Ministry of Health and Social Development of the Republic of Kazakhstan
Republican Center for AIDS Prevention and Control

POPULATION SIZE ESTIMATE OF PEOPLE WHO INJECT DRUGS (PWID) IN THE REPUBLIC OF KAZAKHSTAN

REPORT

Almaty, 2016

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O-88. **Report on Population Size Estimate of People, who Inject Drugs (PWID) in the Republic of Kazakhstan** – Almaty, 2016 – 59p.

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This report presents a Population Size Estimate of People who Inject Drugs (PWID) in the Republic of Kazakhstan, and describes the methodology used therefore, including formative study and qualitative analysis of data obtained through interviews with key informants and focus groups. The estimated population sizes are shown by sentinel site, extrapolated to the scale of respective oblasts.
This publication is intended for the staff of AIDS Centers and Non-Governmental Organizations who provide HIV services to key populations, including PWID, and who participated in organizing and carrying out the Estimate.

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Abbreviations

RDSAT **RDS-Analyst**	special software designed to analyze respondent-driven sampling data sets
abs	absolute value
HCV	hepatitis C virus infection
HIV	human immunodeficiency virus
EKO	East Kazakhstan Oblast
CI	confidence interval
FC	friendly clinic
PD	penitentiary department
VCT	voluntary counseling and testing
WKO	West Kazakhstan Oblast
IDU	injecting drug use
IEC	set of Information, Education and Communication materials
IBBS	Integrated Bio-Behavioral Survey, used for Sentinel Surveillance
STI	sexually transmitted infection
CF	correctional facilities
ELISA	enzyme-linked immunosorbent assay
PLWH	people living with HIV
PWID	people who inject drugs
MoH RK	Ministry of Health of the Republic of Kazakhstan
M&E	monitoring and evaluation
MSM	men who have sex with men
NGO	non-governmental organization
PSE	population size estimate
TP	trust point
PSC	psychosocial counseling on HIV/AIDS
RDS	respondent-driven sampling
RK	Republic of Kazakhstan
SW	sex worker
RAC	Republican AIDS Center
NKO	North Kazakhstan Oblast
DBS	dry blood spot
AIDS	acquired immune deficiency syndrome
MARP	most-at-risk population
UIC	unique identifier code
SKO	South Kazakhstan Oblast
ESP	epidemiologic surveillance of prevalence

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1. Background

1.1 Introduction

Planning and implementation, as well as monitoring and evaluation of HIV prevention measures among people who inject drugs (hereinafter referred to as PWID) are never possible without a population size estimate of the target group. Absence or low quality of such data make it difficult to plan for efficient HIV prevention programs. The reserve and inaccessibility of majority PWID must also be accounted for, so as the high degree of stigmatization and criminalization of the group.

An accurate population size estimate of PWID is needed to enable:

- planning of prevention and treatment programs and evaluation of their efficiency at city, oblast and country levels;
- estimation of needs in supplies and consumables for prevention programs (means of personal prophylaxis, information and educational materials, etc.);
- estimation and adjustment of sample size for ESP in each sentinel site;
- estimation of PWID population size nationwide;
- estimation of risky behavior prevalence at city, Oblast and country levels by extrapolating data to identify changes over time;
- comparison of data obtained through ESP and routine surveillance (HIV prevalence rates, coverage of prevention programs, connection with other at-risk groups);
- evaluation of HIV incidence and population size estimate of people living with HIV (PLWH).

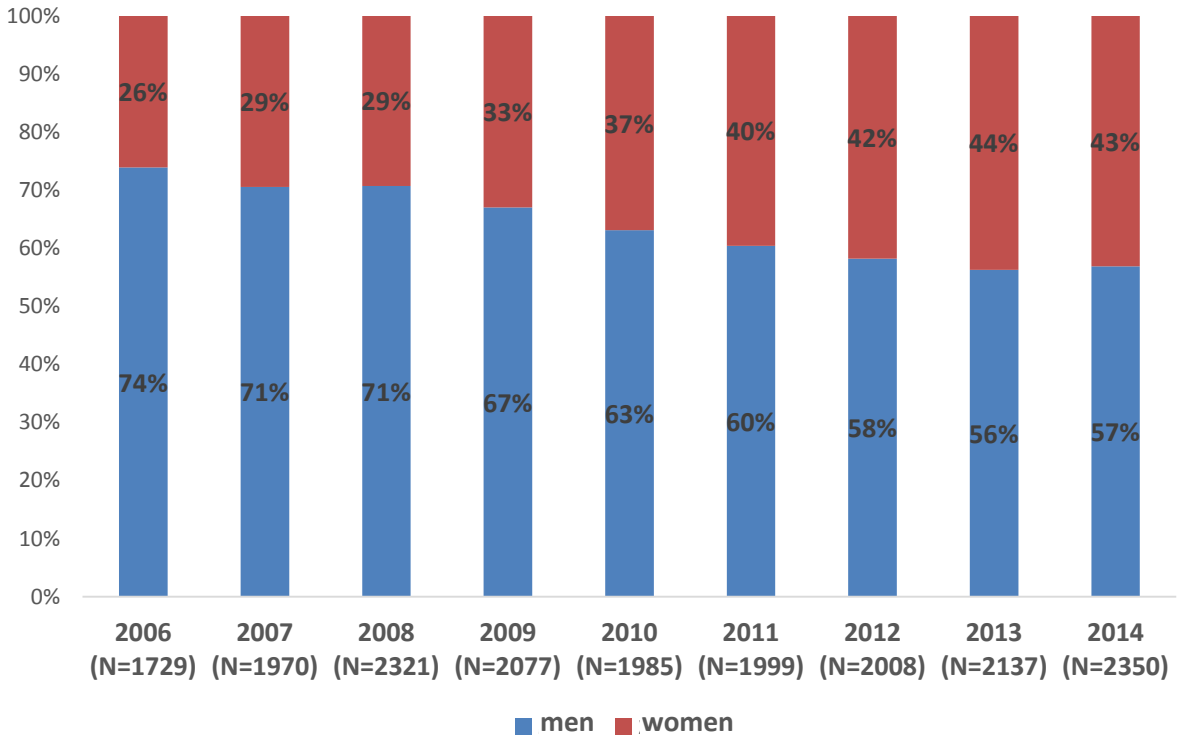
Therefore, this study aims to estimate the total number of people who inject drugs. Population size estimates of PWID in Kazakhstan had been done in the past, but the methodology used even in the most recent studies is not considered best fit for the purpose anymore; the present study accounts for the lessons learnt from the previous experiences.

1.2 Epidemiological situation of HIV in the Republic of Kazakhstan

In Kazakhstan, like in other countries of Eastern Europe and Central Asia, HIV spreads primarily in key populations, which include people who inject drugs, sex workers (hereinafter referred to as SW), men who have sex with men (hereinafter referred to as MSM), and prisoners.

According to statistics from HIV registries, the overall number of PLWH as of January 1, 2015 was 24,216, including 22,109 (128.0 per 100 thousand population) RK citizens, of which 14,683 (66.4%) are men, and 7,426 (33.6%) are women. Annual dynamics show an increase in the proportion of women who have HIV (Figure 1).

Figure 1. Gender distribution among registered HIV cases, by year



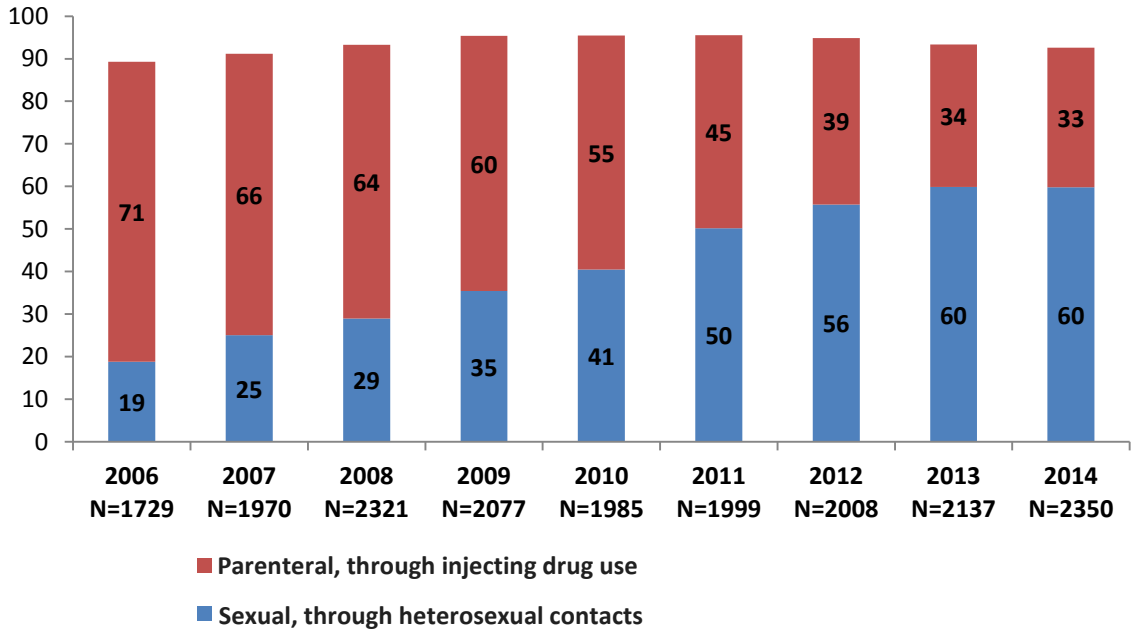
The most intensive HIV prevalence of 0.17% is observed in population aged 15 to 49, the estimated number of people living with HIV (PLWH) in this age group is 20,000.

Concentration of HIV cases across the country is irregular, with greatest numbers registered in Almaty – 3,943 cases (225.9 per 100 thousand population), in Pavlodar Oblast – 1,888 (188.1), and in Karaganda Oblast – 3,544 (166.7). AIDS was diagnosed in 1,714 patients, of which 79 are children below 14. The total number of HIV-related deaths comprises 4,227, including 1,288 AIDS-related deaths.

Injecting drug use is the main driver of HIV transmission in Kazakhstan's concentrated epidemic. As of 1 January 2015, proportion of PWID in cumulative number of HIV cases comprised 58.7%.

Proportion of PLWH with reported heterosexual route of transmission has increased from 19% in 2006 to 60% in 2014. It is important to note that the routes of HIV transmission are self-reported by PLWH during epidemiological survey. It is widely recognized that, for various reasons, some people, especially women, may be reluctant to report past or current injecting drug use, and the true number of people infected through the injecting drug use may be underestimated (Figure 2).

Figure 2. Main routes of HIV transmission in Kazakhstan, by year



The risk of HIV transmission through unsafe injecting drug use is significantly higher than through unprotected sex, therefore if HIV enters PWID population, the infection spreads rapidly through the shared use of non-sterile syringes, needles, other devices or solutions used to prepare the drugs.

Injecting drug use is the main route of HIV transmission among men – out of all HIV cases reported in 2014 (2,206) 48.1% of those infected through injecting drug use were men, and only 11.9% were women, which accurately mirrors the trend of the past several years. There is also data suggesting that a large proportion of infections among women occurs through heterosexual contacts (Figures 3 and 4).

Figure 3. Distribution of HIV cases by the route of transmission in men, by year

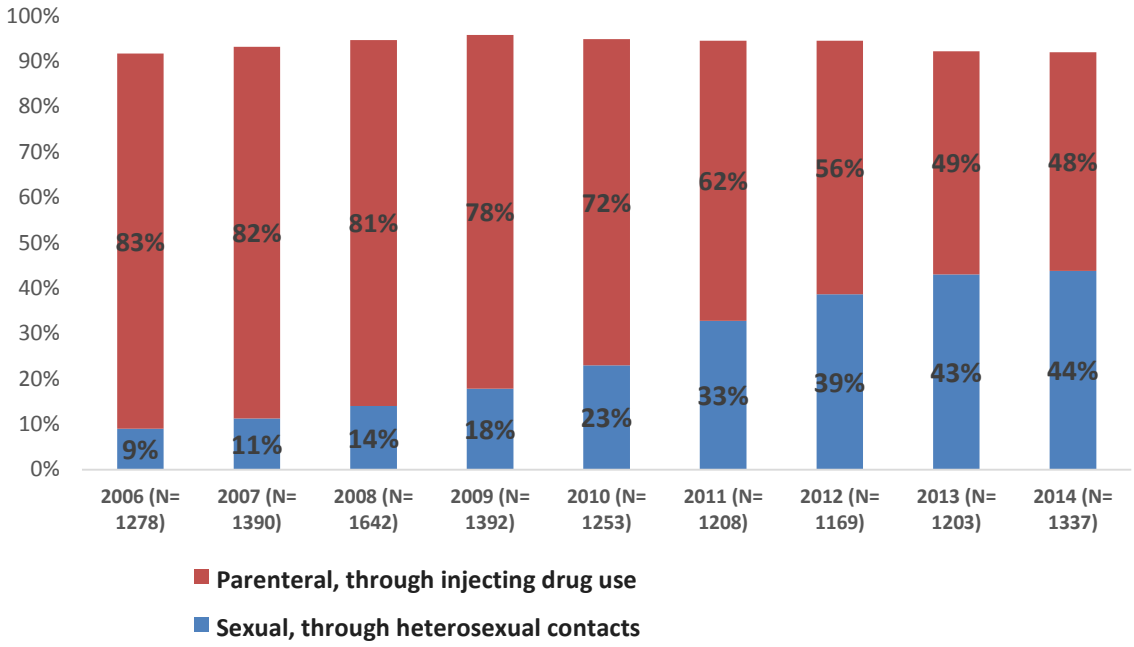
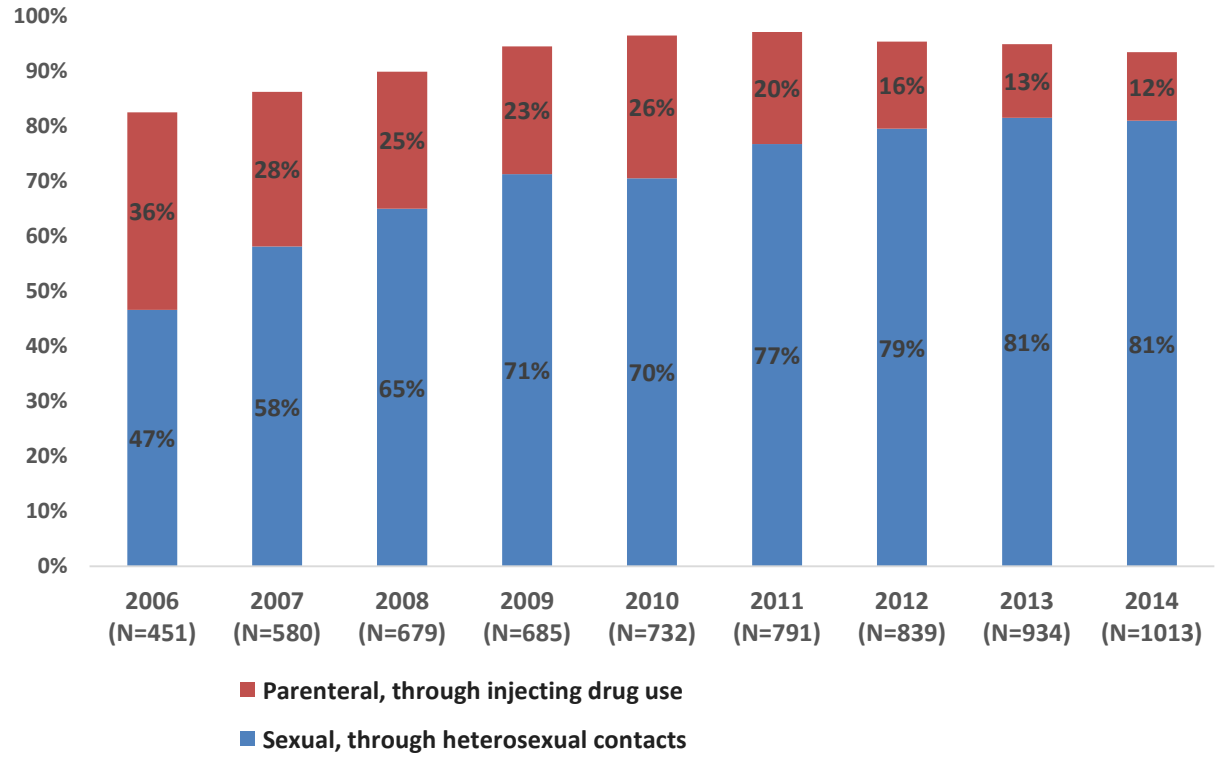


Figure 4. Distribution of HIV cases by the route of transmission in women, by year



According to data from epidemiologic surveillance of HIV prevalence (hereinafter referred to as ESP), prevalence of HIV among PWID in 2014 comprised 8.4%, which is significantly higher than in other key populations.

The most recent population size estimate of PWID in 2013 concluded that the total number of PWID in Kazakhstan was 110,940. On average, only 20% of the country's estimated PWID population is registered with narcology institutions.

Following its international commitments (Millennium Development Goals, 2000; the Declaration of Commitment on HIV/AIDS, 2001; the Political Declaration on HIV/AIDS, 2006; and the Political Declaration on HIV/AIDS, 2011), Kazakhstan is taking steps to control the HIV epidemic. With the help of international donors, such as the Global Fund, UN agencies and projects supported by the American Government – HIP/USAID and ICAP/CDC – the country is implementing targeted measures in an effort to ensure universal access to prevention, diagnosis, treatment and support services.

1.3 Present situation with illicit drug use in the Republic of Kazakhstan[1]

In line with the international perspective, we find that injecting drug use accounts for the major share of illicit drug use in the Republic of Kazakhstan.

In recent years, the country has seen growth in the use of desomorphine, a homemade substance cooked from widely available codeine-containing drugs, as well as in the use of a mixture of food poppy seed and tropicamide.

Opium poppy is grown domestically, and in most cases is used in the form of 'koknar', a strong infusion of crushed poppy heads, or as 'khanka', which is dried and solidified juice of the opium poppy, mainly administered through injection.

There is no reliable data on the use of cocaine, amphetamines and methamphetamines in Kazakhstan. It should be noted, however, that the high price of these drugs in the country significantly lowers their affordability; most seizures of these substances occurred in large cities - Astana and Almaty.

Over the past six years, proportion of people with disorders caused by the use of opioids and stimulants had reduced. On the other hand, proportion of people with disorders caused by the combined use of substances, and disorders from the use of cannabinoids, tends to increase.

[1] Source: National report on drug situation in the Republic of Kazakhstan, 2014 http://mcadkz.org/en/publikacii.html

Treatment of drug dependence in Kazakhstan is a structured intervention involving prescribed medications and/or psychosocial techniques aimed at reducing, or abstaining from, the use of illicit drugs. In fact, large proportion of these interventions in Kazakhstan is aimed at achieving complete abstinence from illicit drugs. Ten cities are now piloting programs of maintenance therapy with opiate receptor agonists using methadone (buprenorphine and other substitution drugs are not used in the country).

In most cases, therapeutic treatment focuses on mental and behavioral disorders caused by the use of opioids (ICD-10 F11, 1994), and the combined use of psychoactive substances (ICD-10 F19, 1994). In patients treated since 1999, opioids were the most common problem drug. According to official statistics of 2013, opioids were the primary problem drug for 70.1% of all clients treated for drug dependence. Main way by which the opioids are used is intravenous injections. Therefore, services of narcology institutions principally target the injecting opioid users.

In 2013, inpatient care for drug dependence was sought 5,614 times (3,638 patients). In 2013, the national rate of seeking treatment for drug dependence comprised 3.3 per 10,000 population. The largest number of people who received drug treatment per 10,000 population was registered in Astana (8.0) and Pavlodar (6.7) Oblasts, as well as in Karaganda, Kostanai and Kyzylorda Oblasts, and in the city of Almaty. For most clients first enrolled in narcology care, final diagnosis was mental or behavioral disorder caused by the use of opioids (ICD-10 F11, 1994). In 26.4% of clients first enrolled in narcology care, the final diagnosis was mental or behavioral disorder induced by combined use of psychoactive substances (ICD-10 F19, 1994). Demographically, most people treated in 2013 were men (89.0%). The average age of narcology patients was 35.1 years.

Opioids were the main problem substance for 83.7% of all patients treated in the Republic of Kazakhstan in 2013. Heroin was the main problem drug for 65.8% of all patients who received treatment. After heroin, the most common primary problem substance among those seeking treatment was opium (11.5%) and cannabis (6.3%).

In recent years, manufacture and use of synthetic drugs and their analogues, and of homemade drugs, has become an increasingly aggravating issue. Of all problem substances available in the country, the one that stands out is desomorphine, a mixture of codeine-containing drugs widely available in the market with tropicamide eye drops, which if used in a certain way cause severe hallucinations followed by heavy toxic poisoning. Another substance, which gained popularity in recent years, is a mixture of food poppy seed with OTC pharmaceuticals. An indicator of growing use of opioids produced from OTC pharmaceuticals and food poppy seed is the increasing share of users of other opioids among patients first enrolled in narcology care to treat opioid dependence (ICD-10 F11.X), which in the last five years increased from 4.8% to 9.5%.

1.4 Past experience of estimating the PWID population size in the Republic of Kazakhstan

Since 1998, multiple attempts to estimate the size of Kazakhstan's PWID population were made by international experts and epidemiological departments of Oblast/City AIDS Centers. Between 1998 and 2003, a number of studies estimated prevalence of drug use in the country.

1. Multi-level survey of drug dependence, 2001, 2003 (PWID – 254 000, 1.7% of RK population).
2. Rapid assessment of drug abuse situation, 2001 (PWID – 165 000–186 000, 1–1.5% of the RK population).
3. Various studies by the Republican AIDS Center, 1998–2003 (PWID– 107 280, 0.7% of the RK population).
4. World Health Organization estimate (2003) – prevalence of drug dependence in Kazakhstan in 2002 reduced to 70.6 per 100 000 population (84.8 in 2001).

Since 1998, UNAIDS has been providing technical assistance to perform the estimates; thus, the first population size estimate of PWID was carried out in South Kazakhstan Oblast (Shymkent) and in the

city of Almaty by an international consultant from Belarus. Several population size estimates of PWID were performed in 2000–2003 in 10 cities of Kazakhstan (Atyrau, Ust-Kamenogorsk, Taraz, Uralsk, Karaganda, Temirtau, Aktau, Pavlodar, Astana).

In this fashion, multiple studies estimating the prevalence of drug use in the Republic of Kazakhstan were carried out between 1998 and 2003. Findings of these studies differed from one another due to the application of different estimation methodologies, fragmented regional coverage and engagement of different services for field work.

The situation required a new specially designed study that would cover all regions of Kazakhstan, apply a uniform estimation methodology, and combine efforts of all stakeholder ministries, departments and services of the country. Ultimately, the study was undertaken in response to the request of the Head of the State, Nursultan Nazarbayev, and the decision of the Security Council of the Republic of Kazakhstan (sub-paragraph 1, paragraph 4 of Minutes No. 01-8.9, September 10, 2003, of the National discussion with members of the Government, heads of law enforcement and other government agencies on the rule of law and crime prevention), and following the Order of the Ministry of Health of the Republic of Kazakhstan No. 139 as of February 9, 2004.

A unique feature of that study was its country-wide coverage and application of a unified integrated methodology that included assessment of official statistics provided by the Narcology Service, by the Penitentiary Committee of the Ministry of Justice, and by the Ministry of Internal Affairs, as well as data obtained through sociological surveys, both from the general population of the Republic of Kazakhstan, and from the at-risk groups (PWID, SW, MSM, street children, children, adolescents, youth, visitors of discotheques and night clubs, etc.).

The data obtained through that special study was then compared with the official statistics and data from previous studies carried out in separate regions of the country using differing methodologies.

In this fashion, the study arrived at an aggregate estimated size of PWID population in Kazakhstan, which was found to be 201 045 people.

In 2004, UNAIDS provided technical assistance to help develop methodology guidelines for “Rapid population size estimate of at-risk groups (injecting drug users, sex workers and men who have sex with men)”, which were approved by the MOH RK. These guidelines were building on the then-new approaches to HIV surveillance developed by the WHO and UNAIDS, and on the experience from previous estimates and surveillance in Kazakhstan’s at-risk populations. The document described concepts of qualitative and quantitative sociology, general principles used for qualitative and quantitative research, concepts of primary and secondary data, the concept of research team, as well as the methodology used for population size estimate of MARP (PWID, SW, MSM).

However, the number of methods used for estimation was limited, and the resulting error was significant. Only two of the used multipliers were derived from unrepresentative sampling study (respondents were selected by snowball sampling); the capture-recapture comparison of data provided by the Narcology Service and by the Department of Internal Affairs showed great discrepancies.

Up until 2014, Kazakhstan’s Oblast/City AIDS Centers followed these guidelines in their population size estimates of key groups.

In 2013, a set of protocols for epidemiological surveillance of HIV prevalence, and a *Population Size Estimate of Most-At-Risk Populations*, as an Annex to the protocols, were developed to improve the national system of epidemiological surveillance of HIV prevalence (national sentinel surveillance through IBBS) and the quality of population size estimates of key groups. The documents were designed in accordance with the contemporary international guidelines for population size estimates of MARPs.

Standard methodology for estimation of PWID population size was integrated into the ESP, and clear criteria defining the target population were established: at least one instance of injecting drug use in the last 12 months, residence within the study area, 18 years old or over. The number of multipliers increased to 7, sampling became representative (ESP now uses respondent-driven sampling – RDS), the source of statistical data for capture-recapture analysis had changed (Department of Internal Affairs was replaced by friendly clinics). The final estimate value is now determined by median, rather than the

arithmetic mean. For the first time, estimates for each sentinel site were extrapolated to the oblasts, and the RDS-based sampling study was done using the RDS-Analyst software.

2 Population size estimate of PWID

2.1 Goal and objectives

Objective:

To obtain strategic information on PWID population size nationwide and in each oblast, and on main patterns of drug use, which information will in future be used in HIV prevention programs for PWID in the Republic of Kazakhstan.

Goals:

1. Estimate the population size of PWID in each oblast and at the national level.
2. Using the valid values, determine the median and the range of PWID population size estimates, age and gender distribution.
3. Estimate the prevalence of injecting drug use.
4. Extrapolate the PWID population size estimates from the sentinel sites to respective oblasts.
5. Produce final estimates to enable adequate planning of prevention programs and calculation of PWID sample size for ESP in 2016.
6. Describe the lessons learned and develop recommendations for future routine estimates of the studied population size.

Definition of the Estimate

Population size estimate is a data collection exercise, which employs standard methods to estimate the number of people in a key group at a specified period of time within a particular geographic area, for the purpose of HIV surveillance.

2.2 Methodology

Since 2014, Kazakhstan's national-level population size estimates of PWID, SW and MSM are based on the above document (2014 – Population Size Estimate of PWID, 2015 – Population Size Estimate of SW, MSM).

Methods used for the estimates are shown in table 1.

Table 1. Methods used to estimate population sizes of most-at-risk populations

Method	General approach	Study population
Census and counting	Census: researchers select appropriate locations, and count the number of MARP representatives in all accessible areas of the locations. Counting: Random sample is taken of all MARP representatives found in accessible areas of the selected locations, then counted, and the population size is estimated.	SW, MSM
Multiplier	Comparison of two independent sources of data that can be used for the MARP size estimate.	PWID, SW, MSM
Capture-recapture	Estimates are based on data about MARP coverage from two independent sources. Resulting population size estimate is based on the number of people covered by both sources.	PWID, SW, MSM

Given that PWID is a group that does not concentrate in visible locations where they can be easily counted, remaining methods to estimate the number of PWID include: capture-recapture without direct contact with the key group (lists), and multiplier method.

2.3 Frequency of population size estimate of PWID

The PWID population size estimate uses data from the most recent epidemiologic surveillance study of HIV prevalence in each site. Since the ESP for PWID population is carried out once every 2 years, the same frequency is adopted for the population size estimate. Timing of the estimate corresponds to the timing of the ESP, starting from preparatory phase including the formative study.

Oblast/City AIDS Centers prepare and submit Population Size Estimate Reports to the Republican AIDS Center at the same periods of the year that the ESP reports are prepared and submitted.

2.4 Team

Composition of the team to carry out the Estimate is determined by available human and material resources. Main functions are performed by the Oblast/City AIDS Centers' staff (epidemiologists, assistant epidemiologists, nurses of trust points and friendly clinics), while coordination is a responsibility of the epidemiology departments' management. Main partners are specialists of Narcology Dispensaries.

Functional responsibilities must be clearly assigned, and if necessary, one study team member can perform several functions. It is acceptable to engage NGO and outreach workers, who, while supervised by a coordinator, can contribute to organizing and conducting the focus group surveys, in-depth interviews, participate in the mapping, or perform other functions within their field of competence. Number of staff to be engaged in the population size estimate will vary depending on specific conditions, such as duration and scope of the study, working schedule, and other factors. Oblast/City AIDS Centers must design terms of reference with functional responsibilities of every team member involved in the estimate.

Training to the team must be provided immediately before the study, in course of the ESP preparatory phase. The Republican AIDS Center shall organize and carry out the estimate at the national level. Scope of responsibilities of the Republican AIDS Center within the study includes guidance, arrangements for external quality control, aggregate data analysis and development of the national report.

2.5 Ethics

Population size estimate of PWID was carried out for the purposes of epidemiologic surveillance of HIV prevalence followed by planning of response interventions, and does not represent a research work.

This estimate was carried out in the maximum possible compliance with ethical principles: ensuring confidentiality of collected information, voluntary and anonymous participation in the sampling study, collecting statistical data in a format for that does not identify PWID personally, using estimation techniques that would minimize risks for the team. Sampling study respondents had the opportunity to get free expert advice, means of prophylaxis, IEC materials, and to be tested for HIV, HCV, and STIs. PWID registered with Narcology services were not specifically identified, data on PWID who receive any type of services was coded, PWID biometrics and their locations were not disclosed. Only generalized data was used for analysis and reports, the results were distributed in a processed form, eliminating any possibility to identify the respondents. No matching of the study participants with the clients of prevention programs was attempted. All services were provided free of charge, and participation was remunerated.

2.6 Preparatory phase

Preparatory phase of PWID population size estimate corresponded to the timing of formative study conducted in preparation for the sampling survey (ESP), which determined the following: sentinel site area, method of respondents sampling, acceptable methods of estimation, data sources and factors influencing the quality of collected data.

Sources of administrative statistics:

- Narcology Dispensaries (number of registered PWID);
- Oblast/City AIDS Centers (number of clients receiving services of trust points and outreach workers, number of clients who visited friendly clinics, were tested for HIV);
- Departments of statistics (general population size).

Prior to the estimate, the team analyzed results of previous PWID population size estimates at a given site and in other sites, as well as methods used for the estimates, problems faced in data collection, and errors of the estimates.

Staff engaged in this PWID population size estimate was allocated clear responsibilities and received appropriate training.

In order to apply the multiplier method, the standard IBBS questionnaires used in sentinel surveillance were expanded with appropriate additional questions. The team defined a list of institutions that provide PWID with health and prevention services, data from which can be used in the estimate. Experts of Narcology Service (Oblast and City Narcology Dispensaries) were consulted in working meetings, official requests for necessary data were sent, narcology doctors were added to the list of key informants.

Definition of the estimated population

Definition of the target population was limited by the sampling criteria used for ESP, since the source of data for the Estimate was a number of questions from the standard questionnaire.

To collect administrative statistics, the following group definition criteria were adopted:

1. at least one instance of injecting drug use in the last 12 months;
2. residence within the given sentinel site;
3. 18 years old or over

3. Key results of 2014 study among PWID

3.1 Study methodology

The 2014 epidemiological surveillance of HIV prevalence among Kazakhstan's PWID was carried out in compliance with the protocols developed as described above, using respondent-driven sampling. For the first time ever, the field phase of ESP was preceded by formative study in all sentinel sites.

Qualitative (formative) study

Qualitative study that preceded the quantitative study among PWID adopted the approach of individual interviews with key informants and focus groups representing various stakeholder organizations and the target group. The information collected during interviews with key informants was used to properly organize data collection among PWID, including suitable locations and time for survey, selection of seeds, and testing of data collection tools (checklist, questionnaire, etc.).

Mapping was used to define geographic boundaries of each sentinel site.

Key informants

Respondents invited for survey included experts capable of providing useful information about PWID in the sentinel sites:

- representatives of public organizations (staff of Oblast/City AIDS Centers, including trust points and friendly clinics; specialists of Narcological Dispensaries, law enforcement officers);
- representatives of non-governmental organizations;
- PWID.

Table 2. Methods used in the formative study

Method	Description	Purpose
Document review	Review of existing recommendations and best practices, government orders and other regulations, experience from previous studies, scientific publications, existing administrative statistics (reports from prevention programs and other services, contacts of the sentinel group with Narcology Service, law enforcement agencies, health institutions, NGOs)	- Enables understanding of what is already known, or is believed to have been studied about the sentinel group and its estimated population size - Helps to formulate a profile of social, political and economic factors that can either facilitate or hinder the study and the population size estimate - Helps to choose key informants - Helps to ensure completeness of studied variables
Focus group	Simultaneous interview of several sentinel group representatives	- Helps to study the basic behavioral characteristics of sentinel group representatives, their beliefs, attitudes, vulnerability and risks of HIV and STI infection - Helps to investigate social networks in the sentinel group - Helps to ensure completeness of studied variables - Helps to determine potential locations for data collection, the optimum amount of remuneration and other logistical details - Helps to learn what key persons in sentinel groups should be involved in planning and carrying out of the study - Helps to select primary respondents (in case of RDS) - Helps to verify results of previous studies and information from other sources - Helps to investigate acceptability of the sampling method (behavioral and biological components)
Mapping	Use of maps, drawings and other visual materials for data collection and reporting	- Helps to identify sentinel group concentration sites (parks, streets, clubs, bars, public transport stops, saunas, markets, AIDS-service NGOs and other organizations that provide MARP with health, social and prevention services) - Helps to determine indirect indicators of risky behavior (carrying used syringes or condoms) - Helps to define boundaries of the study area - Helps to identify main traffic flows and routes - Helps to identify potential data collection sites
Interviews with key informants	Asking questions to the representatives of governmental and nongovernmental organizations that are aware of, or have experience working with the	- Helps to access the key group - Helps to investigate social networks in the sentinel group - Helps to investigate social networks in the sentinel group - Helps to understand common beliefs, attitudes and behavioral patterns related to HIV infection risk - Helps to ensure completeness of studied variables.

	sentinel group	Helps to determine potential locations for data collection, the optimum amount of remuneration and other logistical details - Helps to learn what key persons in sentinel groups should be involved in planning and carrying out of the study - Helps to select primary respondents (in case of RDS) - Helps to verify results of previous studies and information from other sources - Helps to explore the interest of sentinel group representatives in planning of the study

The formative study follows a specially designed protocol, which includes a list of questions recommended for use in formative studies among PWID, when interviews and focus groups with key informants are conducted using semi-structured and open-ended questions.

1. General information about the PWID population (for key informants) – 14 questions
2. Defining the boundaries of sentinel sites (for key informants and PWID) – 4 questions
3. Acceptability assessment of RDS methodology (for key informants and PWID) – 10 questions
4. Organization of the study (for key informants and PWID) - 20 questions
5. Defining the social network (for PWID) – 13 questions
6. Selecting primary respondents (for PWID) – 14 questions

Defining the boundaries of sentinel sites

In all cities, boundaries of sentinel sites were defined using mapping. This helped to understand, in which administrative districts and city areas PWID are concentrated, and to select primary respondents from different administrative districts of the sentinel site.

Defining the sampling method (feasibility of respondent-driven sampling), suitability of PWID's social networks for RDS and data collection techniques that must be used to prepare for the field stage

The formative study demonstrated that in all 22 sentinel sites PWID have quite extensive social networks that overlap with each other. Respondents who participated in the formative study have 15 to 100 contacts, 25–30 PWID on average. Thus, the existing PWID social networks enable RDS sampling.

3.2 Organization of the study – agreeing on logistics of the study

Deciding on location, time and adequate remuneration for participation is an important component of formative study, as these factors greatly influence the success of data collection.

The formative study found that the best locations for data collection were local Oblast/City AIDS Centers, and working hours of sentinel sites that would meet the needs of the target group were set to 10 a.m. through 6 p.m. According to participants of the formative study, an adequate remuneration for participation would be a prepaid mobile phone refill card. Depending on the city, proposals on adequate remuneration for participation ranged from 500 to 1000 units for primary remuneration, while secondary remuneration should be no less than 500 units.

Selecting primary respondents

Primary respondents were selected during the formative study. Main requirements to primary respondents included heterogeneity by key characteristics, such as gender, age, HIV status, years of drug use, registration with Narcology Service, enrollment in prevention programs, residence in different areas of the sentinel site, social status, use of different types of drugs, and relation or access to other key groups, such as SW, MSM, ex-prisoners, or young PWID and PWID with 1-3 years of drug use experience.

A total of 78 primary respondents were selected in all sentinel sites in the cities of Aktobe, Karaganda, Pavlodar, Petropavlovsk, Shymkent, Almaty, Astana and Semey, including 58 men and 20 women, 11 (14%) of them were PWID with known HIV status. The requirement of residence in different areas of the sentinel site was met in all cities; in 6 sites – Kokshetau, Taldykorgan, Uralsk, Kostanai, Aksu, and Shymkent – no women were recruited as primary respondents. Only in 7 sites (Ust-Kamenogorsk, Semey, Kyzylorda, Karaganda, Ekibastuz, Petropavlovsk, Astana) the team managed to recruit primary respondents under the age of 25. In terms of social status, primary respondents included both employed and unemployed PWID, both registered and not registered with the Narcology Service. In almost all sentinel sites, recruited PWID received services of prevention programs or outreach workers, and only in Kokshetau, Aktobe, Semipalatinsk, Kyzylorda, Ekibastuz, Petropavlovsk, Almaty and Astana the recruited PWID selected as seeds were not covered with any prevention services.

Of all primary respondents, only 3 (3.8%) people in Ust-Kamenogorsk, Almaty, and Pavlodar had less than 1 year of injecting drug use experience, and only 8 (10.3%) had a history of injecting drug use of 1 to 5 years – in Kokshetau, Aktobe, Taldykorgan, Semey, Taraz, Kyzylorda, Petropavlovsk, and Astana. In the remaining 11 sites, all primary respondents had more than 5 years of drug use experience. In 7 sites (Kokshetau, Aktobe, Ust-Kamenogorsk, Semey, Pavlodar, Ekibastuz, Petropavlovsk), primary respondents used multiple drugs (heroin, poppy seed, tropicamide, khanka, etc.), while in other sites they used heroin only.

Recruitment criteria for primary respondents in the first wave of the study were to enroll those who have big social networks, including in suburban areas, and SW/PWID, MSM/PWID, or ex-prisoners/PWID who have contacts among PLWH that are influential in their environment and, therefore, have access to private subgroups and young PWID. In half of the sentinel sites, the seeds enrolled met all the above criteria, while in other sites – only the criterion of having a large social network was met.

Screening of potential respondents for belonging to the study group

The formative study helped to identify important points that had to be born in mind in the process of selecting the potential respondents. These included objective signs of intravenous drug use, such as puncture marks at injection sites determined by visual inspection; list of drugs that are most common in the city; most common slang words; cost of one dose; cooking technique and so on.

Possible obstacles to participation in the study:

- Inadequate remuneration;
- Distrust to the staff of data collection site;
- Inconvenient working hours of the sentinel site.

3.3 Inclusion and exclusion criteria

Inclusion criteria:

1. At least one instance of injecting drug use in the last 12 months;
2. Permanent residence within the geographic boundaries of the sentinel site in the last 6 months (excluding correctional facilities);
3. 18 years old or over;
4. Valid invitation to participate in the RDS;
5. Verbal informed consent to the interview and blood collection.

Exclusion criteria:

1. Participation in ESP among PWID in the current year in any of the sentinel sites;
2. Physical or mental inadequacy preventing participation in the study (inability to understand interviewer's questions and answer them, inability to take instructions and react accordingly);
3. Receiving opioid substitution therapy at the background of abstinence from injecting drug use for at least 30 days prior to the date of survey.

3.4 Collection tools for behavioral and serologic data

For behavioral data: The standardized questionnaire, with questions on socio-demographics, injecting and sexual behavior, level of knowledge and enrollment in prevention services.

The questionnaire was also added questions required for the population size assessment of PWID using the multiplier method.

For serologic data: DBS for ELISA testing to detect antibodies to HIV, HCV and syphilis

3.5 Sample size

Was first calculated for the national level, then distributed proportionally by sentinel sites, depending on the site's estimate of the target group population size (Table 3).

Table 3. Distribution of PWID sample by sites – 0.75% error (1.5% confidence interval)

Sites in Kazakhstan	Population size estimate	% from PSE	Sample size	Adjusted sample size
Akmola Oblast (Kokshetau)	1,100	1.28	58	100
Aktobe Oblast (Aktobe)	4,600	5.36	243	243
Almaty Oblast (Taldykorgan)	1,100	1.28	58	100
Atyrau Oblast (Atyrau)	1,500	1.75	79	100
East Kazakhstan Oblast (Ust-Kamenogorsk)	7,700	8.97	407	407
East Kazakhstan Oblast (Semey)	1,800	2.1	95	100
Almaty city	11,000	12.82	581	581
Astana city	5,000	5.83	264	264
Zhambyl Oblast (Taraz)	3,600	4.2	190	190
West Kazakhstan Oblast (Uralsk)	5,100	5.94	269	269
Karaganda Oblast (Karaganda)	5,300	6.18	280	280
Karaganda Oblast (Temirtau)	1,000	1.17	53	100
Karaganda Oblast (Zhezkazgan)	1,700	1.98	90	100
Karaganda Oblast (Balkhash)	4,300	5.01	227	227
Kostanay Oblast (Kostanay)	3,200	3.73	169	169
Kyzylorda Oblast (Kyzylorda)	3,300	3.85	174	174
Mangistau Oblast (Aktau)	2,900	3.38	153	153
Pavlodar Oblast (Pavlodar)	6,600	7.69	349	349
Pavlodar Oblast (Aksu)	1,100	1.28	58	100
Pavlodar Oblast (Ekibastuz)	1,800	2.1	95	100
North Kazakhstan Oblast (Petropavlovsk)	3,800	4.43	201	201
South Kazakhstan Oblast (Shymkent)	8,300	9.67	438	438
Total for RK	**85,800**	**100**	**4,531**	**4,745**

To ensure inclusion of the "hidden" PWID population, we used respondent-driven sampling (RDS). Table 4 shows the number and some features of primary respondents.

Table 4. Primary respondents (seeds) by sentinel sites

No	Oblast	Site	Number of primary respondents

			Total	Of these, HIV-positive
1	Akmola	Kokshetau	3	0
2	Aktobe	Aktobe	5	1
3	Almaty	Taldykorgan	3	1
4	Atyrau	Atyrau	3	0
5	East Kazakhstan	Ust-Kamenogorsk	4	0
6	East Kazakhstan	Semey	3	1
7	Zhambyl	Taraz	4	0
8	West Kazakhstan	Uralsk	2	1
9	Karaganda	Karaganda	4	1
10	Karaganda	Temirtau	6	3
11	Karaganda	Balkhash	2	0
12	Karaganda	Zhezkazgan	2	0
13	Kostanay	Kostanai	2	0
14	Kyzylorda	Kyzylorda	3	0
15	Mangistau	Aktau	4	0
16	Pavlodar	Pavlodar	4	2
17	Pavlodar	Aksu	2	0
18	Pavlodar	Ekibastuz	2	0
19	North Kazakhstan	Petropavlovsk	4	1
20	South Kazakhstan	Shymkent	5	2
21	Almaty city	Almaty city	8	3
22	Astana city	Astana city	6	1
	Total		**81**	**17**

Primary respondents were explained the goals and objectives of the study, and given a maximum of 3 invitations to participate in the study, which they distributed among other PWID, while referring them to the data collection site. Invitations contained the address, telephone number and working hours of the data collection site. Secondary respondents were also given 3 invitations to continue enrollment (recruiting) of other PWID in the study. Thus, the PWID sample was built through PWID's social networks.

3.6 Data collection and analysis

In all sentinel sites (22), data was collected as scheduled, during April–June 2014, using the algorithm set out in the ESP Protocol. The study was coordinated by the staff of the Republican AIDS Center. 22 data collection sites were organized to carry out the study, all meeting the criterion of accessibility for PWID, in the premises of trust points in the Oblast/City AIDS Centers.

Each sentinel site had a research team of experts from Oblast/City AIDS Centers and, where possible, NGO staff. The team consisted of research coordinator (organization of the study, data collection and data entry quality control), invitations manager (verification of invitations, obtaining informed consent, screening, issuing remunerations, encouraging to invite other respondents), interviewers (interviews, filling out questionnaires, pre-test counseling), and nurses (blood collection).

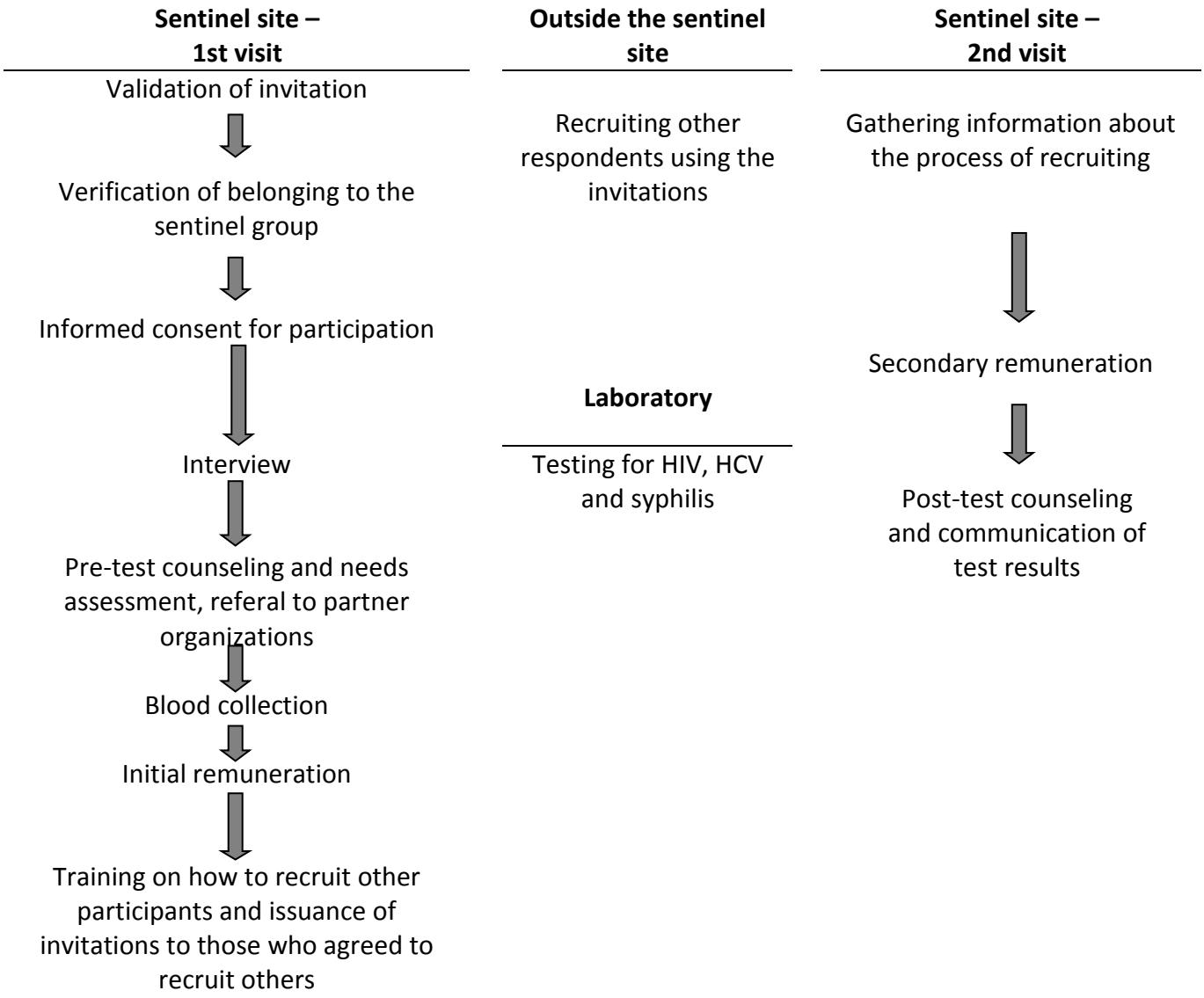
Prior to commencing the study, the team received training on how to organize and perform interviews with PWID, and instructions on how to recruit respondents.

A team of experts from the Republican AIDS Center and staff from Aktobe, Pavlodar, East Kazakhstan Oblast/City AIDS Centers and Semey city AIDS Center, who worked on RDS in 2013, visited 12 Oblast/City AIDS Centers (Astana city AIDS Center, Zhambyl Oblast AIDS Center, Atyrau Oblast AIDS

Center, Kyzylorda Oblast AIDS Center, Almaty city AIDS Center, Karaganda Oblast AIDS Center, East Kazakhstan Oblast AIDS Center, South Kazakhstan Oblast AIDS Center, North Kazakhstan Oblast AIDS Center, Akmola Oblast AIDS Center, Mangistau Oblast AIDS Center), to monitor and assess the quality of data collection.

During the monitoring visits, orientation workshops and trainings for specialists directly involved in the ESP were organized in all Oblast/City AIDS Centers, the total of 142 specialists were trained (doctors, epidemiologists, assistant epidemiologists, nurses, laboratory technicians). All Oblast/City AIDS Centers organized in-house trainings for epidemiologists and trust points staff on how to run formative study, focus groups, create reports and select primary respondents; worksite trainings for invitations managers on principles of respondent coding and procedures of paperwork management for RDS, including in cases of respondents being rejected, refuse to participate, or fail to meet the inclusion criteria; trainings and hands-on practice for interviewers on how to fill out the questionnaires, interview and counsel PWID.

Each respondent's path in the study followed the flow-chart below:



Duration of the field phase of the study: April–June 2014
Data was analyzed using RDS-Analyst software, version 0.5

3.7 Estimating the PWID population size

The Multiplier (Coefficient) Method

The primary method used to estimate the population size of PWID was the multiplier (coefficient) method. This method requires two independent data sources that use the same unit of measurement (defining the target group). One of these data sources is administrative/health statistics (reference), collected about the target group when they receive services or through other interactions. The second data source is findings of population studies among PWID, who are asked if they use services of the organizations, administrative/health statistics (reference) of which will be used to estimate the population size.

To estimate the population size, the reference numbers are divided by the proportion of respondents in the sample who reported use of the services in a certain period of time, and within a particular geographic area.

The estimation formula is S=N/P, where: S is the group size estimate

N is the number of representatives of this group who have used certain services

P is the proportion of study participants who reported the use the services.

Basic assumptions for the multiplier (coefficient) method are:

- representatives of the group from the two sources are similar, but independent (the use of services is not a decisive criterion for participation in the study);
- data sources overlap (study sample must include a random number of representatives of the target group that used the services);
- probability for a representative of the group to be included in ether data source is above zero;
- the study is random and covers both representatives of the group who use services of the reference sources, and representatives of the group who do not use the services, i.e. seeks to ensure representativeness of the study population;
- the administrative/health statistics is specific to the group, and not collected randomly.

Key requirements that must be met before applying the multiplier method:

- the administrative statistics must be obtained and evaluated in advance of the study;
- both data sources must use the same definitions of
  - units of measurement for the target groups;
  - geographical boundaries;
  - time frame;
- it must be possible to make clear distinction of the target group in the administrative/health statistics;
- there must be no double counting in the administrative/health statistics;
- data quality must be re-evaluated after the data collection;
- the more multipliers, the better.

Definition of PWID for inclusion in both studies was the following: person, who injected drugs at least once in the last 12 months. Same definition was used in selection of reference sources, however there is a potential for errors caused by the quality of both the statistics (reference) data and the sentinel IBBS data.

At the preparatory stage of sentinel IBBS, researchers defined geographic boundaries of each sentinel site where the data was to be collected.

The multiplier method uses direct questions related to the respondent's own experience (direct multiplier), as well as indirect questions related to their closest social network (indirect multiplier), utilizing the nomination technique.

The multiplier method, when applied with some caution, is the most economical and practical of all methods. To improve reliability of results, it is recommended to use the maximum possible number of multipliers.

Prior to finalization of the questionnaire, the sources of administrative statistics were evaluated for compliance with the assumptions and requirements of the multiplier method.

Table 5. Sources of data for population size estimate of PWID, multiplier method

Multiplier	Data sources
1. Number of PWID registered with the Narcology Service	**Statistics of the Narcology Service** Number of PWID 18 years old or over, registered with the Narcology Service of this sentinel site as of the end of the first six months of the ESP year (list). **ESP** Number of PWID in the sample, who said "yes" in response to the following questions: - Are you currently registered with a Narcology Dispensary for injecting drug use? - Are you currently registered with the Narcology Service in our city? (referring to the sentinel site where the interview is taking place).
2. Number of PWID contacts registered with the Narcology Service	**Statistics of the Narcology Service** Number of PWID 18 years old or over, registered with the Narcology Service of this sentinel site as of the end of the first six months of the ESP year (list). **ESP** PWID are asked the following questions: - How many contacts do you have, who inject drugs, aren't incarcerated and reside in our city (you know each other by name, seen or phoned each other in the last 12 months)? - How many of these contacts are registered with the Narcology Service of our city?
3. PWID newly registered with the Narcology Service	**Statistics of the Narcology Service** Number of PWID 18 years old or over, registered with the Narcology Service of this sentinel site in the calendar year preceding the ESP, and in the first half of the ESP year. **ESP** Number of PWID in the sample, who reported to had been registered with the Narcology Service in the last or current year, in response to the following question: What year were you first registered with the Narcology Service?
4. Coverage of PWID with needle and syringe exchange programs	**Statistics of Oblast/City AIDS Centers** Number of PWID 18 years old or over, who received free syringes and needles in this sentinel site in the 12 months preceding the field stage of the ESP (clients of stationary and mobile trust points, and of outreach workers, both from the Oblast/City AIDS Centers and NGOs working with PWID). **ESP** Number of PWID in the sample, who said "yes" in response to the following questions: - Have you received free syringes and needles in the last 12 months? - Have you received free syringes and needles in our city in the past 12 months? (referring to the sentinel site where the interview is taking place).

5. Number of PWID who visited a friendly clinic	**Statistics of Oblast/City AIDS Centers** Number of PWID 18 years old or over, who visited a friendly clinic at an Oblast/City AIDS Center within this sentinel site in the 12 months preceding the ESP field stage (NOT the total number of visits to friendly clinics). **ESP** Number of PWID in the sample, who said "yes" in response to the following question: - Have you visited a free dermatologist or gynecologist at an AIDS Center's friendly clinic in our city in the last 12 months? (referring to the sentinel site where the interview is taking place).
6. PWID tested for HIV by Narcology Service	**Statistics of Oblast/City AIDS Centers** Number of HIV tests under code 102 (Form 4) in this sentinel site in the 12 months preceding the ESP field stage. **ESP** Number of PWID in the sample, who reported to have had an HIV test by referral of a narcology doctor in the last 12 months. Derived from answers to the question: - How many times have you been tested for HIV by giving venous blood at a narcology doctor (or by their referral) in our city in the last 12 months? (referring to the sentinel site where the interview is taking place). Given the possibility of one person having had multiple tests over the period, researches must calculate a ratio of retests, which is the arithmetic mean of this variable among all respondents.
7. PWID tested for HIV by rapid testing	**Statistics of Oblast/City AIDS Centers** Number of PWID tested for HIV by rapid testing (M&E data, including all sources of data on HIV rapid testing of PWID) in this sentinel site in the 12 months preceding the ESP field stage. **ESP** Number of PWID in the sample, who reported being rapid tested for HIV in the last 12 months. Derived from answers to the question: - How many times in the last 12 months have you had a free rapid test for HIV in our city (finger blood test with results quickly reported to you in a friendly clinic or trust point, or by a visiting health worker)? Given the possibility of one person having had multiple tests over the period, researches must calculate a ratio of retests, which is the arithmetic mean of this variable among all respondents.

176 key informants (representatives of Narcology Service, law enforcement agencies, non-governmental organizations, specialists of AIDS service and health care organizations working with the target group, outreach workers and selected PWID deemed the most knowledgeable and respected in their environment) were surveyed in 22 sentinel sites.

25 focus groups (249 participants, 4 to 29 in one focus group) were held in sentinel sites; there was only one site where a focus group could not be organized, and therefore in-depth interviews were conducted instead with representatives of TPs, FOs, and NGOs (Atyrau).

General information about the PWID population (study of the target group and finding its specifics).

As highlighted by participants of the formative study, people who use drugs are still hard to reach, and stigma and discrimination towards PWID persists despite the ongoing informational and educational work with the general population. Health workers in general health facilities still show negative attitude towards PWID, and only staff in Oblast/City AIDS Centers are tolerant and open to working with this group. Due to recent changes in the Law on administrative offences, police raids to arrest PWID and bring them to administrative liability for possession of drugs became more frequent in some areas of the country. Thanks to countrywide implementation of multiple-year programs of drug abuse harm reduction, safe behavior and level of knowledge among PWID had improved.

As to new services for PWID, there were none introduced recently, and therefore existing services were named: needle and syringe exchange, free distribution of condoms and IEC materials, methadone therapy, social support, health services, specialist consultations.

There have been reports of PWID using tetralgin and tropicamide, and mixtures of heroin with other psychoactive substances, due to the low quality and high price of heroin.

The most common drug

In almost all sites, PWID use heroin; in 7 sites they use heroin only (Balkhash, Zhezkazgan, Kostanay, Petropavlovsk, Taraz, Temirtau, Shymkent), in 6 sites (Aktau, Astana, Almaty, Atyrau, Karaganda, Kyzylorda, Taldykorgan) heroin is used as the main drug, but can be frequently mixed with croc/ desomorphine, khanka and other drugs. Often a dose of heroin is mixed wth Dimedrol (diphenylhydramine) and tropicamide as boosters. Poppy (seeds) is used in Aksu, Aktobe, Kokshetau, Pavlodar, Semipalatinsk, Uralsk, Ust-Kamenogorsk, and Ekibastuz, mainly because of the poor quality heroin and the fear of being arrested by police for possession. Heroin can be used either individually or in small groups of 2–3 people; the method of cooking it from food poppy seed involves group use (1 kg of food poppy seeds produces 3–4 doses), sharing the equipment or distributing the content of a bigger common syringe into smaller volume syringes. The growth in the use of food poppy seed may be associated with its lower cost as compared to heroin, and availability of ingredients in the market and in pharmacies.

Data collected and produced for RK sites (multiplier method)

Multiplier 1: Number of PWID registered with the Narcology Service

N – Number of PWID 18 years old or over, registered with the Narcology Service of this sentinel site as of July 30, 2014.
Data source: Narcology Service. Collected data corresponded to the definition of study population by the criteria of age, sex, time and geography.
P – Proportion of PWID in the sample, who said "yes" in response to **question 22a** 'Are you currently registered with the Narcology Service in our city?'

Table 6. Multiplier 1: Number of PWID registered with the Narcology Service

##	ESP sites	Reference for multiplier 1 - Number of PWID 18 years old or over, registered with the Narcology Service of this sentinel site as of July 30, 2014	ESP sample	Number of PWID in the sample, who said "yes" in response to question 22a 'Are you currently registered with the Narcology Service in our city?'	Proportion of PWID in the sample, who said "yes" in response to question 22a 'Are you currently registered with the Narcology Service in our city?' (in the population)	Group size estimate
1	**Aksu**	129	100	17	0.1092	**1,200**
2	**Aktau**	591	152	63	0.3736	**1,600**
3	**Aktobe**	968	211	130	0.5719	**1,700**
4	**Almaty**	2,729	532	215	0.4134	**6,600**
5	**Astana**	1,684	198	80	0.3446	**4,900**
6	**Atyrau**	216	100	30	0.2777	**800**
7	**Balkhash**	133	101	20	0.219	**600**
8	**Zhezkazgan**	382	100	60	0.5769	**700**
9	**Karaganda**	1,145	210	76	0.3437	**3,300**
10	**Kokshetau**	287	100	**13**	0.1147	**2,500**
11	**Kostanay**	1,463	300	115	0.3553	**4,100**
12	**Kyzylorda**	391	126	72	0.4329	**900**
13	**Pavlodar**	1,348	400	218	0.5142	**2,700**
14	**Petropavlovsk**	531	211	92	0.381	**1,400**
15	**Semey**	456	150	76	0.4862	**900**
16	**Taldykorgan**	273	100	39	0.3637	**800**
17	**Taraz**	679	210	61	0.2654	**2,600**
18	**Temirtau**	577	247	91	0.3006	**1,900**

19	**Uralsk**	651	211	84	0.3014	**2,200**
20	**Ust-Kamenogorsk**	874	273	134	0.4271	**2,000**
21	**Shymkent**	2,118	281	87	0.2473	**8,600**
22	**Ekibastuz**	329	115	48	0.3877	**900**

Multiplier 2: Number of PWID contacts registered with the Narcology Service

N – Number of PWID 18 years old or over, registered with the Narcology Service of this sentinel site (within the boundaries specified in Table 1) as of the end of the first six months of the ESP year. Data source: Narcology Service. Collected data corresponded to the definition of study population by the criteria of age, sex, time and geography.

P – Proportion of 'contacts', registered with the Narcology Service.

To calculate this proportion, a new variable is introduced into the database – proportion of 'contacts', registered with the Narcology Service: total Number of 'contacts' registered with the Narcology Service (response to **question 26**), divided by the total number of PWID contacts (response to **question 25**).

Table 7. Multiplier 2: Number of PWID contacts registered with the Narcology Service

ESP sites	Reference for multiplier 2 – Number of PWID 18 years old or over, registered with the Narcology Service of this sentinel site as of July 30, 2014	ESP sample	Number of contacts, who inject drugs, aren't incarcerated and reside in our city (question 25 of the ESP questionnaire)	Number of PWID contacts registered with the Narcology Service (question 26 of the ESP questionnaire)	Proportion of contacts, registered with the Narcology Service	Group size estimate
Aksu	129	100	1,179	338	0.2867	**500**
Aktau	591	152	2,444	798	0.3265	**1,800**
Aktobe	968	211	4,219	2,307	0.5468	**1,770**
Almaty	2,729	532	10,503	4,979	0.4741	**5,800**
Astana	1,684	198	3,980	1,536	0.3859	**4,400**
Atyrau	216	100	986	335	0.3398	**600**
Balkhash	133	101	653	118	0.1807	**700**
Zhezkazgan	382	100	2,708	1,192	0.4402	**900**
Karaganda	1,145	210	2,453	857	0.3494	**3,300**
Kokshetau	287	100	1,405	108	0.0769	**3,700**
Kostanay	1,463	300	4,527	1,915	0.4230	**3,500**
Kyzylorda	391	126	3,152	772	0.2449	**1,600**
Pavlodar	1,348	400	10,595	6,185	0.5838	**2,300**

Petropavlovsk	531	211	3,035	1,213	0.3997	**1,300**
Semey	456	150	3,675	1,737	0.4727	**1,000**
Taldykorgan	273	100	1,221	413	0.3382	**800**
Taraz	679	210	2,324	181	0.0779	**8,000**
Temirtau	577	247	1,727	700	0.4053	**1,400**
Uralsk	651	211	2,861	1,022	0.3572	**1,800**
Ust-Kamenogorsk	874	273	5,057	2,247	0.4443	**2,000**
Shymkent	2,118	281	2,616	667	0.2550	**8,300**
Ekibastuz	329	115	2,095	864	0.4124	**800**

Multiplier 3: PWID newly registered with the Narcology Service

Data sources:

N – Number of PWID 18 years old or over, registered with the Narcology Service of this sentinel site in the calendar year preceding the ESP, and in the first half of the ESP year. Data source: Narcology Service.

P – Proportion of PWID in the sample, who reported to had been registered with the Narcology Service of this sentinel site (answered "yes" to **question 22a**) **either in 2013, or in 2014** (**question 23** 'What year were you first registered with the Narcology Service?').

Table 8. Multiplier 3: PWID newly registered with the Narcology Service

ESP sites	Reference for multiplier 3 – Number of PWID 18 years old or over, registered with the Narcology Service of this sentinel site in the calendar year preceding the ESP, and in the first half of the ESP year. Data source: Narcology Service	ESP sample	Number of PWID, who answered "yes" to question (question 23 'What year were you first registered with the Narcology Service?')	Proportion of PWID in the sample, who reported to had been registered with the Narcology Service of this sentinel site (answered "yes" to question 22a) either in 2013, or in 2014 (question 23 'What year were you first registered with the Narcology Service?') (in the population)	Group size estimate
Aksu	10	100	1	0.0037	**2,700**
Aktau	23	152	6	0.0496	**500**
Aktobe	51	211	7	0.0188	**2,700**
Almaty	139	532	5	0.0141	**9,900**
Astana	42	198	8	0.0326	**1,300**
Atyrau	13	100	0	0	**0**
Balkhash	4	101		0.0473	**85**

Zhezkazgan	31	100	3	0.0317	**1,000**
Karaganda	42	210	8	0.0378	**1,100**
Kokshetau	41	100	**0**	0.0000	**0**
Kostanay	161	300	10	**0.0221**	**7,300**
Kyzylorda	33	126	0	0	**0**
Pavlodar	367	400	17	0.0559	**6,600**
Petropavlovsk	138	211	9	0.0417	**3,300**
Semey	134	150	8	0.0804	**1,700**
Taldykorgan	55	100	4	0.0657	**800**
Taraz	211	210	2	0.0164	**13,000**
Temirtau	54	247	2	0.0166	**3,300**
Uralsk	54	211	5	0.0185	**2,900**
Ust-Kamenogorsk	504	273	6	0.0168	**30,000**
Shymkent	23	281	1	0.0050	**4,600**
Ekibastuz	65	115	10	0.1286	**500**

Multiplier 4: Coverage of PWID with needle and syringe exchange programs

Data sources:

N – Number of PWID 18 years old or over, who received free syringes and needles in this sentinel site in the 12 months preceding the field stage of the ESP (clients of stationary and mobile trust points, and of outreach workers, both from the Oblast/City AIDS Centers and NGOs working with PWID). Data source: Oblast/City AIDS Centers.

P – Proportion of PWID in the sample, who said "yes" in response to **question 51a** 'Have you received free syringes and needles in our city in the past 12 months?'

Table 9. Multiplier 4: Coverage of PWID with needle and syringe exchange programs

ESP sites	Number of PWID 18 years old or over, who received free syringes and needles in this sentinel site in the 12 months preceding the field stage of the ESP (clients of stationary and mobile trust points, and of outreach workers, both from the Oblast/City AIDS Centers and NGOs working with PWID)	ESP sample	Number of PWID, who said "yes" in response to question 51a 'Have you received free syringes and needles in our city in the past 12 months'	Proportion of PWID in the IBBS sample, who said "yes" in response to question 51a 'Have you received free syringes and needles in our city over the past 12 months?'(in the population)	Group size estimate
Aksu	532	100	32	0.6211	**900**
Aktau	1,162	152	63	0.4075	**2,900**

Aktobe	1,970	211	100	0.4324	**4,600**
Almaty	7,273	532	371	0.668	**11,000**
Astana	2,771	198	92	0.4667	**6,000**
Atyrau	527	100	38	0.3479	**1,500**
Balkhash	480	101	44	*0.3899*	**1,200**
Zhezkazgan	620	100	39	0.3588	**1,700**
Karaganda	2,256	210	104	0.4382	**5,100**
Kokshetau	565	100	34	0.6589	**900**
Kostanay	1,589	300	142	0.4873	**3,300**
Kyzylorda	1,795	126	74	0.531	**3,400**
Pavlodar	3,250	400	140	0.3081	**10,500**
Petropavlovsk	1,422	211	69	0.2399	**6,000**
Semey	1,219	150	79	0.4843	**2,500**
Taldykorgan	627	100	24	0.2582	**2,400**
Taraz	2,246	210	88	0.4323	**5,200**
Temirtau	2,590	247	128	0.4889	**5,300**
Uralsk	3,285	211	147	0.6466	**5,100**
Ust-Kamenogorsk	3,358	273	130	0.3787	**8,900**
Shymkent	6,651	281	159	0.4536	**8,600**
Ekibastuz	860	115	75	0.5686	**1,500**

Multiplier 5: Number of PWID who visited a friendly clinic

N – Number of PWID 18 years old or over, who visited an Oblast/City AIDS Center within this sentinel site (within the boundaries specified in Table 1) in the 12 months preceding the ESP field stage. Data source: Oblast Aids Centers. Collected data corresponded to the definition of study population by the criteria of age, sex, time and geography; double counting of PWID could not be ruled out.
P – Proportion of PWID in the sample, who said "yes" in response to question 42a 'Have you visited a free dermatologist or gynecologist at an AIDS Center's friendly clinic in our city in the last 12 months?'

Table 10. Multiplier 5: Number of PWID who visited a friendly clinic

ESP sites	Reference for multiplier 5 – Number of PWID 18 years old or over, who visited an Oblast/City AIDS Center within this sentinel site (within the	ESP sample	Number of PWID, who said "yes" in response to question 42a 'Have you visited a free dermatologist or gynecologist at an AIDS Center's	Proportion of PWID in the sample, who said "yes" in response to question 42a 'Have you visited a free dermatologist or gynecologist at an	Group size estimate

	boundaries specified in Table 1) in the 12 months preceding the ESP field stage		friendly clinic in our city in the last 12 months?'	AIDS Center's friendly clinic in our city in the last 12 months?' (in the population)	
Aksu	143	100	4	0.01125	**12,700**
Aktau	225	152	10	0.06892	**3,300**
Aktobe	622	211	6	0.01654	**38,000**
Almaty	1,283	532	56	0.1142	**11,200**
Astana	780	198	26	0.1366	**5,700**
Atyrau	86	100	6	0.06726	**1,300**
Balkhash	0	101	0	0	**0**
Zhezkazgan	193	100	10	0.08594	**2,200**
Karaganda	210	210	13	0.05018	**4,200**
Kokshetau	241	100	10	0.0832	**2,900**
Kostanay	298	300	42	0.1551	**1,900**
Kyzylorda	949	126	36	0.2959	**3,200**
Pavlodar	834	400	92	0.20844	**4,000**
Petropavlovsk	372	211	23	0.08712	**4,300**
Semey	202	150	27	0.123	**1,600**
Taldykorgan	627	100	24	0.01353	**46,300**
Taraz	292	210	10	0.0471	**6,200**
Temirtau	416	247	29	0.09688	**4,300**
Uralsk	361	211	31	0.163195	**2,200**
Ust-Kamenogorsk	462	273	25	0.06019	**7,700**
Shymkent	1,181	281	10	0.0236	**50,042**
Ekibastuz	356	115	34	0.1954	**1,800**

Multiplier 6: PWID tested for HIV by Narcology Service

N – Number of HIV tests under code 102 by referral from Narcology Dispensary (based on Statistical Reporting Form No 4) in this sentinel site (within the boundaries specified in Table 1) in the 12 months preceding the ESP field stage. Data source: Oblast Aids Centers. Collected data corresponded to the definition of study population by the criteria of age, sex, time and geography; counting of non-PWID tests could not be ruled out, so as the fact that not all PWID get tested under code 102 every year (even those registered with the Narcology Service).

P – Proportion of PWID in the sample, who reported to have had an HIV test by referral of a narcology doctor in the last 12 months. The data was obtained by asking respondents **question 56** 'How many times have you been tested for HIV by giving venous blood at a narcology doctor (or by their referral) in our city in the last 12 months?'

Table 11. Multiplier 6: PWID tested for HIV by Narcology Service

ESP sites	Reference for multiplier 6 – Number of HIV tests under code 102 by referral from Narcology Dispensary (based on Statistical Reporting Form No 4) in this sentinel site in the 12 months preceding the ESP field stage	ESP sample	Number of PWID in the sample, who reported to have had an HIV test at, or by referral of, a narcology doctor in the last 12 months. The data was obtained by asking respondents question 56 'How many times have you been tested for HIV by giving venous blood at a narcology doctor (or by their referral) in our city in the last 12 months?'		Proportion of PWID in the sample, who reported to have had an HIV test at, or by referral of, a narcology doctor in the last 12 months. The data was obtained by asking respondents question 56 'How many times have you been tested for HIV by giving venous blood at a narcology doctor (or by their referral) in our city in the last 12 months?'	Adjustment factor	Group size estimate
Aksu	46	100	13	23	0.0766	1.7692	**300**
Aktau	285	152	19	27	0.0895	1.4211	**2,200**
Aktobe	1,491	211	81	135	0.3629	1.6667	**2,500**
Almaty	1,435	532	34	64	0.0606	1.8824	**12,600**
Astana	492	198	61	122	0.2613	2.0000	**900**
Atyrau	110	100	6	12	0.0637	2.0000	**900**
Balkhash	117	101	7	12	0.0822	1.7143	**800**
Zhezkazgan	158	100	53	58	0.5614	1.0943	**300**
Karaganda	446	210	41	71	0.1899	1.7317	**1,400**
Kokshetau	540	100	9	16	0.0694	1.7778	**4,400**
Kostanay	528	300	60	81	0.1770	1.3500	**2,200**
Kyzylorda	259	126	15	15	0.0940	1.0000	**2,800**
Pavlodar	1,225	400	143	252	0.3276	1.7622	**2,100**
Petropavlovsk	566	211	64	89	0.2627	1.3906	**1,500**
Semey	632	150	46	83	0.2998	1.8043	**1,200**
Taldykorgan	120	100	16	18	0.1049	1.1250	**1,000**
Taraz	1,609	210	34	46	0.1436	1.3529	**8,300**
Temirtau	175	247	32	40	0.0904	1.2500	**1,500**
Uralsk	256	211	67	120	0.2552	1.7910	**600**

Ust-Kamenogorsk	1,318	273	77	157	0.2179	2.0390	**3,000**
Shymkent	1,735	281	75	94	0.2112	1.2533	**6,600**
Ekibastuz	412	115	41	84	0.3250	2.0488	**600**

Multiplier 7: PWID tested for HIV by rapid testing

N – Number of PWID tested for HIV by rapid testing (M&E data, including all sources of data on HIV rapid testing of PWID) in this sentinel site (within the boundaries specified in Table 1) in the 12 months preceding the ESP field stage. Data source: Oblast Aids Centers. Collected data corresponded to the definition of study population by the criteria of age, sex, time and geography; counting of non-PWID rapid tests could not be ruled out.
P – Proportion of PWID in the sample, who reported being rapid tested for HIV in the last 12 months. Data was obtained by asking respondents **question 57** 'How many times in the last 12 months have you had a free rapid test for HIV in our city (finger blood test with results quickly reported to you in a friendly clinic or trust point, or by a visiting health worker)?'

Table 12. Multiplier 7: PWID tested for HIV by rapid testing

ESP sites	Number of PWID tested for HIV by rapid testing (M&E data, including all sources of data on HIV rapid testing of PWID) in this sentinel site (within the boundaries specified in Table 1) in the 12 months preceding the ESP field stage	ESP sample	Number of PWID in the sample, who reported being rapid tested for HIV in the last 12 months. Data was obtained by asking respondents question 57 'How many times in the last 12 months have you had a free rapid test for HIV in our city (finger blood test with results quickly reported to you in a friendly clinic or trust point, or by a visiting health worker)?' (in the population)		Proportion of PWID in the sample, who reported being rapid tested for HIV in the last 12 months. Data was obtained by asking respondents question 57 'How many times in the last 12 months have you had a free rapid test for HIV in our city (finger blood test with results quickly reported to you in a friendly clinic or trust point, or by a visiting health worker)?'	Adjustment factor	Group size estimate
Aksu	570	100	7	9	0.05564	1.286	**8,000**
Aktau	371	152	29	38	0.201	1.310	**1,400**
Aktobe	2,464	211	68	98	0.267	1.441	**6,400**
Almaty	1,007	532	40	69	0.0711	1.725	**8,200**
Astana	2,591	198	34	48	0.1532	1.412	**12,000**
Atyrau	398	100	16	51	0.1276	3.188	**1,000**
Balkhash	79	101	18	26	0.195	1.444	**300**
Zhezkazgan	115	100	37	58	0.3489	1.568	**200**
Karaganda	820	210	29	38	0.1211	1.310	**5,200**
Kokshetau	537	100	26	57	0.221	2.192	**1,100**

Kostanay	1,661	300	126	193	0.4245	1.532	**2,600**
Kyzylorda	1,307	126	52	55	0.3746	1.058	**3,300**
Pavlodar	2,000	400	68	86	0.1604	1.265	**9,900**
Petropavlovsk	901	211	51	52	0.1702	1.020	**5,200**
Semey	464	150	50	94	0.2818	1.880	**900**
Taldykorgan	106	100	19	24	0.1336	1.263	**600**
Taraz	901	210	33	73	0.1491	2.212	**2,700**
Temirtau	446	247	41	50	0.1268	1.220	**2,900**
Uralsk	1,084	211	82	184	0.3935	2.244	**1,200**
Ust-Kamenogorsk	1,029	273	49	56	0.1285	1.143	**7,000**
Shymkent	2,464	281	37	43	0.1188	1.162	**18,000**
Ekibastuz	794	115	56	70	0.4029	1.250	**1,600**

Note: The reference (numerator) was based on the actual administrative/health statistics.
Multipliers 1–3 are based on official data from Oblast/City Narcology Dispensaries collected as of the end of the first half of 2014; multipliers 4, 5, and 7 are based on data from M&E reports, AIDS Service reports, and reports of prevention programs for PWID delivered in the 12 months preceding the ESP. Multiplier 6 is based on AIDS Service's Statistical Reporting Form 4, code 102 (number of PWID tested for HIV), collected for 12 months preceding the ESP field stage. The denominator was based on the 2014 ESP data, and questions from a questionnaire similar to the reference (concerning registration with a Service, or any care received).

Capture-recapture without direct contact

The study team used two independent databases, one from the Narcology Service and one from the Friendly clinics of Oblast/City AIDS Centers, which both use the same unique identification code (UIC) to register PWID.

Key steps to estimate the PWID population size using the capture-recapture method are:

1. For each sentinel site, make a UIC-based list of PWID who visited a friendly clinic at either an Oblast or City AIDS Center during a specified period of time, and count their total number.
2. For each sentinel site, make a UIC-based list of PWID registered with the Narcology Service, as of the last date of the same period of time, and count their total number.
3. Obtain primary data:
   - number of PWID UICs, listed only among those who visited a friendly clinic at an Oblast or City AIDS Center, but not registered with the Narcology Service;
   - number of PWID UICs, listed only as registered with the Narcology Service, but not among those who visited a friendly clinic at an AIDS Center;
   - number of PWID UICs that appear in both lists (visited a friendly clinic at an AIDS Center, and registered with the Narcology Service within the sentinel site – the capture-recapture).
4. Estimate the PWID population size in the sentinel site using the formula.

Data used to make the lists must be accurate and comparable. When making lists, it is important to account for accidental errors and bias, and minimize them.

Estimating the PWID population size

Calculate the **d** value using a 4-cell matrix with the formula:

'fully known' – those appearing in both lists: **a**	**'partly known'** – those appearing in the narcology list, but not in the friendly clinic list: **c**
'partly known' – those appearing in the friendly clinic list, but not in the narcology list: **b**	**'not known' –** those who do not appear neither in the narcology, nor in the friendly clinic list: **d =bc/a**

The capture-recapture method for PWID population size estimation uses summing of the values from the matrix: **a+b+c+d**, with rounding of the result (to 100).

Data quality:

1. Errors:

- varying age criteria for inclusion in the lists/databases;
- varying time criteria for inclusion in the lists/databases;
- varying geographic criteria for inclusion in the lists/databases.

2. Discrepancies between the lists/databases and the actual number of PWID who sought the services may lead to distortion of the estimate:

- overestimation (if the lists/databases include not only PWID, but also other populations);
- underestimation (if the lists/databases include not all PWID who sought the services).

3. Other errors, which occur in course of data preparation, entry and processing.

In order to prevent and eliminate these errors, the study team included doctors from FO Oblast/City AIDS Centers and representatives of Narcology Service, who helped to ensure data quality, timely detection and elimination of obvious well-known confounders, and to obtain more information

about prevention services provided to PWID, as well as about criteria for registration and de-registration from Narcology Registries.

The method of capture-recapture without direct contact was supposed to be used for population size estimate of PWID in all Oblast/City AIDS Centers, however, 15 sites didn't have two standalone databases, which would use the same unique identification code.

Therefore, the capture-recapture method was applied only in 7 sites (Pavlodar, Aksu, Ekibastuz, Karaganda, Zhezkazgan, Temirtau, Semey), which used the lists of PWID registered with the Narcology Service for injecting drug use, and patient records from Friendly clinics, where patient identification was coded as follows: first letters of the last and first name, date, month, and the last 2 digits of the year of birth, gender in digital equivalent ('1' for male, '2' for female), in a numbered list.

Using the Excel function of sorting, the resulting "Friendly clinic" list was arranged in alphabetical order (sorted by the second column, that is, by the codes).

Table 6 shows population size estimate of PWID, obtained by the capture-recapture method.

Table 13. Population size estimate of PWID, using the method of capture-recapture without direct contact

##	Site	Population size estimate of PWID
1	Karaganda	3,900
2	Temirtau	3,100
3	Zhezkazgan	2,800
4	Pavlodar	6,400
5	Aksu	2,600
6	Ekibastuz	2,200
7	Semey	1,800

Population size estimate of PWID, summary of results, by sentinel site

Table 14. Population size estimate of PWID, summary of results, by sentinel site

№	ESP sites	Multipliers							Capture-recapture method	Population size estimate per sentinel site (median of valid values)
		1. Number of PWID registered with the Narcology Service	2. Number of PWID contacts registered with the Narcology Service	3.PWID newly registered with the Narcology Service	4. Coverage of PWID with needle and syringe exchange programs	5. Number of PWID who visited a friendly clinic	6. PWID tested for HIV by Narcology Service	7. PWID tested for HIV by rapid testing		
1	Aksu	1,200	500	2,700	900	12,700	300	8,000	2,600	1,900
2	Aktau	1,600	1,800	500	2,900	3,300	2,200	1,400	-	2,900
3	Aktobe	1,700	1,770	2,700	4,600	38,000	2,500	6,400	-	4,600
4	Almaty	6,600	5,800	9,900	11,000	11,200	12,600	8,200	-	11,100
5	Astana	4,900	4,400	1,300	6,000	5,700	900	12,000	-	5,300
6	Atyrau	800	600	0	1,500	1,300	900	1,000	-	1,300
7	Balkhash	600	700	85	1,200	0	800	300	-	1,000
8	Zhezkazgan	700	900	1,000	1,700	2,200	300	200	2,800	2,000
9	Karaganda	3,300	3,300	1,100	5,100	4,200	1,400	5,200	3,900	5,200
10	Kokshetau	2,500	3,700	0	900	2,900	4,400	1,100	-	1,000
11	Kostanay	4,100	3,500	7,300	3,300	1,900	2,200	2,600	-	3,800
12	Kyzylorda	900	1,600	0	3,400	3,200	2,800	3,300		3,300
13	Pavlodar	2,700	2,300	6,600	10,500	4,000	2,100	9,900	6,400	6,600
14	Petropavlovsk	1,400	1,300	3,300	6,000	4,300	1,500	5,200	-	3,800
15	Semey	900	1,000	1,700	2,500	1,600	1,200	900	1,800	2,500
16	Taldykorgan	800	800	800	2,400	46,300	1,000	600	-	1,700
17	Taraz	2,600	8,000	13,000	5,200	6,200	8,300	2,700	-	5,700
18	Temirtau	1,900	1,400	3,300	5,300	4,300	1,500	2,900	3,100	4,800
19	Uralsk	2,200	1,800	2,900	5,100	2,200	600	1,200	-	5,100
20	Ust-Kamenogorsk	2,000	2,000	30,000	8,900	7,700	3,000	7,000	-	7,700
21	Shymkent	8,600	8,300	4,600	14,700	50,042	6,600	18,000	-	16,400
22	Ekibastuz	900	800	500	1,500	1,800	600	1,600	2,200	1,700
	Total for sentinel sites									99,400

Analysis and interpretation of results

National workshop on Size Estimation Methodology of Most-At-Risk Populations – PWID, SW, MSM, held in Almaty on 24-26 February 2015 with participation of Oblast/City AIDS Centers' epidemiology and prevention departments management, discussed methodology for estimation of PWID population size, the importance of ensuring the quality of formative research, as well as analysis and interpretation of results, extrapolated to the entire oblast. It was recommended to organize a working group meeting on PWID population size estimation upon completion of the data collection stage.

The following was presented in the working group meeting:

- strengths and weaknesses of the methods used;
- results of previous estimates and lessons learned (in this and other sentinel sites);
- compliance with methodology and its impact on results;
- potential distortion of the results, evaluation of accuracy and reliability.

Obvious underestimated or overestimated results were excluded:

- results were considered underestimated, if the estimate value was close to the administrative statistics (reference);
- overestimation of resulted was determined by expert assessment (experts from the Republican AIDS Center and representatives of international organizations).

All remaining values, which the working group recognized as credible, were arranged in increasing order. Distribution of values obtained using different methods was arranged from the lowest to the highest. None of these results can be considered completely accurate and reliable, due to the influence of various confounders. The ultimate population size estimate of PWID was the median of the distribution, which methodologically is more correct than the arithmetic mean.

Extrapolation of results

Extrapolation of data obtained in each of the sentinel sites was used to estimate PWID population size in each oblast, region and in the country as a whole. Extrapolation took into account the existing ESP data and health statistics (reference), which imply dependence of injecting drug use prevalence from age and gender structure of general population, as well as from the place of residence (urban or rural area).

During this ESP round, the age and gender structure of the PWID sample was proportionally extrapolated to the estimated PWID population in the sentinel site. The resulting size estimates of these groups in the sentinel site were then used to estimate prevalence of injecting drug use in each group, by dividing the estimated population size of each group by the number of the sentinel site's general population, aged 18 and over up to the oldest age in the PWID sample.

Prevalence of injecting drug use in the above groups was then extrapolated to the same groups of general population outside the sentinel site.

Prevalence ratios of injecting drug use in different age groups, in men and women, in urban and rural populations, had to be calculated for PWID registered with the Narcology Service within the sentinel site, in cities outside the sentinel site, and in rural areas.

This extrapolation method assumes equal probability of being registered with the Narcology Service for all PWID residing in the oblast. Therefore, the ratio of PWID registered with the Narcology Service was used as the basis for adjusting the prevalence of injecting drug use outside the sentinel site.

Table 15. Population size estimate of PWID in Akmola Oblast

PSE for the sentinel site	**1,000**					
Group	**General population size in cities NOT covered with ESP**	**Proportion for PSE**	**PSE in cities NOT covered with ESP, unadjusted**	**General population size in villages NOT covered with ESP**	**PSE PWID in villages NOT covered with ESP, unadjusted**	**Total population of the sentinel site**
Men	28,838	0.02000	577	124,432	2,489	39,237
Women	26,271	0.00540	142	102,208	552	39,745
Age 18–29	20,817	0.00780	162	87,811	685	34,658
Age 30–39	17,483	0.02300	402	65,479	1,506	21,379
Age 40+	16,809	0.01040	175	73,350	763	22,945
Group	**PWID registered with the Narcology Service within the sentinel site**	**PWID registered with the Narcology Service in cities outside the sentinel site**	**PWID registered with the Narcology Service in villages outside the sentinel site**	**Proportion for PSE in cities NOT covered with ESP**	**Proportion for PSE in villages NOT covered with ESP**	
Men	265	193	70	0.73	0.26	
Women	22	22	2	1.00	0.09	
Age 18–29	27	45	8	1.67	0.30	
Age 30–39	153	115	35	0.75	0.23	
Age 40+	107	55	29	0.51	0.27	
Group	**Proportion based on ESP**	**PSE PWID in the sentinel site**	**PSE PWID in cities NOT covered with ESP (adjusted)**	**PSE PWID in villages NOT covered with ESP (adjusted)**		
Men	0.7844	784	420	657		
Women	0.2156	216	142	50		
Age 18–29	0.2710	271	270	203		
Age 30–39	0.4910	491	302	345		
Age 40+	0.2380	238	90	207		
Total			**562**	**707**		
			662	**755**		
Mean			**612**	**731**		
PSE for the Oblast	**2,343**	**2,300**				

Table 16. Population size estimate of PWID in Aktobe Oblast

PSE for the sentinel site	**4,600**					
Group	**General population size in cities NOT covered with ESP**	**Proportion for PSE**	**PSE in cities NOT covered with ESP, unadjusted**	**General population size in villages NOT covered with ESP**	**PSE PWID in villages NOT covered with ESP, unadjusted**	**Total population of the sentinel site**
Men	31,215	0.03570	1,114	69,177	2,470	114,986
Women	31,590	0.00380	120	65,724	250	129,918
Age 18–29	25,391	0.00350	89	56,706	198	108,626
Age 30–39	16,723	0.04110	687	35,567	1,462	65,161
Age 40+	20,691	0.02160	447	42,628	921	71,117
Group	**PWID registered with the Narcology Service within the sentinel site**	**PWID registered with the Narcology Service in cities outside the sentinel site**	**PWID registered with the Narcology Service in villages outside the sentinel site**	**Proportion for PSE in cities NOT covered with ESP**	**Proportion for PSE in villages NOT covered with ESP**	
Men	853	65	9	0.08	0.01	
Women	115	13	1	0.11	0.01	
Age 18–29	86	9	1	0.10	0.01	
Age 30–39	564	45	8	0.08	0.01	
Age 40+	318	24	1	0.08	0.00	
Group	**Proportion based on ESP**	**PSE PWID in the sentinel site**	**PSE PWID in cities NOT covered with ESP (adjusted)**	**PSE PWID in villages NOT covered with ESP (adjusted)**		
Men	0.8930	4108	85	26		
Women	0.1070	492	14	2		
Age 18–29	0.0836	385	9	2		
Age 30–39	0.5825	2,680	55	21		
Age 40+	0.3339	1,536	34	3		
Total			**98**	**28**		
			98	**26**		
Mean			**98**	**27**		
PSE for the Oblast	**4,725**	**4,700**				

Table 17. Population size estimate of PWID in Almaty Oblast

PSE for the sentinel site	**1,700**					
Group	**General population size in cities NOT covered with ESP**	**Proportion for PSE**	**PSE in cities NOT covered with ESP, unadjusted**	**General population size in villages NOT covered with ESP**	**PSE PWID in villages NOT covered with ESP, unadjusted**	**Total population of the sentinel site**
Men	73,667	0.03350	2,468	505,273	16,927	40,244
Women	56,079	0.01040	583	302,683	3,148	33,866
Age 18–29	58,993	0.01750	1,032	328,268	5,745	33,742
Age 30–39	42,829	0.03280	1,405	224,855	7,375	23,278
Age 40+	27,924	0.02020	564	254,833	5,148	17,090
Group	**PWID registered with the Narcology Service within the sentinel site**	**PWID registered with the Narcology Service in cities outside the sentinel site**	**PWID registered with the Narcology Service in villages outside the sentinel site**	**Proportion for PSE in cities NOT covered with ESP**	**Proportion for PSE in villages NOT covered with ESP**	
Men	755	301	454	0.4	0.6	
Women	80	46	34	0.6	0.4	
Age 18–29	64	16	48	0.3	0.8	
Age 30–39	354	125	229	0.4	0.6	
Age 40+	417	206	211	0.5	0.5	
Group	**Proportion based on ESP**	**PSE PWID in the sentinel site**	**PSE PWID in cities NOT covered with ESP (adjusted)**	**PSE PWID in villages NOT covered with ESP (adjusted)**		
Men	0.7923	1347	984	10,178		
Women	0.2077	353	335	1,338		
Age 18–29	0.3479	591	258	4,309		
Age 30–39	0.4487	763	496	4,771		
Age 40+	0.2034	346	279	2,605		
Total			**1,319**	**11,516**		
			1,033	**11,685**		
Mean			**1,176**	**11,601**		
PSE for the Oblast	**14,476**	**14,400**				

Table 18. Population size estimate of PWID in Atyrau Oblast

PSE for the sentinel site	**1,300**					
Group	**General population size in cities NOT covered with ESP**	**Proportion for PSE**	**PSE in cities NOT covered with ESP, unadjusted**	**General population size in villages NOT covered with ESP**	**PSE PWID in villages NOT covered with ESP, unadjusted**	**Total population of the sentinel site**
Men	19,733	0.01420	280	63,050	895	**77,186**
Women	13,499	0.00290	39	60,162	174	**71,220**
Age 18–29	14,881	0.00540	80	46,277	250	**59,203**
Age 30–39	8,254	0.01350	111	27,441	370	**39,074**
Age 40+	6,661	0.00910	61	49,494	450	**50,129**
Group	**PWID registered with the Narcology Service within the sentinel site**	**PWID registered with the Narcology Service in cities outside the sentinel site**	**PWID registered with the Narcology Service in villages outside the sentinel site**	**Proportion for PSE in cities NOT covered with ESP**	**Proportion for PSE in villages NOT covered with ESP**	
Men	208	8	0	0.04	0.00	
Women	8	0	0	0.00	0.00	
Age 18–29	88	1	0	0.01	0.00	
Age 30–39	14	3	0	0.21	0.00	
Age 40+	114	4	0	0.04	0.00	
Group	**Proportion based on ESP**	**PSE PWID in the sentinel site**	**PSE PWID in cities NOT covered with ESP (adjusted)**	**PSE PWID in villages NOT covered with ESP (adjusted)**		
Men	0.8419	1094	11	0		
Women	0.1581	206	0	0		
Age 18–29	0.2452	319	1	0		
Age 30–39	0.4047	526	24	0		
Age 40+	0.3501	455	2	0		
Total			**11**	**0**		
			27	**0**		
Mean			**19**	**0**		
PSE for the Oblast	**1,319**	**1,300**				

Table 19. Population size estimate of PWID in East Kazakhstan Oblast

PSE for the sentinel site	**7,700**					
Group	**General population size in cities NOT covered with ESP**	**Proportion for PSE**	**PSE in cities NOT covered with ESP, unadjusted**	**General population size in villages NOT covered with ESP**	**PSE PWID in villages NOT covered with ESP, unadjusted**	**Total population of the sentinel site**
Men	54,421	0.05920	3,222	176,243	10,434	100,859
Women	58,451	0.01460	853	168,608	2,462	118,663
Age 18–29	30,099	0.03490	1,050	95,750	3,342	72,693
Age 30–39	28,199	0.07020	1,980	77,971	5,474	49,193
Age 40+	54,574	0.01750	955	171,130	2,995	97,636
Group	**PWID registered with the Narcology Service within the sentinel site**	**PWID registered with the Narcology Service in cities outside the sentinel site**	**PWID registered with the Narcology Service in villages outside the sentinel site**	**Proportion for PSE in cities NOT covered with ESP**	**Proportion for PSE in villages NOT covered with ESP**	
Men	767	612	61	0.80	0.08	
Women	107	86	12	0.80	0.11	
Age 18–29	116	42	7	0.36	0.06	
Age 30–39	485	450	35	0.93	0.07	
Age 40+	273	206	31	0.75	0.11	
Group	**Proportion based on ESP**	**PSE PWID in the sentinel site**	**PSE PWID in cities NOT covered with ESP (adjusted)**	**PSE PWID in villages NOT covered with ESP (adjusted)**		
Men	0.7751	5,968	2,571	830		
Women	0.2249	1,732	686	276		
Age 18–29	0.3295	2,537	380	202		
Age 30–39	0.4486	3,454	1,837	395		
Age 40+	0.2219	1,709	721	340		
Total			**3,256**	**1,106**		
			2,938	**937**		
Mean			**3,097**	**1,022**		
PSE for the Oblast (excluding Semey)	**11,819**	**11,800**				
PSE for the Oblast (including Semey)	**2,500**	**14,300**				

Table 20. Population size estimate of PWID in Zhambyl Oblast

PSE for the sentinel site	**5,700**					
Group	**General population size in cities NOT covered with ESP**	**Proportion for PSE**	**PSE in cities NOT covered with ESP, unadjusted**	**General population size in villages NOT covered with ESP**	**PSE PWID in villages NOT covered with ESP, unadjusted**	**Total population of the sentinel site**
Men	21,849	0.05790	1,265	167,793	9,715	84,539
Women	22,130	0.00840	186	161,250	1,355	96,099
Age 18–29	16,113	0.02870	462	132,944	3,815	69,120
Age 30–39	11,675	0.05830	681	88,225	5,144	48,099
Age 40+	16,191	0.01440	233	107,874	1,553	63,419
Group	**PWID registered with the Narcology Service within the sentinel site**	**PWID registered with the Narcology Service in cities outside the sentinel site**	**PWID registered with the Narcology Service in villages outside the sentinel site**	**Proportion for PSE in cities NOT covered with ESP**	**Proportion for PSE in villages NOT covered with ESP**	
Men	621	110	267	0.18	0.43	
Women	58	4	11	0.07	0.19	
Age 18–29	65	6	9	0.09	0.14	
Age 30–39	341	39	99	0.11	0.29	
Age 40+	273	69	170	0.25	0.62	
Group	**Proportion based on ESP**	**PSE PWID in the sentinel site**	**PSE PWID in cities NOT covered with ESP (adjusted)**	**PSE PWID in villages NOT covered with ESP (adjusted)**		
Men	0.8589	4,896	224	4,177		
Women	0.1411	804	13	257		
Age 18–29	0.3482	1,985	43	528		
Age 30–39	0.4919	2,804	78	1,493		
Age 40+	0.1599	911	59	967		
Total			**237**	**4,434**		
			179	**2,988**		
Mean			**208**	**3,711**		
PSE for the Oblast	**9,619**	**9,600**				

Table 21. Population size estimate of PWID in West Kazakhstan Oblast

PSE for the sentinel site	**5,100**					
Group	**General population size in cities NOT covered with ESP**	**Proportion for PSE**	**PSE in cities NOT covered with ESP, unadjusted**	**General population size in villages NOT covered with ESP**	**PSE PWID in villages NOT covered with ESP, unadjusted**	**Total population of the sentinel site**
Men	17,316	0.05890	1,020	50,960	3,002	76,187
Women	18,253	0.00710	130	51,600	366	86,479
Age 18–29	8,910	0.02720	242	28,423	773	61,393
Age 30–39	8,433	0.05790	488	20,692	1,198	42,449
Age 40+	18,226	0.01650	301	53,445	882	58,824
Group	**PWID registered with the Narcology Service within the sentinel site**	**PWID registered with the Narcology Service in cities outside the sentinel site**	**PWID registered with the Narcology Service in villages outside the sentinel site**	**Proportion for PSE in cities NOT covered with ESP**	**Proportion for PSE in villages NOT covered with ESP**	
Men	474	30	32	0.06	0.07	
Women	37	1	3	0.03	0.08	
Age 18–29	92	2	3	0.02	0.03	
Age 30–39	267	26	17	0.10	0.06	
Age 40+	152	3	15	0.02	0.10	
Group	**Proportion based on ESP**	**PSE PWID in the sentinel site**	**PSE PWID in cities NOT covered with ESP (adjusted)**	**PSE PWID in villages NOT covered with ESP (adjusted)**		
Men	0.8798	4,487	65	203		
Women	0.1202	613	4	30		
Age 18–29	0.3272	1,669	5	25		
Age 30–39	0.4821	2,459	48	76		
Age 40+	0.1907	973	6	87		
Total			**68**	**233**		
			59	**188**		
Mean			**63**	**211**		
PSE for the Oblast	**5,374**	**5,400**				

Table 22. Population size estimate of PWID in Karaganda Oblast

PSE for the sentinel site	**5,200**					
Group	**General population size in cities NOT covered with ESP**	**Proportion for PSE**	**PSE in cities NOT covered with ESP, unadjusted**	**General population size in villages NOT covered with ESP**	**PSE PWID in villages NOT covered with ESP, unadjusted**	**Total population of the sentinel site**
Men	43,729	0.02970	1,299	71,706	2,130	140,249
Women	29,777	0.00870	259	44,541	388	118,332
Age 18–29	26,081	0.00630	164	44,360	279	103,097
Age 30–39	24,170	0.03030	732	33,541	1,016	81,713
Age 40+	23,255	0.02820	656	38,346	1,081	73,771
Group	**PWID registered with the Narcology Service within the sentinel site**	**PWID registered with the Narcology Service in cities outside the sentinel site**	**PWID registered with the Narcology Service in villages outside the sentinel site**	**Proportion for PSE in cities NOT covered with ESP**	**Proportion for PSE in villages NOT covered with ESP**	
Men	947	491	149	0.52	0.16	
Women	198	96	20	0.48	0.10	
Age 18–29	116	192	43	1.66	0.37	
Age 30–39	577	285	75	0.49	0.13	
Age 40+	452	110	51	0.24	0.11	
Group	**Proportion based on ESP**	**PSE PWID in the sentinel site**	**PSE PWID in cities NOT covered with ESP (adjusted)**	**PSE PWID in villages NOT covered with ESP (adjusted)**		
Men	0.8013	4,167	674	335		
Women	0.1987	1,033	126	39		
Age 18–29	0.1240	645	271	104		
Age 30–39	0.4762	2,476	362	132		
Age 40+	0.3998	2,079	160	122		
Total			**799**	**374**		
			793	**358**		
Mean			**796**	**366**		
PSE for the Oblast (excl. other sentinel sites)	6,362	6,400				
Total PSE for the Oblast	**14,200**					
PSE for Temirtau	4,800					
PSE for Balkhash	1,000					
PSE for Zhezkazgan	2,000					

Table 23. Population size estimate of PWID in Kostanay Oblast

PSE for the sentinel site	**3,800**					
Group	**General population size in cities NOT covered with ESP**	**Proportion for PSE**	**PSE in cities NOT covered with ESP, unadjusted**	**General population size in villages NOT covered with ESP**	**PSE PWID in villages NOT covered with ESP, unadjusted**	**Total population of the sentinel site**
Men	50,296	0.04940	2,485	109,610	5,415	70,361
Women	51,437	0.00460	237	107,703	495	69,778
Age 18–29	43,186	0.01800	777	89,948	1,619	51,459
Age 30–39	29,910	0.05440	1,627	64,551	3,512	35,149
Age 40+	28,637	0.01790	513	62,814	1,124	53,531
Group	**PWID registered with the Narcology Service within the sentinel site**	**PWID registered with the Narcology Service in cities outside the sentinel site**	**PWID registered with the Narcology Service in villages outside the sentinel site**	**Proportion for PSE in cities NOT covered with ESP**	**Proportion for PSE in villages NOT covered with ESP**	
Men	1,274	585	222	0.46	0.17	
Women	189	95	19	0.50	0.10	
Age 18–29	396	184	69	0.46	0.17	
Age 30–39	730	340	120	0.47	0.16	
Age 40+	337	156	52	0.46	0.15	
Group	**Proportion based on ESP**	**PSE PWID in the sentinel site**	**PSE PWID in cities NOT covered with ESP (adjusted)**	**PSE PWID in villages NOT covered with ESP (adjusted)**		
Men	0.9153	3,478	1,141	944		
Women	0.0847	322	119	50		
Age 18–29	0.2440	927	361	282		
Age 30–39	0.5036	1,914	758	577		
Age 40+	0.2524	959	237	173		
Total			**1,260**	**994**		
			1,356	**1,032**		
Mean			**1,308**	**1,013**		
PSE for the Oblast	**6,121**	**6,100**				

Table 24. Population size estimate of PWID in Kyzylorda Oblast

PSE for the sentinel site	**3,300**					
Group	**General population size in cities NOT covered with ESP**	**Proportion for PSE**	**PSE in cities NOT covered with ESP, unadjusted**	**General population size in villages NOT covered with ESP**	**PSE PWID in villages NOT covered with ESP, unadjusted**	**Total population of the sentinel site**
Men	27,091	0.03820	1,035	95,814	3,660	80,176
Women	29,603	0.00280	83	101,882	285	84,254
Age 18–29	23,049	0.01900	438	71,234	1,353	64,878
Age 30–39	11,977	0.02110	253	57,772	1,219	44,214
Age 40+	21,668	0.02050	444	68,690	1,408	55,338
Group	**PWID registered with the Narcology Service within the sentinel site**	**PWID registered with the Narcology Service in cities outside the sentinel site**	**PWID registered with the Narcology Service in villages outside the sentinel site**	**Proportion for PSE in cities NOT covered with ESP**	**Proportion for PSE in villages NOT covered with ESP**	
Men	319	17	7	0.05	0.02	
Women	72	9	2	0.13	0.03	
Age 18–29	133	3	2	0.02	0.02	
Age 30–39	110	11	4	0.10	0.04	
Age 40+	148	12	3	0.08	0.02	
Group	**Proportion based on ESP**	**PSE PWID in the sentinel site**	**PSE PWID in cities NOT covered with ESP (adjusted)**	**PSE PWID in villages NOT covered with ESP (adjusted)**		
Men	0.9290	3,066	55	80		
Women	0.0710	234	10	8		
Age 18–29	0.3742	1,235	10	20		
Age 30–39	0.2821	931	25	44		
Age 40+	0.3437	1,134	36	29		
Total			**66**	**88**		
			71	**93**		
Mean			**68**	**91**		
PSE for the Oblast	**3,459**	**3,500**				

Table 25. Population size estimate of PWID in Mangistau Oblast

PSE for the sentinel site	**2,900**					
Group	**General population size in cities NOT covered with ESP**	**Proportion for PSE**	**PSE in cities NOT covered with ESP, unadjusted**	**General population size in villages NOT covered with ESP**	**PSE PWID in villages NOT covered with ESP, unadjusted**	**Total population of the sentinel site**
Men	30,112	0.04040	1,217	54,080	2,185	51,392
Women	33,004	0.01450	479	59,103	857	57,022
Age 18–29	21,560	0.01540	332	44,436	684	40,378
Age 30–39	15,182	0.04150	630	23,330	968	28,367
Age 40+	26,374	0.02770	731	45,417	1,258	39,669
Group	**PWID registered with the Narcology Service within the sentinel site**	**PWID registered with the Narcology Service in cities outside the sentinel site**	**PWID registered with the Narcology Service in villages outside the sentinel site**	**Proportion for PSE in cities NOT covered with ESP**	**Proportion for PSE in villages NOT covered with ESP**	
Men	382	71	48	0.19	0.13	
Women	48	3	1	0.06	0.02	
Age 18–29	18	3	3	0.17	0.17	
Age 30–39	240	34	15	0.14	0.06	
Age 40+	172	37	31	0.22	0.18	
Group	**Proportion based on ESP**	**PSE PWID in the sentinel site**	**PSE PWID in cities NOT covered with ESP (adjusted)**	**PSE PWID in villages NOT covered with ESP (adjusted)**		
Men	0.7157	2,076	226	275		
Women	0.2843	824	30	18		
Age 18–29	0.2142	621	55	114		
Age 30–39	0.4064	1,179	89	61		
Age 40+	0.3794	1,100	157	227		
Total			**256**	**293**		
			302	**402**		
Mean			**279**	**348**		
PSE for the Oblast	**3,526**	**3,500**				

Table 26. Population size estimate of PWID in Pavlodar Oblast

PSE for the sentinel site	**6,600**					
Group	**General population size in cities NOT covered with ESP**	**Proportion for PSE**	**PSE in cities NOT covered with ESP, unadjusted**	**General population size in villages NOT covered with ESP**	**PSE PWID in villages NOT covered with ESP, unadjusted**	**Total population of the sentinel site**
Men	0	0.03030	0	4,878	148	180,756
Women	0	0.00710	0	4,545	32	158,090
Age 18–29	0	0.01060	0	2,835	30	130,666
Age 30–39	0	0.03640	0	2,592	94	107,456
Age 40+	0	0.01290	0	3,996	52	100,724
Group	**PWID registered with the Narcology Service within the sentinel site**	**PWID registered with the Narcology Service in cities outside the sentinel site**	**PWID registered with the Narcology Service in villages outside the sentinel site**	**Proportion for PSE in cities NOT covered with ESP**	**Proportion for PSE in villages NOT covered with ESP**	
Men	1,149	0	36	0.00	0.03	
Women	199	0	3	0.00	0.02	
Age 18–29	247	0	4	0.00	0.02	
Age 30–39	761	0	25	0.00	0.03	
Age 40+	340	0	10	0.00	0.03	
Group	**Proportion based on ESP**	**PSE PWID in the sentinel site**	**PSE PWID in cities NOT covered with ESP (adjusted)**	**PSE PWID in villages NOT covered with ESP (adjusted)**		
Men	0.8310	5,485	0	5		
Women	0.1690	1,115	0	0		
Age 18–29	0.2102	1,387	0	0		
Age 30–39	0.5928	3,912	0	3		
Age 40+	0.1970	1,300	0	2		
Total			**0**	**5**		
			0	**5**		
Mean			**0**	**5**		
PSE for the Oblast (excl. other sentinel sites)	6,605	6,600				
Total PSE for the Oblast	**10,200**					
Aksu	1,900					
Ekibastuz	1,700					

Table 27. Population size estimate of PWID in North Kazakhstan Oblast

PSE for the sentinel site	**3,800**					
Group	**General population size in cities NOT covered with ESP**	**Proportion for PSE**	**PSE in cities NOT covered with ESP, unadjusted**	**General population size in villages NOT covered with ESP**	**PSE PWID in villages NOT covered with ESP, unadjusted**	**Total population of the sentinel site**
Men	11,326	0.04610	522	120,694	5,564	71,965
Women	13,864	0.00510	71	127,454	650	94,139
Age 18–29	4,878	0.02990	146	53,586	1,602	43,407
Age 30–39	4,861	0.06390	311	45,513	2,908	32,284
Age 40+	15,451	0.00480	74	149,049	715	90,413
Group	**PWID registered with the Narcology Service within the sentinel site**	**PWID registered with the Narcology Service in cities outside the sentinel site**	**PWID registered with the Narcology Service in villages outside the sentinel site**	**Proportion for PSE in cities NOT covered with ESP**	**Proportion for PSE in villages NOT covered with ESP**	
Men	487	27	46	0.06	0.09	
Women	44	0	0	0.00	0.00	
Age 18–29	122	5	6	0.04	0.05	
Age 30–39	342	15	33	0.04	0.10	
Age 40+	67	7	7	0.10	0.10	
Group	**Proportion based on ESP**	**PSE PWID in the sentinel site**	**PSE PWID in cities NOT covered with ESP (adjusted)**	**PSE PWID in villages NOT covered with ESP (adjusted)**		
Men	0.8737	3,320	29	526		
Women	0.1263	480	0	0		
Age 18–29	0.3419	1,299	6	79		
Age 30–39	0.5431	2,064	14	281		
Age 40+	0.1150	437	8	75		
Total			**29**	**526**		
			27	**435**		
Mean			**28**	**481**		
PSE for the Oblast	**4,309**	**4,300**				

Table 28. Population size estimate of PWID in South Kazakhstan Oblast

PSE for the sentinel site	**16,400**					
Group	**General population size in cities NOT covered with ESP**	**Proportion for PSE**	**PSE in cities NOT covered with ESP, unadjusted**	**General population size in villages NOT covered with ESP**	**PSE PWID in villages NOT covered with ESP, unadjusted**	**Total population of the sentinel site**
Men	101,382	0.09460	9,591	490,546	46,406	161,949
Women	107,039	0.00570	610	490,291	2,795	190,351
Age 18–29	68,142	0.02310	1,574	351,472	8,119	159,976
Age 30–39	44,974	0.09200	4,138	213,992	19,687	95,954
Age 40+	95,305	0.04020	3,831	415,373	16,698	96,370
Group	**PWID registered with the Narcology Service within the sentinel site**	**PWID registered with the Narcology Service in cities outside the sentinel site**	**PWID registered with the Narcology Service in villages outside the sentinel site**	**Proportion for PSE in cities NOT covered with ESP**	**Proportion for PSE in villages NOT covered with ESP**	
Men	1,895	139	18	0.07	0.01	
Women	223	28	0	0.13	0.00	
Age 18–29	264	22	2	0.08	0.01	
Age 30–39	785	99	12	0.13	0.02	
Age 40+	1,069	46	4	0.04	0.00	
Group	**Proportion based on ESP**	**PSE PWID in the sentinel site**	**PSE PWID in cities NOT covered with ESP (adjusted)**	**PSE PWID in villages NOT covered with ESP (adjusted)**		
Men	0.9338	15,314	704	441		
Women	0.0662	1,086	77	0		
Age 18–29	0.2255	3,698	131	62		
Age 30–39	0.5384	8,830	522	301		
Age 40+	0.2362	3,874	165	62		
Total			**780**	**441**		
			818	**425**		
Mean			**799**	**433**		
PSE for the Oblast	**17,632**	**17,600**				

Table 29. Summary of population size estimates of PWID, by Oblasts of the Republic of Kazakhstan

##	Oblast	Population size estimate
1	Akmola	2,300
2	Aktobe	4,700
3	Almaty	14,400
4	Atyrau	1,300
5	East Kazakhstan Oblast	14,300
6	Zhambyl	9,600
7	West Kazakhstan Oblast	5,400
8	Karaganda	14,200
9	Kostanay	6,100
10	Kyzylorda	3,500
11	Mangistau	3,500
12	Pavlodar	10,200
13	North Kazakhstan Oblast	4,300
14	South Kazakhstan Oblast	17,600
15	Astana city	5,300
16	Almaty city	11,100
	Total for Kazakhstan	**127,800**

Figure 5. Population size estimate of people who inject drugs (PWID) in the Republic of Kazakhstan, based on the 2014 study

Comparative data on PWID registered with the Narcology Service.

Number of PWID registered with the Narcology Service reduces year on year: 30,256 PWID were registered as of the end of 2011, 24,987 – as of the end of 2012, 24,667– as of the end of 2013. According to the official statistics as of December 31, 2014, there were 22,323 PWID registered with the Narcology Service institutions, 89% of them were men, and 11% were women.

Table 30. Number of PWID registered with the Narcology Service, and PSE for the RK in 2013–2014

Oblasts	Number of PWID officially registered (abs.)		PSE PWID (abs.)		% registered from the PSE	
	As of 31.12.2013	As of 31.12.2014	2013	2014	2013	2014
Akmola	658	542	2,300	2,300	28.6	23.6
Aktobe	1,109	1,105	3,500	4,700	31.7	23.5
Almaty	1,063	835	4,500	1,400	23.6	5.8
Atyrau	258	220	2000	1,300	12.9	16.9
East Kazakhstan	2,400	2,150	12,000	14,300	20.0	15.0
Zhambyl	1,609	1,369	6,800	9,600	23.7	14.3
West Kazakhstan	808	648	4000	5,400	20.2	12.0
Karaganda	3,573	3,109	13,240	14,200	27.0	21.9
Kostanay	2,457	2,193	5,100	6,100	48.2	40.0
Kyzylorda	408	235	2,200	3,500	18.5	6.7
Mangistau	838	775	4,100	3,500	18.5	22.1
Pavlodar	1,931	1,723	12,000	10,200	16.1	16.9
North Kazakhstan	613	607	4,000	4,300	15.3	14.1
South Kazakhstan	2,456	2,290	20,500	17,600	12.0	13.0
Almaty city	3,080	2,652	10,000	11,100	30.8	23.9
Astana city	1,406	1,870	6,500	5,300	21.6	35.3
Total for Kazakhstan	**24,667**	**22,323**	**112,740**	**127,800**	**21.9**	**17.5**

In 2014, the national average of PWID registered with the Narcology Service comprised 17.5% of the estimated population size of PWID (in 2013 the proportion was 21.9%), with the maximum in Kostanay Oblast, and the minimum – in Almaty Oblast.

Population size estimate of PWID, which was based on administrative and health statistics and the 2014 ESP, comprised 127 800, which is 11.8% higher than the previous estimate (112 740).

In 5 regions (Atyrau, Mangistau, Pavlodar and South Kazakhstan Oblasts, and the city of Astana) the population size estimate of PWID had reduced, in one region (Akmola Oblast) it remained unchanged, and in other regions it increased, most significantly in Oblasts of Almaty, Zhambyl and East Kazakhstan.

3.8 Limitations

Epidemiological surveillance of prevalence, like any other study among PWID, has its limitations stemming from the group's features, which affect reliability of the data. All input data used for population size estimate of PWID in 2014 were provided by Oblast/City AIDS Centers. Reliability of results is a derivative of input data quality. Adequate understanding of potential problems with the input data enables making adjustments.

Potential errors associated with quality of statistics (references):

For all the multipliers:

1. Failure to meet the age criterion can lead to distortion of the estimates:
- overestimation (if statistics include PWID under 18, which is an exclusion criterion for ESP);
- underestimation (if statistics include PWID not from the age of 18 (if present), but from an older age).

2. Failure to meet the site area criterion could lead to distortion of the estimates:
- overestimation (if statistics include settlements outside of the sentinel site area);
- underestimation (if statistics do not include all settlements within the sentinel site area).

3. Failure to meet the time frame criterion can lead to distortion of the estimates:
- overestimation (if the statistics cover longer period than indicated in the questionnaire),
- underestimation (if the statistics cover shorter period than indicated in the questionnaire).

For multipliers 1, 2:

1. Failure to timely update (by the end of reporting period) statistics on PWID registered with the Narcology Service to account for deaths and departures can lead to distortion of the estimates resulting in overestimation.

For multipliers 1, 2, 3:

1. Lack of a clear distinction between people who use drugs by the type of use (injecting vs. non-injecting) may lead to distortion of the estimates:
- overestimation (if statistics include people who use drugs other than by injecting);
- underestimation (if statistics do not include all PWID).

Possible errors associated with the ESP data quality for all multipliers:

Estimates can be distorted due to errors in course of ESP (during preparation, data collection, data input and analysis stages), which affects representativeness of the results.

Failure to comply with the sampling methodology, since ensuring randomness of the sample and quality data collection are key prerequisites to apply the multiplier method.

Table 31. Potential errors associated with ESP data quality for all multipliers

Multiplier	Potential errors associated with quality of statistics (reference data)	Potential errors associated with ESP data quality
1. Number of PWID registered with the Narcology Service	1. Failure to timely update (by the end of reporting period) statistics on PWID registered with the Narcology Service to account for deaths and departures can lead to distortion of the estimates resulting in overestimation 2. Lack of a clear distinction between people who use drugs by the type of use (injecting vs. non-injecting) may lead to distortion of	- Underestimation is possible, if the sample includes more PWID registered with the Narcology Service, as they tend to be more committed to participate in the study. - Overestimation is possible, if the sample includes more of PWID not registered with the Narcology Service.

	the estimates: - overestimation (if statistics include people who use drugs other than by injecting); - understimation (if statistics do not include all PWID) Key informant is a narcology doctor	
2. Number of PWID contacts registered with the Narcology Service	Same as multiplier 1 Key informant is a narcology doctor	- Underestimation is possible, if the sample includes more PWID, whose contacts are more likely to be registered with the Narcology Service. - Overestimation is possible, if the sample includes more PWID, whose contacts are less likely to be registered with the Narcology Service. - Estimates can be distorted, if the fact of being registered with the Narcology Service is not discussed among PWID (error at the level of communication between PWID contacts). It is important to examine in course of formative study, how widely is Narcology registration status discussed and communicated between PWID.
3. PWID newly registered with the Narcology Service	If the number of PWID newly registered with the Narcology Service is small, it may lead to underestimation. Key informant is a narcology doctor	Same as multiplier 1 When using this multiplier, PWID registered with the Narcology Service before the last year cannot be included in the statistics.
4. Coverage of PWID with needle and syringe exchange programs	If the official number of PWID, who received free syringes and needles, does not correspond to the true number of PWID, covered with needle and syringe exchange programs, this may lead to distortion of estimates: - overestimation (if PWID are counted twice, i.e. double counted, or if the coverage data is overstated); - underestimation (if the statistics do not include all PWID covered with needle and syringe exchange programs within the sentinel site). Key informant is a specialist of either an Oblast or City AIDS Center, supervising the work with MARP.	- Underestimation is possible, if the sample includes more PWID covered with needle and syringe exchange programs, as they tend to be more committed to participate in the study. - Overestimation is possible, if the sample includes more PWID, not covered with needle and syringe exchange programs.

5. Number of PWID who visited a friendly clinic	If the official number of PWID who visited a friendly clinic does not correspond with the true number of PWID covered with the services of friendly clinics, this may lead to distortion of estimates: - overestimation (if PWID are counted twice, i.e. double counted, or if the coverage data is overstated, including due to misidentification of a friendly clinic client as PWID); - underestimation (if the statistics do not include all PWID covered with friendly clinic services within the sentinel site, or if it is difficult to identify a friendly clinic client as PWID). Key informant is a friendly clinic doctor in either an Oblast or City AIDS Center	- Underestimation is possible, if the sample includes more PWID covered with the services of friendly clinics, as they tend to be more committed to participate in the study. - Overestimation is possible, if the sample includes PWID not covered with the services of friendly clinics. - Estimates can be distorted due to errors in course of ESP (during preparation, data collection, data input and analysis stages), which affects representativeness of the results.
6. PWID tested for HIV by Narcology Service	If the official number of HIV tests under code 102 does not correspond with the true number of PWID tested for HIV by the referral of narcology doctor, this may lead to distortion of estimates: - overestimation (if the statistics of HIV tests under code 102 include not only PWID, but also other groups of the population); - underestimation (if the statistics of HIV tests under code 102 do not include all PWID tests). Key informant is a narcology doctor	- Underestimation is possible, if the sample includes more PWID registered with the Narcology Service (and therefore tested by referral of a narcology doctor), as they tend to be more committed to participate in the ESP. - Overestimation is possible, if the sample includes PWID, who are not registered with the Narcology Service, and who, therefore, could not be tested by referral of a narcology doctor. - Estimates can be distorted, if PWID are unable to answer with confidence, if they were ever tested by referral of a narcology doctor, and if they were, recall, how many times. When using this multiplier, PWID, who are not registered with the Narcology Service, may be not accounted for in the statistics.
7. PWID tested for HIV by rapid testing	If the official number of PWID tested for HIV by rapid testing does not correspond with the true number of PWID tested for HIV by rapid testing, this may lead to distortion of estimates: - overestimation (if the statistics include not only PWID tested for HIV by rapid testing, but also other groups of the population); - underestimation (if the statistics do not include all PWID tested for HIV by rapid testing). Key informant is a specialist of either an Oblast or City AIDS Center, supervising the work with MARP.	- Underestimation is possible, if the sample includes more PWID who are covered with prevention services (therefore, tested for HIV by rapid testing), as they tend to be more committed to participate in the ESP. - Overestimation is possible, if the sample includes more PWID who are not covered with prevention services, and who, therefore, could not be tested for HIV by rapid testing. - Estimates can be distorted, if PWID are unable to answer with confidence, if they were ever tested for HIV by rapid testing, and if they were, recall, how many times.

3.9 Lessons learned for future estimates

1. Ensuring quality of the formative study and data collection process, and strict observance of sampling methodology, is key to obtaining a valid population size estimate.

2. Use of respondent-driven sampling (RDS) and calculating proportions in RDS-Analyst enables justification of the estimate using representative data, and improves its accuracy.
3. Efficiency of multipliers varies: data from Narcology Registries and on HIV tests by referral of a narcology doctor in many sites induces underestimation, while the number of visits to friendly clinics disposes to overestimation.

   One multiplier that produced the most overestimated results in all sentinel sites was 'Coverage of PWID with needle and syringe exchange programs'. As judged by this multiplier, in 13 sentinel sites the coverage of PWID with prevention programs was 100% or more of their estimated population size, which can not be true.

   Use of seven multipliers enabled selection of valid data for the estimate, and use of median as the estimated value, although the number of multipliers that proved to be efficient was smaller than expected.
4. In 15 sites, the method of capture-recapture was not applied, and measures must be taken to ensure that this method can be applied in future, as the most reliable results are obtained by combination of different methods.
5. When the estimates were extrapolated to oblasts, estimated numbers of PWID population outside the sentinel site was very small, which may be a result of poor management of narcology registries, especially in rural areas.
6. To improve data quality, next population size estimate of PWID must request data on PWID registered as enrolled both in narcology care, and in prevention programs.
7. In selection of seeds, preference must be given to PWID seeds not registered with the Narcology Service.

   All problems identified as distorting the estimates must be eliminated by 2016, when the population size estimate of PWID and sampling survey for ESP will be carried out again.

Conclusions

The final estimated population size of PWID in 2014 in 22 sentinel sites comprised 99 400, and after extrapolation to all oblasts of RK – 127 800.

Number of PWID registered with the Narcology Service reduces year on year – the national average of PWID registered with the Narcology Service comprised 17.5% of the estimated number of PWID (21.9% in 2013).

Range of ages in the estimated PWID population corresponds to the range of ages in the sampling study (ESP), i.e. 18–65 years of age. Prevalence of injecting drug use in the population of the Republic of Kazakhstan in the age group of 18 to 65 is estimated as 1%, and ranges from 0.4% in Almaty Oblast to 2.4% in Pavlodar Oblast.

These estimates were recognized as acceptable, and will now be used in planning of preventive interventions for PWID population in the Republic of Kazakhstan in 2016:

- to determine financing required to purchase consumables (IEC, means of prophylaxis, rapid tests);
- to decide on a rational distribution of trust points, and the number of paid staff and outreach workers required for the planned coverage;
- to compare data obtained through ESP and routine surveillance (HIV infection and prevalence rates, coverage of prevention programs, connection with other at-risk groups);
- to evaluate HIV prevalence and estimate population size of people living with HIV (PLWH).

Results of the population size estimate of PWID will also be used to calculate the 2016 ESP sample.

Indirectly, results of the population size estimate and lessons learned (overestimations, underestimations from a number of multipliers) enable a judgment on the effectiveness of work with PWID that had already been carried out in the region, and identify the most problematic areas.

Presentation of results

Results of the estimate presented in this report were translated into English and published at the Republican AIDS Center's website for all stakeholders, including international partners.

This population size estimate of PWID will be used in preparation of the 2015 National AIDS Response Progress Report, as well as for other publications and presentations at various levels.

Recommendations

1. Population size estimate of PWID must be considered an integral part of the ESP. Integration of multiplier method into the ESP will allow for cost-effective estimation of PWID population size on a regular basis.
2. It is essential to improve effective cooperation of services that provide reference data (Narcology Service, Department of Internal Affairs, Oblast/City AIDS Centers), as quality of the references directly influences quality of the estimates.
3. High quality of the ESP preparatory stage must be ensured, with special attention paid to organization and performance of the formative study, as well as to the data collection stage to obtain representative data for the population size estimate of PWID.