who have been tested to HIV in Friendly rooms during 2016	5300	357	269	88	0.75	7034		

For national extrapolation at first step the weighted by age prevalence of sex work has been calculated (Table 15). At second step the sex work prevalence weighted by age from IBBS data collection sites has been extrapolated to the remaining female population living outside of the IBBS data collection sites – half of the prevalence for urban area female population and third of the prevalence for rural area female population (

Table 16).

Table 15 Sex work prevalence weighted by age in female population in IBBS data collection sites, FSW

Age groups	Bishkek				Jalal-Abad				Osh				Weighted prevalence		
	Proportion in the IBBS sample	Estimated size per age group	Female population	Prevalence of sex work	Proportion in the IBBS sample	Estimated size per age group	Female population	Prevalence of sex work	Proportion in the IBBS sample	Estimated size per age group	Female population	Prevalence of sex work	Estimated size per age group	Female population	Prevalence of sex work
18-29	0.619	2043	111818	0.018	0.41	287	16833	0.017	0.485	630.5	38374	0.016	2960	167025	0.018
30-39	0.297	980	89793	0.011	0.48	336	9061	0.037	0.345	448.5	21309	0.021	1765	120163	0.015
40 -49	0.081	267	117419	0.002	0.11	77	11733	0.007	0.16	208	28230	0.007	552	157382	0.004
49 +	0.003	10	55205	0.00018	0	0	3514	0	0.01	13	11793	0.0011	23	70512	0.0003
Total		3300	374235	0.0089		700	41141	0.017		1300	99706	0.013	2960	167025	0.018

Table 16 Extrapolation, direct imputation method, FSW

	Prevalence of sex work	Urban areas outside of data collection sites, half of the prevalence applied		Rural areas, outside of data collection sites, third of the prevalence applied		Estimated size of FSW living outside of IBBS data collection	Estimated size of FSW living in IBBS data collection	Estimated size of FSW living in Kyrgyzstan
		Female population	Estimated size	Female population	Estimated size			
18-29	0.018	69,558	616	403,660	2,385	**5,300**	**5,300**	**10,600**
30-39	0.015	48,076	353	294,959	1,444			
40 -49	0.004	50,547	89	301,384	353			
49 +	0.0003	33,138	5	153,125	17			

MSM

In the Table 17 the data used for calculation and the results per each service multiplier are presented. The sample recruited in Osh IBBS data collection site registered high coverage rates across several service multipliers coming from HIV prevention programmes. This led to the exclusion of respective resulted estimates from the size estimation interval because of the closeness to the benchmarks.

Table 17 Results per service multiplier, MSM

Data collection site	Benchmark	Proportion row, mid-point	Proportion weighted, mid-point	Proportion weighted, lower bound	Proportion weighted, upper bound	ES, mid-point	ES, lower bound	ES, upper bound
Service multiplier: MSM 18+ who received condoms for free during 2016 (Q65)								
Bishkek	2015	0.39	0.28	0.20	0.35	**7309**	9951	5774
Osh	371	0.82	0.75	0.67	0.82	**497**	553	451
Service multiplier: MSM 18+ who received condoms for free during 2016 (Q76.1)								
Bishkek	2015	0.56	0.43	0.37	0.49	**4730**	5508	4140
Osh	371	0.96	0.91	0.85	0.97	**407**	436	382
Service multiplier: MSM 18+ who received lubricants for free during 2016 (Q78.1)								
Bishkek	1940	0.51	0.37	0.30	0.44	**5243**	6370	4446
Osh	371	0.92	0.88	0.80	0.95	**424**	466	389
Service multiplier: MSM 18+ who were referred for HIV rapid saliva based testing by the implementing NGO during 2016 (Q80)								
Bishkek	1530	0.46	0.35	0.28	0.43	**4322**	5493	3568
Osh	190	0.13	0.12	0.06	0.18	**1612**	3163	1082
Service multiplier: MSM 18+ who received referral to HIV testing during 2016 (Q74.4)								
Bishkek	1530	0.47	0.35	0.28	0.42	**4345**	5383	3643
Osh	190	0.12	0.10	0.06	0.13	**1935**	2969	1433
Service multiplier: MSM 18+ who visited "Friendly rooms" in dermato-venereal dispensaries or NGOs during 2016 (Q82 and Q83)								
Bishkek	840	0.13	0.10	0.06	0.14	**8292**	13395	6001
Osh	140	0.35	0.35	0.28	0.41	**403**	497	339
Service multiplier: MSM 18+ with STIs symptoms who have been treated in Friendly rooms (Q 69.3)								
Bishkek	210	0.3	0.01	0.00	0.01	**35000**	74893	21674
Osh	50	0.8	0.01	-0.01	0.02	**6828**	-5417	2094

The selection of size estimation interval and the mid-point for each of the IBBS data collection site is presented in Table 18.

The 2016 IBBS data do not suggest any migration from benefiting from services prospective in last 12 months prior to data collection. The highest share of respondents who benefited from services in another region of Kyrgyzstan is 2.7% in Osh sample and is related to distribution of lubricants.

Table 18 Size estimation interval, MSM

Service multiplier	Bishkek		Osh	
	ES	Selected	ES	Selected
MSM 18+ who received condoms for free during 2016 (Q65)	7309	6000	497	
MSM 18+ who received condoms for free during 2016 (Q76)	4730		6828	
MSM 18+ with STIs symptoms who have been treated in Friendly rooms (Q69)	35000		1935	1935
MSM 18+ who received referral to HIV testing during 2016 (Q74.4)	4345	4345	407	
MSM 18+ who received lubricants for free during 2016 (Q78)	5243	5243	424	
MSM 18+ who were referred for HIV rapid saliva based testing by the implementing NGO during 2016 (Q80)	4322	4322	1612	1612
MSM 18+ who visited Friendly rooms in dermato-venereal dispensaries or NGOs during 2016 (Q82 and Q84)	8292	8292	403	
Size estimation interval per data collection site	4300 -8300		1600 -2000	
Mid-point of the size estimation per data collection site	5200		1800	

For the extrapolation the direct imputation method has been applied. At first step the weighted by age prevalence of same sex in IBBS data collection sites has been calculated (Table 19). At second step the same sex prevalence weighted by age from IBBS data collection sites has been extrapolated to the remaining male population living outside of the IBBS data collection sites – half of the prevalence for urban areas male population and third of the prevalence for rural areas male population (Table 20).

Table 19 Same sex prevalence weighted by age in male population in IBBS data collection sites, MSM

Age groups	Bishkek				Osh				Weighted prevalence		
	Proportion in the IBBS sample	Estimated size per age group	Male population	Prevalence of same sex	Proportion in the IBBS sample	Estimated size per age group	Male population	Prevalence of same sex	Estimated size per age group	Male population	Prevalence of same sex
18-29	0.8	4158	101399	4%	0.73	1323	34343	3.9%	5481	135742	4.0%
30-39	0.12	631	77051	1%	0.25	443	20297	2.2%	1074	97348	1.1%
40 -49	0.06	295	97262	0%	0.017	30	25605	0.1%	326	122867	0.3%
49 +	0.02	114	28265	0%	0.002	4	7093	0.0%	114	35358	0.3%

Table 20 Extrapolation, direct imputation method, MSM

Age groups	Prevalence of same sex	Urban areas outside of data collection sites, half of the prevalence applied		Rural areas, outside of data collection sites, third of the prevalence applied		Estimated size of MSM living outside of IBBS data collection	Estimated size of MSM living in IBBS data collection	Estimated size of MSM living in Kyrgyzstan
		Male population	Estimated size	Male population	Estimated size			
18-29	4.0%	87029	1757	460995	6205	**9,900**	**7,000**	**16,900**
30-39	1.1%	56043	309	284690	1047			
40 -49	0.3%	72207	96	369778	327			
49 +	0.3%	29829	48	133030	143			