

**Report**  
**from**  
**an Epidemiological Study of the Biological and Behavioural**  
**Indicators of HIV Prevalence Among the Group of People Who**  
**Use Drugs in the City of Sofia**

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**Sofia**

**2025**

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## **List of abbreviations**

AIDS – acquired immunodeficiency syndrome

EEA – European Economic Area

EU – European Union

HBV – hepatitis B virus

HCV – hepatitis C virus

HIV – human immunodeficiency virus

IBBS – integrated biological and behavioural surveillance

PWUD – people who use drugs

PWID – people who inject drugs

IQR – interquartile range

PLHIV – people living with HIV

PrEP – pre-exposure prophylaxis

RDT – rapid diagnostic tests

SD – standard deviation

STI – sexually transmitted infections

WHO – World Health Organization

## INTRODUCTION

The HIV epidemic is firmly rooted in human behaviour and is driven by economic, cultural and social conditions. Behavioural and social sciences are essential to finding solutions to control it. HIV infection is to a large extent socially determined and linked to people's behaviour. Therefore, a thorough understanding of not only the biological factors of HIV transmission, but also the social and behavioural determinants driving its spread is necessary. Building on this understanding, in 2000 WHO recommended the expansion of HIV epidemiological surveillance to include surveillance of the social and behavioural factors associated with the disease. This type of epidemiological surveillance is termed “Second Generation Sentinel Surveillance of HIV Infection”, which involves examining the relationship between biological and behavioural factors through Integrated Biological and Behavioural Surveillance (IBBS).

In 2020, there were 18,600 people who use drugs in the country, and the percentage of new HIV cases detected by civil society organisations over a 12-month period (July 2019 – July 2020) was a cumulative 23% of all new cases registered (14% in 2019 and 9% in 2020). With all harm reduction services in Bulgaria having ceased in July 2020, the new annual data (2021) show only 5.5% of new cases in the substance user group. This discrepancy may be a strong indicator of a hidden epidemic among this group related to the lack of HIV testing since 2017. In 2019 The Center for Humane Policy founded The Pink House, the only low-threshold social service centre for people who use drugs in Bulgaria.

People who use drugs are one of the key populations of interest in relation to HIV. This is due to the fact that between 40 and 50% of all new HIV infections among adults globally occur among people from key populations and their immediate partners.

Approximately 30 000 new HIV infections are reported each year in EU/EEA countries, with mortality declining due to the increasing use of effective antiretroviral treatment.

Bulgaria is still a country with low HIV prevalence in the general population. However, the country faces a major challenge related to the possibility of rapid development of concentrated epidemics in particular groups identified as most at risk. There is already such epidemiological and behavioural evidence for groups of people who inject drugs, men who have sex with men and sex workers. The risk relates to the possibility of transmission to the general population, where the primary mode of transmission is heterosexual.

People who inject drugs are the most vulnerable group among the people who use drugs group. Risk factors for the spread of infection in this group are the common use of contaminated injecting equipment as well as sexual behaviour, where motivation for safe practices and the possibility of self-control decline sharply under the influence of substance use. The group is also extremely vulnerable due to severe social marginalisation in terms of limited access to services, criminal behaviour and persecution by the law.

Stimulant and other non-injecting substance users and addicts are at risk of contracting HIV and other blood and sexually transmitted infections due to sexual behaviour where motivation for safe practices and the ability to self-control decline under the influence of substance use.

The use of shared equipment for nasal drug intake (snorting) also carries a risk of acquiring blood-borne infections.

The information generated by IBBS is essential for healthcare professionals, national governments and international agencies in designing an adequate national and international response to the HIV/AIDS epidemic. Data from such surveys are essential for advocacy, strengthening engagement, and community mobilisation.

## **PURPOSE OF THE STUDY**

The purpose of the present study is to analyse and assess the prevalence of HIV, hepatitis B and C, and syphilis among people who use drugs, in the city of Sofia, as well as to evaluate the current situation in regards to the provision of services to the affected groups and their behaviour and knowledge, and to develop a mechanism for outreach and access to socially excluded groups.

## **MAIN OBJECTIVES**

1. To study the change in injecting and sexual behaviour among people who use drugs in the city of Sofia.
2. To study the relationship between the prevalence of HIV, hepatitis B and C, and syphilis among people who use drugs and their behaviour.
3. To analyse the situation among the at-risk group with lack of access to social services and the prevalence of HIV, hepatitis B and C, and syphilis.
4. To monitor the awareness of HIV, hepatitis B and C, and syphilis among people who use drugs.

## **Study design**

The study was cross-sectional and was conducted among substance users (injecting and non-injecting users).

## **Participant selection criteria**

Individuals meeting the following inclusion criteria were eligible for participation in the study:

- Persons who have used drugs in the last 1 month, aged 18 years or older, regardless of their sex
- Persons who declare in writing their willingness to participate in the study

## **Exclusion criteria**

- Persons under the age of 18
- Persons who have used drugs for less than 1 month
- Persons unwilling to sign an informed consent and refusing to participate in the study

A total of 480 people who use drugs from the city of Sofia were included in the study. To ensure the smooth organisation and implementation of the study, the research team enlisted the support of professionals with previous experience in working directly with people who use drugs. The blood sampling process was carried out by qualified medical professionals who were specifically recruited to ensure the safe and proper handling of biological materials.

All staff involved in the study underwent extensive training to ensure consistency and quality in data collection. They were fully briefed on the objectives, structure and procedures of the study and received targeted training on how to accurately administer the study questionnaire, how to properly collect, label and store blood samples, and how to adhere to the ethical principles governing research, including issues of confidentiality, informed consent and respectful treatment of study subjects.

### **Study period and data collection**

The study was conducted over the period Feb 2024 – Aug 2024 during which data were systematically collected from the selected participants. The study used a combination of two complementary methods to ensure both the reliability and depth of the collected information.

- The first method involved conducting face-to-face interviews with each participant, guided by a specially designed and structured questionnaire tailored to the specific characteristics and experiences of people who use drugs. The questionnaire was carefully designed to cover a wide range of relevant topics and was divided into thirteen separate sections, each addressing a particular aspect of the participants' demographic, behavioural and health profiles:

**Section 1** – Demographic Characteristics – 12 questions aimed at collecting basic socio-demographic information such as age, gender, educational level, employment status, and place of residence.

**Section 2** – Psychoactive Substance Use – 9 questions exploring types, frequency, and patterns of drug use.

**Section 3** – Injecting Behaviour – 19 questions focused on the practices, habits and risks associated injecting drug use.

**Section 4** – Marriage and Cohabitation – 3 questions related to participants' marital status and cohabiting relationships.

**Section 5** – Sexual Behaviour: Number and Type of Partners – 5 questions related to the number of sexual partners and the nature of these relationships.

**Section 6** – Sexual Behaviour – 5 questions delving into sexual practices and behaviours beyond the number of partners.

**Section 7** – Relationship Specifics – Female Partners – 29 questions focusing on relationships with female partners.

**Section 8** – Relationship Specifics – Male Partners – 29 questions focusing on relationships with male partners.

**Section 9** – Condom Use – 5 questions assessing frequency, consistency, and context of condom use.

**Section 10** – Sexually Transmitted Infections (STIs) – 10 questions focused on identifying history, diagnosis, and awareness of STIs.

**Section 11** – Knowledge, Beliefs and Attitudes about HIV/AIDS – 32 questions assessing participants' understanding, beliefs and attitudes about HIV and AIDS.

**Section 12** – Knowledge of hepatitis B and C – 18 questions assessing participants' knowledge of these two types of hepatitis, including transmission, prevention and treatment.

**Section 13** – Reach of Interventions to the Target Group – questions aimed at determining whether and how participants were exposed to harm reduction, prevention or treatment services.

- The second method of data collection involved collecting biological samples. Blood samples were collected from each participant by trained medical staff and subsequently tested using rapid diagnostic tests for the presence of HIV, hepatitis B, hepatitis C, and syphilis. This allowed the study to supplement self-reported data with objective health screening results.

Participation in the study was entirely voluntary and was preceded by the process of obtaining informed consent from each participant, ensuring ethical standards and respect for individual autonomy. To maintain both confidentiality and the integrity of the data link between the questionnaires and the biological samples, a unique identification code was created for each participant. The code was generated using a combination of personal identifiers: the first letter of the respondent's first name, their month and date of birth, and the first letter of their mother's lowercase first name. This system allowed the study team to link the blood test results to the questionnaire data without revealing the identity of the participants.

### **Ethical considerations**

The study conforms to current ethical principles and guidelines for conducting research among human subjects and was approved by the Ethics Committee of Medical University – Plovdiv (P 1442/10.06.2024).

### **STATISTICAL METHODS**

Descriptive statistical methods were used to summarise and characterise the study variables. Specifically, for quantitative (continuous) variables, data were presented as means accompanied by their corresponding standard deviations (SD), when the distribution of the variable conformed to normal distribution. In cases where variables did not follow normal distribution, data were summarised using the median along with the 25th and 75th percentiles (interquartile range (IQR)) to reflect central tendency and dispersion more accurately. For qualitative

(categorical) variables, descriptive statistics were reported as absolute frequencies and relative proportions expressed as numbers (n) and percentages (%).

The normality of the distribution of continuous variables was assessed using the Kolmogorov-Smirnov test, which is a nonparametric method suitable for testing the conformity of sampling distributions to a normal theoretical distribution.

For comparative analyses, the choice of statistical test is based on the type and distribution of variables. The Mann-Whitney U test, a nonparametric alternative to the independent samples t-test, was applied to compare the means of continuous variables between two independent groups, especially when the assumption of normal distribution was not met. A z-test for proportions was used to compare the proportions of categorical variables between two independent groups.

All processes related to data collation, management, and statistical analysis were performed using the Statistical Package for the Social Sciences (SPSS), version 26.0 for Windows (IBM Corp., released in 2019; Armonk, New York, USA).

## RESULTS

### Demographic characteristics

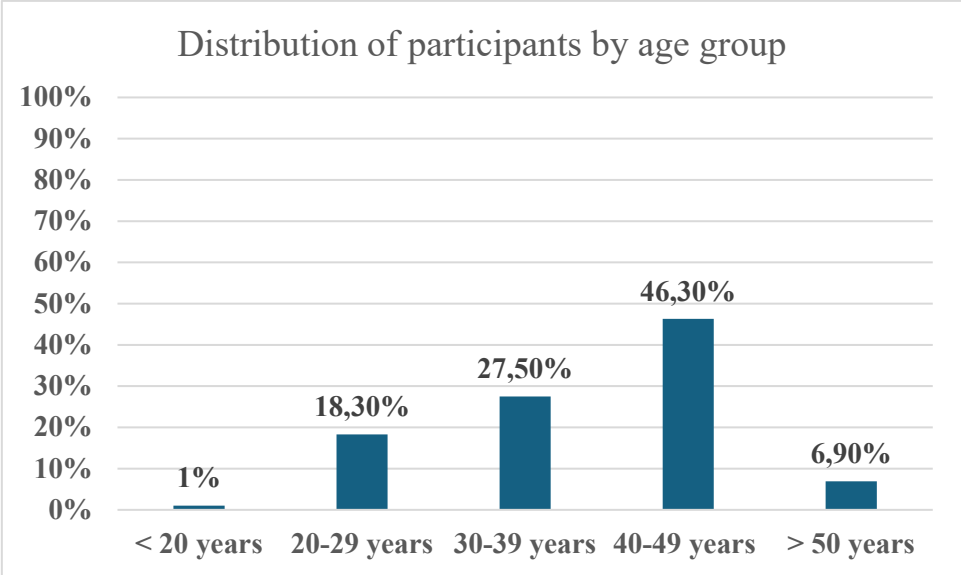
A total of 480 people participated in the study. Of these, 378 were male, representing 78.8% of the sample, while 102 were female, representing 21.2%. The estimated male-to-female ratio was 3.7:1, a distribution which is consistent with established trends in the epidemiology of drug use, where a higher prevalence of substance use is generally observed among men compared with women. This gender imbalance is consistent with findings reported in both national and international studies on drug-using populations.

The age of participants varied widely, reflecting a diverse demographic profile. The average age of the total sample was 40 years. Given the inequality observed in the age distribution, the interquartile range (IQR) was also reported, with the 25th percentile at 33 years and the 75th percentile at 44 years. This indicates that the majority of study participants were concentrated in this age group.

For the purposes of comparative analysis, and in accordance with the classification used in similar epidemiological studies, the sample was stratified into two age groups: individuals aged 25 years or younger and those aged 25 years or older. Within this framework, 47 participants (9.8%) were identified as belonging to the younger age group ( $\leq 25$  years), while the remaining 433 individuals (90.2%) were classified as adults over 25 years of age (**Fig. 1**). It must be noted that the smallest proportion of participants was recorded among individuals aged less than 20 years, a finding which is consistent with previous studies and observational reports on this population, which also documented declining or relatively low representation of people who use drugs in the youngest age categories.

A significant proportion of study participants reported unstable housing conditions. Specifically, 17.5% (n=84) of respondents indicated that they were currently living on the streets at the time of the survey, which highlights the extent of homelessness among this

population. When asked if they had ever been forced to live on the streets for an extended period of time, the proportion was significantly higher. A total of 29.6% (n=142) of participants reported having been homeless for more than one month at some point in their lives, suggesting that housing insecurity is both a prevalent and recurring problem among people who use drugs.



**Fig.1. Distribution of participants by age group**

In terms of educational attainment, the survey revealed significant differences which reflect social vulnerability. When asked if they had ever attended formal school, 6.9% (n=33) of participants reported that they were never enrolled in school, highlighting a major gap in access to education. Among those who attended school, the highest proportion, 39.6% (n = 190), reported completing secondary education. This was followed by 32.1% (n=154) of respondents who reported primary education as their highest level of education completed, and 14.8% (n=71) who attained only primary education. These findings suggest that lower levels of educational attainment are common in this population, which is consistent with patterns observed in other marginalised groups (**Table 1**).

When considering ethnic self-identification, the sample reflects the main ethnic groups present in the country, namely Bulgarian, Roma and Turkish. The majority of respondents identified themselves as ethnic Bulgarians, representing 69.4% (n = 333) of the total sample. Participants identifying as Roma made up 22.1% (n = 106), while a smaller proportion, 2.5% (n = 12), reported Turkish ethnicity. An additional 6.0% (n = 29) of respondents identified with other ethnic backgrounds not listed among the major groups.

In terms of religious affiliation, the majority of respondents identified as practicing Orthodox Christianity, which is consistent with the predominant religious tradition in Bulgaria and consistent with findings from previous studies of similar populations.

**Table 1. Demographic characteristics of study participants (n=480).**

Demographic indicators	n (%)
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<b>Education</b>	
Primary	71 (14.8)
Lower Secondary	154 (32.1)
Secondary	190 (39.6)
Higher	19 (4.0)
Did not attend school	33 (6.9)
No answer	13 (2.7)
<b>Availability of a place to live</b>	
Yes	394 (82.1)
No	84 (17.5)
No answer	2 (0.4)
<b>Ethnicity</b>	
Bulgarian	333 (69.4)
Roma	106 (22.1)
Turkish	12 (2.5)
Other ethnicity	29 (6.0)
<b>Religion</b>	
No religion	116 (24.2)
Protestantism/Evangelicalism	18 (3.8)
Orthodox Christianity	310 (64.6)
Islam	23 (4.8)
Other religion	10 (2.1)
No answer	3 (0.6)

### **Marriage and sexual behaviour**

The participants enrolled in the study were predominantly sexually active. A significant majority, specifically 97.9%, reported having had sexual intercourse at least once in their lifetime. Of particular interest was the reported age of sexual initiation, with the average age of first sexual intercourse being 15 years. The interquartile range further highlights this trend, with the 25th percentile at 13 years and the 75th percentile at 16 years, indicating that the majority of participants initiated sexual activity during early to middle adolescence.

Among the individuals surveyed, 16.3% (n=78) reported having been married. The mean age of first marriage was 24 years, with a significant range in age distribution – participants at the 25th percentile reported being married at 19.25 years, while those at the 75th percentile reported being married at 30 years. This variability may reflect broader socioeconomic and cultural factors influencing decisions about formal partnership and cohabitation among this group.

Of particular interest are the data on early initiation of sexual activity. The mean age of first sexual intercourse among participants was 15 years, with an interquartile range spanning from 13 years (25th percentile) to 16 years (75th percentile). This early onset of sexual activity is concerning from a public health perspective, as it is often associated with increased vulnerability to sexually transmitted infections (STIs), unplanned pregnancies, and engagement in high-risk sexual behaviour, particularly in populations also affected by substance use.

The data also revealed that the majority of participants were sexually active. Specifically, 77.7% (n=377) reported having had sexual contact in the past 12 months, while 56.3% (n=270)

indicated having had sexual contact in the past month. However, despite high levels of sexual activity, consistent condom use remains suboptimal. Among participants who were sexually active in the past month, only approximately half (n=124) reported using a condom during their last sexual encounter. This suggests a gap between knowledge and behaviour which may contribute to an increased risk of STI transmission, particularly in the context of concurrent injecting drug use.

On average, participants reported having one sexual partner in the past six months, suggesting relatively low partner turnover; however, even within monogamous relationships or relationships with a small number of partners, inconsistent condom use may still pose a significant health risk. A small but notable proportion of participants reported same-sex sexual contact. Among women, 9.8% (n=10) reported having sex with a woman, and among men, 5.5% (n=21) reported having sex with a man. These findings highlight the importance of inclusive sexual health services that meet the needs of individuals across the spectrum of sexual orientations.

**HIV/AIDS, hepatitis B, hepatitis C, and syphilis test results**

As part of the study, participants underwent serologic screening for four key infectious diseases associated with high-risk behaviours: human immunodeficiency virus (HIV), hepatitis B virus (HBV), hepatitis C virus (HCV), and syphilis. Screening was conducted using rapid diagnostic tests (RDTs), which offer the advantage of immediate results and are particularly useful in community or field settings where access to laboratory facilities may be limited. The results of the serological tests are summarised in the table below.

**Table 2.** Results of testing for markers of HIV, hepatitis B, hepatitis C, and syphilis

Type of test	n (%)
HIV antibodies	61 (12.7%)
HBsAg	11 (2.3%)
Anti-HCV antibodies	305 (63.5%)
Antibodies against <i>Treponema pallidum</i>	15 (3.1%)

Compared to data from a previous study conducted between 2006 and 2011, there was a significant increase in both HIV and HCV seropositivity. Specifically, the prevalence of HIV antibodies in the current cohort was 12.7%, indicating a significant increase that may reflect either increased community transmission or improved detection through expanded testing efforts. Similarly, the prevalence of anti-HCV antibodies was recorded at 63.5%, representing a significant increase from levels reported in the earlier study period.

These findings are worrisome, especially given that both HIV and HCV are commonly associated with injection drug use, which remains the predominant mode of transmission in this population. Increased prevalence may be attributable to several factors, including limited access to sterile injection equipment, inadequate coverage of harm reduction services, and perpetuation of high-risk sexual and drug use behaviours.

It is important to emphasise that all infections in this study were identified using rapid tests. Although these tests are effective for initial screening, the results should be interpreted with

some caution. Furthermore, the study did not collect data on whether individuals with a positive test were already aware of their infection status or were newly diagnosed. This represents a limitation in interpreting the results, particularly in assessing the effectiveness of ongoing testing.

The relatively lower prevalence rates of HBsAg (2.3%) and antibodies to *Treponema pallidum* (3.1%) indicate that although HBV and syphilis remain in the study population, their burden is significantly lower than that of HIV and HCV. Nevertheless, these infections also deserve attention because of their potential for serious health complications and their shared modes of transmission with HIV and HCV.

Overall, the high rates of seropositivity, particularly for HIV and HCV, highlight the urgent need for the strengthening of harm reduction interventions, including increased access to sterile injecting equipment, improved outreach testing, and integrated treatment services. Future studies should seek to distinguish between newly diagnosed and previously known cases to better assess transmission dynamics and the effectiveness of public health interventions.

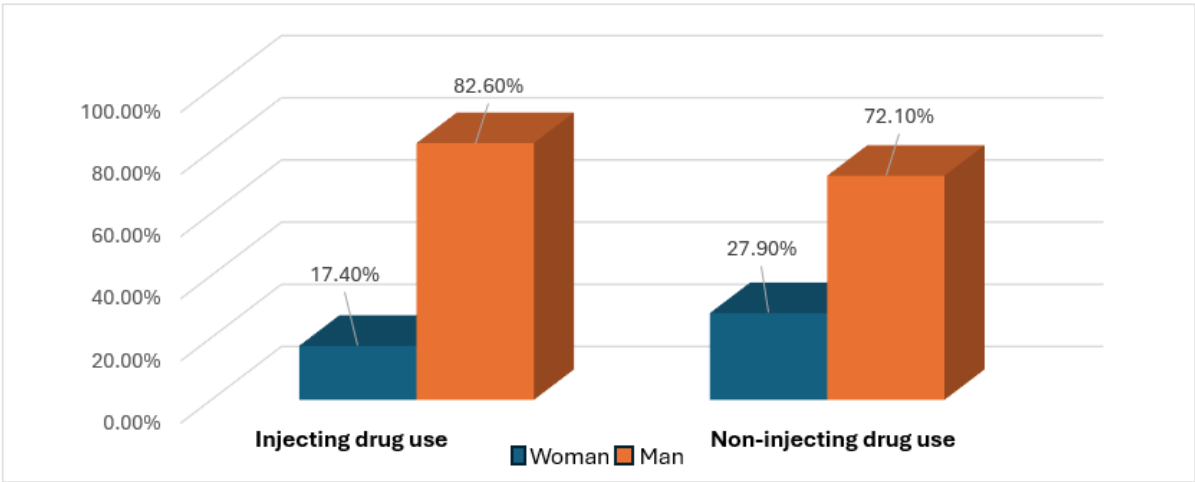
### **Psychoactive substance use**

A significant proportion of the study population reported a history of injecting drug use, with 63.3% (n=304) identifying as current or former people who inject drugs (PWID). This finding is consistent with existing literature highlighting the prevalence of injection practices among PWID populations, particularly in settings with limited harm reduction coverage. A detailed analysis of age of onset of illicit drug use revealed that the mean age at which participants initiated drug use was 17 years. The interquartile range (IQR) further indicated that 25% of participants started using drugs at or before age 15, while 75% started by age 20.5. This distribution suggests that drug use typically begins in adolescence, a developmental period associated with increased neurobiological vulnerability and increased susceptibility to risky behaviours.

In terms of gender distribution among those reporting injecting drug use, the analysis revealed statistically significant differences between people who inject drugs (PWIDs) and non-injecting people who use drugs. Specifically, 82.6% (n=251/304) of participants in the PWID group identified as male, compared with 72.1% (n=127/176) in the non-injecting people who use drugs group. This difference was statistically significant ( $\chi^2=7.214$ ,  $p=0.007$ ), indicating a disproportionate representation of males among PWID group.

This gender disparity is consistent with patterns observed in other studies which consistently report higher rates of intravenous drug use among men. Several factors may contribute to this trend, including gender differences in risk behaviours, social norms around substance use, and differential access to or participation in drug use groups. In addition, structural and cultural factors may shape patterns of initiation and escalation of drug use differently between genders, potentially explaining the higher prevalence of injection among men. At the same time, the significant proportion of women who also inject drugs deserves attention, particularly given the unique health risks they may face, including increased susceptibility to gender-based violence, barriers to accessing care, and higher biological vulnerability to blood-borne infections. The comparative gender distribution between the two groups – PWID and non-injecting PWUD –

is illustrated in the graph below, providing a visual representation of the observed statistically significant differences.



**Fig. 2** Gender distribution among participants according to mode of drug use

Remarkably, the transition from non-injecting to intravenous drug use occurred several years after the initial onset of drug use. The mean age at first injection was 20 years, with an interquartile range of 17 to 24 years. This time lag between first use and initiation of injection may reflect a trajectory of escalating severity of drug use, possibly influenced by factors such as peer pressure, the presence of injection drugs, or the development of tolerance. Of particular concern was the subgroup of participants who started injecting at a very young age: 21.4% (n=65) of PWID reported having started injecting before age 16. Early initiation of injecting drug use is critical due to its association with the more rapid development of dependence, greater cumulative exposure to blood-borne infections, and increased involvement in high-risk behaviours such as needle sharing.

Consistent with expectations and established epidemiological trends, results from the rapid testing component of the study showed a significantly higher prevalence of anti-HIV antibodies among individuals with a history of injecting drug use. Specifically, 17.1% (n=52/304) of PWID tested positive for HIV, compared with 5.11% (n=9/176) among non-injecting drug users. This difference was statistically significant ( $\chi^2=14.449$ ,  $p<0.001$ ), highlighting the increased risk of HIV transmission associated with injecting use. Similarly, seropositivity for hepatitis C virus (HCV) was significantly higher among PWID, with 89.1% (n=271/304) testing positive as opposed to 19.3% (n=34/176) of non-injecting users. This difference was also statistically significant ( $\chi^2=234.602$ ,  $p<0.001$ ). These findings confirm the strong epidemiological association between intravenous drug use and blood-borne viral infections and highlight the urgent need for targeted interventions such as needle and syringe programs, opioid substitution therapy, and early prevention efforts to reduce associated harms.

The duration of illicit drug use emerged as a critical factor associated with the increased risk of various infections, particularly those transmitted through blood and sexual contact. These include HIV/AIDS, hepatitis B and C, and syphilis. Among respondents, the mean duration of

total illicit drug use was 18.3 years (SD=9.19 years). When focusing specifically on injecting drug use, the mean duration was marginally lower at 17.84 years (SD=8.29 years).

To further analyse patterns of injecting drug use, participants were stratified into three categories based on the duration of their injecting practices. A small proportion, 5.3% (n=16), reported injecting drugs for less than one year. Another 6.6% (n=20) had engaged in injection practices for one to five years. However, the majority, 88.1% (n=268), reported a duration of more than five years. This distribution highlights the chronic nature of drug dependence among this population and underlines the urgent need for sustained public health interventions targeting long-term users.

### **Type of drug used**

In contrast to results reported in earlier studies, our data show a marked change in the pattern of substance use among the study population. Specifically, methadone emerged as the most commonly used substance, overtaking heroin, which has traditionally held a dominant position in similar cohorts. This shift likely reflects broader trends observed in recent years characterised by the increasing abuse of prescription drugs, particularly opioid substitution therapies such as methadone. Although methadone is widely used as a component of substitution treatment for opioid use disorder, its diversion and abuse point to systemic problems in access, monitoring, and education in relation to the appropriate therapeutic use.

Heroin use, although no longer the most dominant substance reported, remains serious and continues to pose significant risks to users, particularly in the context of injection-related complications and blood-borne infections.

Of particular concern is the observed increase in methamphetamine use, especially among PWID (Table 3). Methamphetamines, due to their potent psychostimulant effects and high potential for dependence, present unique challenges in terms of both medical treatment and harm reduction strategies. The increase in methamphetamine use among PWID not only exacerbates the risk of comorbid physical and psychiatric illnesses, but also contributes to increased rates of infectious disease transmission due to riskier injection practices.

Collectively, these findings highlight the evolving nature of substance use patterns and underline the need for adaptive, evidence-based public health responses which address both traditional substances such as heroin and emerging threats such as the rise in methadone and methamphetamine use.

**Table 3.** Distribution by drug type of non-injecting and injecting drug-user participants

Type of drug used	Use (n=480) n (%)	Injection (n=304) n (%)
<b>Heroin</b>	<b>123 (25.6)</b>	<b>64 (21.1)</b>
Substitol/Morphine/Lydol	7 (1.4)	3 (0.9)
<b>Methadone</b>	<b>257 (53.5)</b>	<b>161 (53)</b>
Fentanyl	34 (7.1)	15 (4.9)
<b>Cocaine</b>	<b>53 (11.0)</b>	<b>36 (11.8)</b>
Crack cocaine	7 (1.4)	2 (0.6)
Speedball	8 (1.6)	7 (2.3)

<b>Amphetamines</b>	<b>37 (7.7)</b>	<b>19 (6.2)</b>
<b>Methamphetamines</b>	<b>154 (32.1)</b>	<b>62 (20.4)</b>
Benzodiazepines	5 (1.0)	2 (0.6)
Diazepam	5 (1.0)	1 (0.3)
<b>Rivotril</b>	110	1 (0.3)
Leponex	8 (1.6)	2 (0.6)
Atarax	2 (0.4)	2 (0.6)
Pregabalin	2 (0.4)	2 (0.6)
<b>Marijuana</b>	<b>99 (20.6)</b>	0 (0)
<b>Cannabinoid</b>	<b>102 (21.2)</b>	0 (0)
Laughing gas	4 (0.8)	0 (0)

### Frequency of illicit drug use

In addition to identifying the types of psychoactive substances used, the survey instrument was designed to capture detailed information regarding the frequency of drug use among participants. This measure provides critical insight into the intensity of substance dependence and the potential health risks associated with repeated use. Data revealed that a significant proportion of respondents reported using drugs multiple times per day, with the most commonly cited patterns being 2-3 times per day (32.7%) and once per day (30.4%). These figures highlight a high level of habitual use, which may reflect both physiological dependence and behavioural patterns associated with substance use disorders.

A comparable pattern emerged in relation to the frequency of drug injection. Among participants who engaged in intravenous drug use, the most commonly reported frequencies were once daily (26.6%) and 2-3 times per day (26.0%) (Table 4). The similarity in frequency distribution between general use and injection-specific behaviours suggests that many individuals in this population rely on injection as their primary route of drug administration, which is associated with increased health risks, including vein damage, overdose, and transmission of infectious diseases such as HIV and Hepatitis C.

**Table 4.** Distribution of participants according to frequency of drug use.

	<b>Use (other than injecting)</b>	<b>Injecting</b>
1 time in the last month	8 (1.7)	15 (4.9)
2-3 times in the last month	20 (4.2)	11 (3.6)
1 time per week	8 (1.7)	7 (2.3)
2-3 times a week	54 (11.3)	28 (9.2)
4-5 times a week	15 (3.1)	6 (2.0)
1 time per day	<b>146 (30.4)</b>	<b>81 (26.6)</b>
2-3 times a day	<b>157 (32.7)</b>	<b>79 (26.0)</b>
4 or more times a day	67 (14.0)	15 (4.9)
No answer	3 (0.6)	62 (20.4)

### Risky injection practices

Among people who inject drugs, the risk of contracting blood-borne infections such as HIV, hepatitis B and hepatitis C is significantly increased due to the prevalence of high-risk injecting

practices. One of the most critical risk factors is the sharing of injecting equipment, especially needles and syringes, which can make the direct transmission of infectious agents through contaminated blood easier.

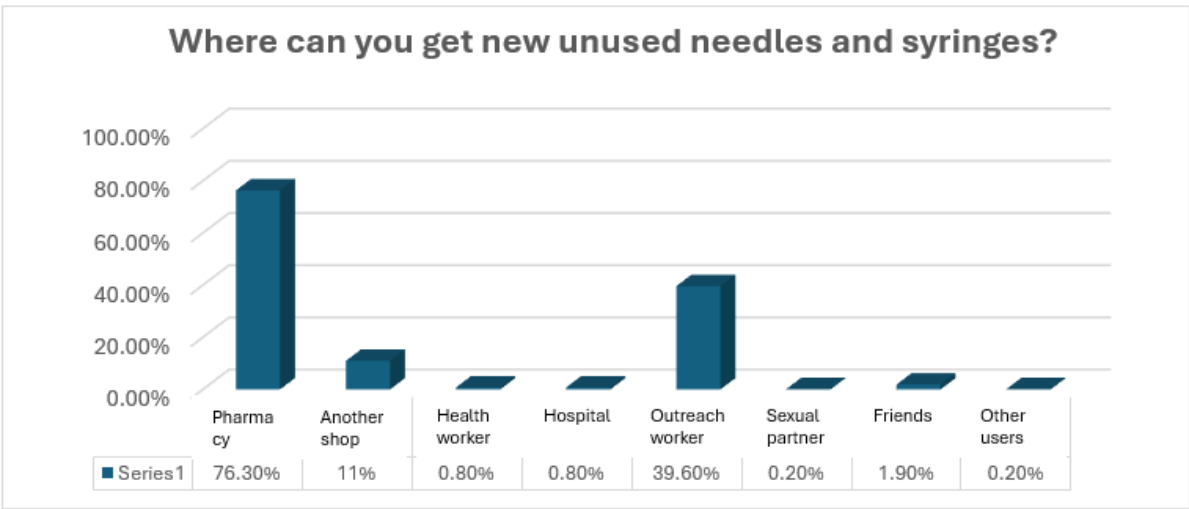
In the study, 38 participants, representing 12.5% of surveyed PWID, admitted to practicing such high-risk behaviours. Most of these individuals reported borrowing needles or syringes from friends or, in some cases, from casual sexual partners – both scenarios significantly increasing the risk of cross-contamination and infection.

Of particular concern is the finding that 4.3% of PWID reported consistently using previously used injecting equipment – either "every time" or "at least half the time" – in the past month. This regular pattern of reuse represents a persistent and dangerous practice, suggesting systemic barriers to accessing sterile injecting equipment or a lack of awareness of the associated risks.

Another behaviour identified as contributing to the transmission of bloodborne pathogens is the use of prefilled syringes, the origin and sterility of which are often unknown. In our sample, 21 participants (6.9%) admitted to engaging in this practice. The use of prefilled syringes is particularly worrisome as they can be distributed in informal or illegal settings where proper sanitation and safety standards cannot be guaranteed.

Despite these worrying behaviours, the study also revealed a relatively high level of access to sterile injecting equipment. In line with findings from previous studies of drug-using populations, a large proportion of participants (80.2%, n=385) indicated that they could obtain new, unused needles and syringes if needed. This suggests that while risky practices persist, there is a baseline level of infrastructure or awareness which facilitates harm reduction.

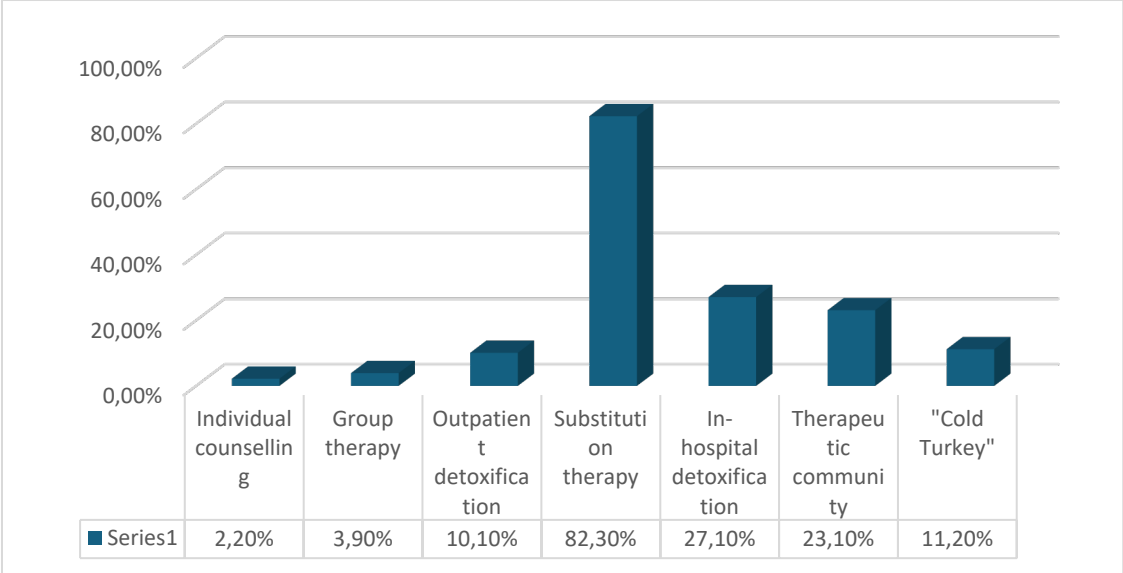
In addition, the data collected included information on the most common sources and locations from which participants access clean injecting equipment (Fig. 3). These findings, presented in the figure below, offer important information for public health officials and harm reduction providers aiming to improve access to and distribution of sterile equipment.



**Fig. 3.** Distribution of participant responses according to choice of location/provider of unused needles or syringes.

Among the individuals enrolled in this study, a total of 277 participants (57.7%) reported receiving treatment for substance use disorders at some point in their lives, either currently or in the past. At the time of data collection, 132 individuals (27.5%) were actively engaged in treatment. This reflects a significant proportion of the study population with a history of treatment, highlighting the chronic and relapsing nature of substance use disorders, as well as the ongoing need for accessible and continued care options.

The most commonly reported form of treatment was opioid substitution therapy, cited by 82.3% of those who were treated (Fig. 4). Substitution therapies, such as those using methadone or buprenorphine, represent an evidence-based approach to managing opioid dependence and have been shown to reduce illicit opioid use, improve treatment retention, and reduce the risk of overdose and transmission of infectious diseases. The high prevalence of substitution therapy use among participants is consistent with current treatment protocols and reflects ongoing efforts to implement pharmacological interventions as the cornerstone of care.



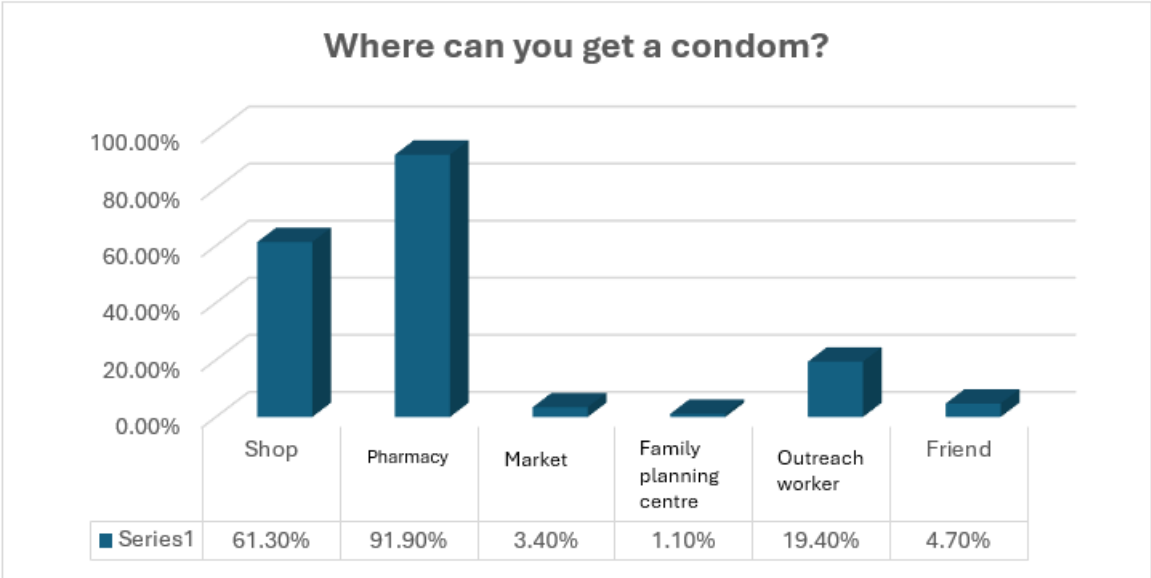
**Fig. 4.** Distribution of the more commonly utilised and preferred treatment modalities used by participants.

**Condom use**

When asked if they had ever heard of a condom, 99.2% of respondents gave a positive answer. Encouragingly, 90.4% of respondents reported having used a condom at some point with a sexual partner, suggesting a general awareness of precautions. In addition, the vast majority (97.7%) indicated that they knew where to get condoms. This high level of awareness and accessibility is a positive indicator of public health efforts aimed at promoting safer sexual practices.

The sources from which individuals reported obtaining condoms provide insight into the infrastructure supporting harm reduction and sexual health promotion. Pharmacies emerged as the most common source, cited by 91.9% (n=441) of respondents, followed by regular outlets such as supermarkets or shops, reported by 61.3% (n=294) (Fig. 5). Notably, 19.4% (n=93) of participants received condoms from social workers, highlighting the critical role of harm

reduction programs in reaching populations that may be underserved by traditional health or commercial systems. These programs often target individuals engaging in high-risk behaviours, such as intravenous drug use, and play a key role in ensuring equitable access to prevention resources.



**Fig. 5.** Sources and locations from which participants obtain condoms.

These findings emphasise the continued relevance and need for integrated behavioural interventions and public education efforts which not only raise awareness but also highlight the importance of consistent condom use. Such strategies should particularly target populations at increased risk for STIs due to factors such as substance use, unstable housing, or limited access to health services. By reinforcing positive behaviours and overcoming barriers to consistent condom use, public health initiatives can more effectively mitigate the spread of infectious diseases and promote overall sexual health.

**Knowledge of sexually transmitted infections (STIs)**

The study revealed a high level of general knowledge of sexually transmitted infections (STIs) among participants, with 94.4% (n=453) reporting that they had heard of STIs. While this figure suggests widespread exposure to basic sexual health information, further analysis suggests that this general knowledge does not consistently translate into comprehensive or nuanced knowledge of the clinical manifestations of sexually transmitted infections (STIs), particularly in relation to gender-specific symptoms.

When participants were asked to identify symptoms of STIs in women, only 178 individuals (37.1%) were able to identify at least one symptom. Among this subgroup, the most frequently mentioned symptoms were genital discharge (n=134, 75.3%), discharge with unpleasant odour (n=93, 52.2%), and genital sores (n=41, 23.0%). These findings highlight a limited understanding of female-specific symptoms of STIs, which may have significant public health implications. Insufficient knowledge may delay healthcare seeking and contribute to ongoing transmission, particularly in marginalised populations such as people who use drugs, who often

face additional barriers to healthcare access, including stigma, discrimination, and structural disadvantages.

Knowledge of STI symptoms was slightly more prevalent among men, with 191 participants (39.8%) able to correctly identify at least one symptom. Remarkably, when the data were stratified by drug use behaviour, they showed that participants who reported intravenous drug use were significantly more likely to demonstrate knowledge of STI symptoms in men. Specifically, 47.2% (n=142/304) of PWID reported knowledge of at least one symptom, compared to only 27.8% (n=49/176) among non-injecting PWUD. This difference was statistically significant ( $\chi^2=14.754$ ,  $p=0.001$ ).

This disparity in knowledge between PWID and non-injecting PWUD may reflect differential exposure to health education and outreach services, particularly those integrated into harm reduction programs, where topics such as safe sex practices and STI awareness are often emphasized. However, the generally low levels of detailed knowledge about symptoms, particularly in relation to female-specific manifestations, highlight a critical gap in sexual health literacy. Bridging this gap through targeted, gender-sensitive educational interventions is essential to improve early detection and treatment of STIs and to support broader public health goals in high-risk populations.

The most frequently mentioned symptoms included penile discharge (n=140, 73.3%), burning sensation during urination (n=89, 46.6%), and itching in the groin area (n=51, 26.7%).

In the 12 months preceding the survey, 8.5% (n=41) of respondents reported genital discharge, while 4.2% reported sores or rashes in the genital area. Despite the presence of such symptoms, engagement with diagnostic services remained alarmingly low. Only two participants reported having been tested for STIs in the past year. This gap between symptom recognition and test uptake highlights significant barriers to accessing appropriate sexual health services, which may include stigma, limited health infrastructure, or a lack of perceived risk.

Biological testing conducted as part of the study further revealed the presence of antibodies to syphilis. Using rapid diagnostic testing for *Treponema pallidum*, 15 individuals (3.1%) tested positive. There was a statistically significant difference between genders in the prevalence of positive results: 7.4% of women (7 of 95) had a positive result compared with 2.2% of men (8 of 370), with the difference reaching statistical significance ( $\chi^2=5.977$ ,  $p=0.014$ ). This suggests that women in the sample may be at greater risk of undiagnosed or untreated syphilis, potentially due to biological susceptibility, differences in healthcare-seeking behaviour, or increased exposure through sexual or drug-related risk factors.

No statistically significant associations were found between syphilis positivity and participants' age or type of drug use. This finding suggests that the risk of infection may be distributed among different demographic and behavioural subgroups, reinforcing the need for universal rather than targeted STI screening strategies in this population.

Collectively, these findings highlight the critical importance of enhancing sexual health education, improving access to STI testing and treatment services, and addressing the specific

needs of both men and women in populations with high rates of substance use and associated health vulnerabilities.

### **Knowledge, perceptions and attitudes about HIV/AIDS**

A significant majority of study participants (94.6%, n=454) reported having heard of HIV/AIDS, indicating a high level of general knowledge among the study population. This widespread recognition suggests that public health messages about HIV/AIDS have achieved significant reach. However, general knowledge does not necessarily equate to comprehensive understanding, especially regarding specific modes of HIV transmission and effective prevention strategies. It is notable that a significant proportion of respondents (n=319) reported personal acquaintance with persons living with HIV or who had died from AIDS-related complications. This personal acquaintance was significantly higher among participants who inject drugs (PWID), with 85.8% (n=261) confirming such connections, compared to 32.9% (n=58) among non-injecting PWUD. The difference was statistically significant ( $p < 0.001$ ), highlighting the increased prevalence and visibility of HIV/AIDS in PWID communities.

This higher level of personal acquaintance among PWID may promote increased emotional engagement with the topic of HIV/AIDS. However, this does not necessarily mean a deeper understanding of HIV transmission routes. Research suggests that while general awareness of HIV is often high among people who inject drugs (PWID), detailed knowledge of transmission mechanisms, such as the risks associated with sharing injecting equipment or engaging in unprotected sex, may be lacking.

Despite the widespread awareness, the data reveal several critical gaps in participants' understanding of HIV/AIDS transmission mechanisms. Notably, 20.2% of respondents (n=97) mistakenly believe that HIV can be transmitted by eating food prepared by an infected person. This misconception reflects the persistence of stigma and misinformation that can contribute to the social exclusion of people living with HIV (PLHIV). Equally concerning is the lack of awareness of vertical transmission (mother-to-child): 7.3% of respondents do not believe that an HIV-positive pregnant woman can transmit the virus to her unborn child, and an additional 16.7% are unsure. A similar knowledge deficit is evident with regard to transmission through breastfeeding, with 18.1% of respondents claiming that transmission in this context is not possible.

Such misconceptions have important public health implications, especially in communities with limited access to accurate health information and services. They highlight the ongoing need for targeted educational interventions which address not only the biomedical facts of HIV transmission, but also the social and structural barriers perpetuating misinformation.

Awareness of the availability of preventive measures such as pre-exposure prophylaxis (PrEP) was extremely low among participants, with only a small proportion of the sample reporting awareness of this biomedical intervention. Given that PrEP is a highly effective method for preventing HIV infection when taken consistently, this lack of awareness represents a missed opportunity in the broader strategy to limit the spread of HIV, particularly among high-risk populations.

One of the most striking findings of the study was the relationship between drug use patterns and HIV status. Among the total sample, nearly one-fifth (22.1%) of participants reported never having been tested for HIV, which is particularly concerning given their elevated risk profile. Analysis of seroprevalence data revealed a statistically significant association between intravenous drug use and HIV positivity. Specifically, 17.1% (52 of 304) of PWID tested positive for anti-HIV antibodies, compared with only 5.1% (9 of 176) among non-injecting PWUD. This difference was statistically significant ( $\chi^2=14.449$ ,  $p<0.001$ ), highlighting the increased vulnerability of people who inject drugs to HIV infection, possibly due to factors such as needle sharing and limited access to harm reduction services.

Collectively, these findings underline the urgent need for comprehensive harm reduction strategies, including needle sharing programs, HIV testing and counselling services, PrEP awareness campaigns, and educational initiatives aimed at correcting misconceptions regarding HIV transmission. These interventions should be tailored specifically to the needs of people who use drugs, with an emphasis on those who inject, to effectively reduce the spread of HIV and improve health outcomes in this population.

**Table 5.** Distribution among participants regarding questions on HIV/AIDS knowledge.

<b>HIV/AIDS knowledge questions</b>	<b>n (%)</b>
<b>Can the risk of contracting HIV/AIDS be reduced by condom use?</b>	
Yes	400 (83.3)
No	26 (5.4)
Don't know	28 (5.9)
No answer	26 (5.4)
<b>Can a person get HIV/AIDS from a mosquito bite?</b>	
Yes	191 (39.8)
No	178 (37.1)
Don't know	111 (23.1)
<b>Can the risk of HIV/AIDS be reduced by having sex with only one regular, faithful and healthy partner?</b>	
Yes	356 (74.2)
No	78 (16.3)
Don't know	46 (9.5)
No answer	
<b>Can a person become infected with HIV/AIDS if they eat from the food of someone who is infected?</b>	
Yes	97 (20.2)
No	328 (68.3)
Don't know	27 (5.6)
No answer	28 (5.9)
<b>Can a person protect themselves from HIV/AIDS by not using other people's needles, syringes, caps, etc.?</b>	
Yes	399 (83.1)
No	38 (7.9)
Don't know	16 (3.4)
No answer	27 (5.6)

<b>Can an injecting drug user protect themselves from HIV/AIDS by starting to take drugs in another way (e.g. on film) or switching to non-injecting drugs?</b>	
Yes	356 (74.2)
No	53 (11.0)
Don't know	46 (9.6)
No answer	25 (5.2)
<b>Is it possible for a pregnant woman infected with HIV/AIDS to transmit the virus to her unborn child?</b>	
Yes	338 (70.4)
No	35 (7.3)
Don't know	80 (16.7)
No answer	27 (5.6)
<b>Can a mother infected with HIV/AIDS transmit the virus to her baby through breastfeeding?</b>	
Yes	237 (49.4)
No	87 (18.1)
Don't know	127 (26.5)
No answer	29 (6.0)
<b>Have you ever been tested for HIV/AIDS?</b>	
Yes	346 (72.1)
No	106 (22.1)
No answer	28 (5.8)
<b>Have you ever heard of Prep before?</b>	
Yes	11 (2.3)
No	336 (70.0)
No answer	133 (27.7)

### **Knowledge of hepatitis B and hepatitis C**

More than half of the study participants had heard of the hepatitis B virus (HBV) and hepatitis C virus (HCV), with 78.3% (n=376) being aware of HBV and 81.3% (n=390) of HCV. However, more in-depth analysis revealed significant knowledge gaps in key areas related to transmission, prevention and treatment. For example, while 64.8% of participants correctly indicated that HBV can be transmitted through shared needles and syringes, a significant proportion – 22.3% – did not provide an answer and 8.3% stated that they did not know. Only 60.2% knew that HBV could be transmitted through sexual contact, and less than half (44.4%) were aware that an infected mother could transmit the virus to her child during pregnancy. Similar trends were observed for hepatitis C. While 73.3% of participants were aware that a treatment for HCV existed, only 66.3% correctly recognised the possibility of sexual transmission, and 51.0% were aware of the possibility of vertical transmission (mother-to-child). In addition, 66.5% reported being tested for HCV, while only 55.0% had been tested for HBV.

Vaccination awareness was also limited, with only 40.8% of participants aware of the availability of an HBV vaccine. This lack of knowledge is exacerbated by the fact that nearly a

quarter of respondents (21.7%) did not answer the question about vaccine availability, and 28.1% explicitly stated that they did not know.

These findings highlight a clear need for targeted education initiatives among PWUD aimed at improving awareness and understanding of viral hepatitis, including modes of transmission, prevention strategies, and available treatments. This can be achieved effectively through additional educational sessions and community outreach programs.

In addition, there was a statistically significant difference in anti-HCV antibody seroprevalence by gender: 66.9% of male participants (253 of 378) tested positive compared with 51.0% of female participants (52 of 102),  $\chi^2=8.822$ ,  $p=0.003$ . This suggests gender-related inequalities in exposure risk or healthcare-seeking behaviours, further highlighting the need for tailored interventions.

**Table 6.** Distribution among participants regarding questions on hepatitis B and hepatitis C knowledge

<b>Hepatitis B and hepatitis C knowledge questions</b>	<b>n (%)</b>
<b>Have you ever heard of the hepatitis B virus?</b>	
Yes	376 (78.3)
No	99 (20.7)
Don't know	1 (0.2)
No answer	4 (0.8)
<b>Is there a vaccine available for hepatitis B?</b>	
Yes	196 (40.8)
No	45 (9.4)
Don't know	135 (28.1)
No answer	104 (21.7)
<b>Can hepatitis B be transmitted through used needles and syringes?</b>	
Yes	311 (64.8)
No	22 (4.6)
Don't know	40 (8.3)
No answer	107 (22.3)
<b>Can a person get hepatitis B through sexual contact</b>	
Yes	289 (60.2)
No	32 (6.7)
Don't know	54 (11.3)
No answer	105 (21.8)
<b>Have you ever been tested for hepatitis B</b>	
Yes	264 (55.0)
No	100 (20.8)
No answer	116 (24.2)
<b>Can hepatitis B be transmitted by sharing personal items such as razors and toothbrushes?</b>	
Yes	309 (64.4)
No	25 (5.2)
Don't know	39 (8.1)
No answer	107 (22.3)

<b>Can a woman infected with hepatitis B transmit the virus to her child during pregnancy?</b>	
Yes	213 (44.4)
No	30 (6.3)
Don't know	128 (26.7)
No answer	109 (22.6)
<b>Have you ever heard of the hepatitis C virus?</b>	
Yes	390 (81.3)
No	83 (17.3)
No answer	7 (1.4)
<b>Is there a treatment for hepatitis C?</b>	
Yes	352 (73.3)
No	20 (4.2)
Don't know	108 (22.5)
<b>Can a person get hepatitis C from sexual contact?</b>	
Yes	318 (66.3)
No	43 (9.0)
Don't know	32 (6.7)
No answer	87 (18.0)
<b>Have you ever been tested for hepatitis C?</b>	
Yes	319 (66.5)
No	70 (14.6)
No answer	91 (18.9)
<b>Can a woman infected with hepatitis C transmit the virus to her child during pregnancy?</b>	
Yes	245 (51.0)
No	42 (8.8)
Don't know	106 (22.2)
No answer	87 (18.0)

### **Reach of interventions to the target group**

One of the aims of the study was to assess the extent to which harm reduction interventions – particularly access to outreach programmes – effectively reached those in the target group, namely people who use drugs. Our findings revealed a significant gap in services: a substantial proportion of participants (n=349, 72.7%) reported interacting with an outreach worker. This highlights a gap in the reach and accessibility of current harm reduction efforts and underlines the need to expand the reach and intensity of outreach initiatives. Improving these services could play a key role in ensuring more people in this vulnerable group being engaged, informed and supported.

During the assessment of service use over the previous 12-month period, participants reported varying levels of access to key harm reduction and health services. The most commonly used service was the needle and syringe exchange program, with 179 participants (51.3%) indicating use. This was followed by provision of free condoms (n=114; 32.7%), methadone replacement therapy (n=109; 31.2%) and HIV testing (n=87; 24.9%). A smaller proportion of participants reported access to drop-in centres (n=73; 20.9%) and counselling (n=38; 10.9%). These

findings suggest that although some services are used moderately, there is still a significant proportion of the target group who do not benefit from the full range of harm reduction interventions. This further underlines the need for a comprehensive expansion of outreach and service delivery efforts to effectively address the multifaceted needs of people who use drugs.

### Characteristics of participants with positive HIV and hepatitis C test results

To gain a clearer picture of the individuals who tested positive on rapid HIV and HCV seropositivity testing, we further examined their characteristics in detail. The table shows their demographic characteristics respectively.

**Table 7.** Demographic characteristics of the groups in relation to HIV and hepatitis C serostatus

Demographic characteristics	HIV (-) (n=419)	HIV (+) (n=61)	p-value	HCV (-) (n=175)	HCV (+) (n=305)	p-value
<b>Age</b>	38.25±9.15	38.69±5.63	0.713*	40.90±6.892	33.78±9.834	<b>0.000*</b>
<b>Age group</b>						
< 20 years	5 (1.2)	0 (0)		5 (3.0)	0 (0)	
20-29 years	85 (20.3)	3 (4.9)		66 (37.7)	22 (7.2)	
30-39 years	106 (25.3)	26 (42.6)	<b>0.002</b>	54 (30.8)	78 (25.6)	<b>&lt;0.001</b>
40-49 years	191 (45.6)	31 (50.8)		40 (22.8)	182 (59.7)	
50+ years	32 (7.6)	1 (1.7)		10 (5.7)	23 (7.5)	
<b>Gender</b>						
Male	327 (78.0)	51 (83.6)	0.321	125 (71.4)	253 (83.0)	<b>0.003</b>
Female	92 (22.0)	10 (16.4)		50 (28.6)	52 (17.0)	
<b>Education</b>						
Primary	56 (13.4)	15 (24.6)		36 (20.6)	35 (11.5)	
Lower secondary	133 (31.7)	21 (34.4)		63 (36.0)	91 (29.8)	
Secondary	172 (41.0)	18 (29.4)	0.238	50 (28.6)	140 (45.9)	<b>&lt;0.001</b>
Higher	18 (4.3)	1 (1.7)		5 (3.0)	14 (4.6)	
Has not attended school	31 (7.5)	4 (6.6)		14 (8.0)	21 (6.9)	
No answer	9 (2.1)	2 (3.3)		7 (3.8)	4 (1.3)	
<b>Availability of a place to live</b>						
Yes	350 (83.5)	44 (72.1)		131 (74.8)	263 (86.2)	
No	67 (16.0)	17 (27.9)	0.066	43 (24.6)	41 (13.4)	<b>0.008</b>
No answer	2 (0.5)	0 (0)		1 (0.6)	1 (0.4)	

\*T-test

The comparison of mean ages revealed no statistically significant difference between individuals with a positive anti-HIV antibody test and those with a negative test, indicating that the age distribution was relatively similar in both groups. In contrast, there was a statistically significant difference between seronegative and seropositive persons for hepatitis C virus (HCV). Specifically, the mean age of HCV-negative participants was  $40.9 \pm 6.9$  years, whereas HCV-positive individuals had a mean age of  $33.8 \pm 9.8$  years ( $p < 0.001$ ), suggesting a younger age profile among HCV-infected individuals. Age stratification further highlighted significant differences in age distribution patterns for both HIV and HCV. For HIV, the age profile varied significantly between seropositive and seronegative individuals ( $p = 0.002$ ). Among those who were HIV-positive, the majority were concentrated in the 30-49 age group, reflecting the higher burden of infection in this demographic. Conversely, among HIV-negative individuals, there

was a small but noticeable proportion of participants under the age of 20, which may suggest early exposure to risk factors or more frequent testing in younger populations. For HCV, the difference in age distribution was even more pronounced ( $p < 0.001$ ). The most represented age group among HCV-positive individuals was 40-49 years, highlighting the cumulative nature of risk with increasing age, potentially associated with long-term exposure to transmission routes such as intravenous drug use or unscreened blood transfusions at an earlier age. Gender distribution also revealed significant trends. Among HCV-positive individuals, men were significantly overrepresented, consistent with the broader literature on HCV epidemiology. This gender disparity may reflect different behavioural risk profiles, including higher prevalence of intravenous drug use, occupational exposures, or other socio-behavioural factors more commonly associated with men in certain populations.

Among those who tested positive for anti-HIV antibodies, 22.9% ( $n=14$ ) reported ever being married, while 17.0% ( $n=52$ ) of those who tested positive for anti-HCV antibodies reported a marital history. The mean age at first marriage among HIV-positive individuals was 25 years, compared with 27 years among those seropositive for hepatitis C, indicating a slightly earlier onset of marriage in the former group.

In regards to recent sexual activity, a significant proportion of seropositive persons reported being sexually active. Specifically, 60.6% of those living with HIV and 74.4% of those with hepatitis C infection reported having had sexual intercourse in the past 12 months. In a shorter time period, 45.9% ( $n = 28$ ) of HIV-positive individuals and 55.0% ( $n=168$ ) of HCV-positive individuals reported sexual activity in the past month, highlighting continued participation in potentially risky behaviours despite infection status.

Condom use at last sexual contact was suboptimal in both groups. Only 53.6% of HIV-positive individuals reported condom use during their last sexual encounter, and an even lower proportion – 47.0% – was observed among HCV-positive individuals. These findings are concerning, especially in the context of ongoing transmission risks, and highlight the need for increased sexual health education and prevention strategies tailored to seropositive populations.

The relatively low rates of condom use, despite awareness of infectious status, suggest persistent gaps in risk perception, access to prevention resources, or behavioural interventions. These patterns are also consistent with findings from other studies showing that awareness of seropositive status does not always translate into consistent prevention practices. Therefore, public health programs should prioritize sustained behavioural counselling and support for persons diagnosed with HIV and HCV, particularly in promoting safer sexual practices to prevent further transmission.

### **Psychoactive substance use**

Analysis of patterns of psychoactive substance use among individuals stratified by serostatus for HIV and hepatitis C (HCV) revealed several statistically significant differences, highlighting the association between specific drug use behaviours and seropositivity. In terms of HIV status, individuals who tested positive for anti-HIV antibodies were significantly more likely to report methadone use, with 73.8% of HIV-seropositive individuals reporting such use

compared with 50.6% among their HIV-seronegative counterparts ( $p < 0.001$ ). This association may reflect the higher likelihood of opioid substitution therapy participation among those already in health systems due to their HIV diagnosis. In contrast, marijuana use was significantly more prevalent among HIV-seronegative individuals, suggesting different substance use profiles between the two groups.

**Table 8.** Distribution among the groups in terms of serostatus for HIV and hepatitis C versus type of substance used.

Type of drug used	HIV (-) Use (n=419) n (%)	HIV (+) Use (n=61) n (%)	p- value	HCV (-) Use (n=175) n (%)	HCV (+) Usage (n=305) n (%)	p- value
Heroin	108 (25.8)	15 (24.6)	0.827	35 (20.0)	88 (28.8)	<b>0.034</b>
Substitol/Morphine	5 (1.2)	2 (3.3)	0.207	2 (1.1)	5 (1.6)	0.664
Methadone	212 (50.6)	45 (73.8)	<b>0.001</b>	42 (24.0)	215(70.5)	<b>&lt;0.001</b>
Fentanyl	31 (7.4)	3 (4.9)	0.475	10 (5.7)	24 (7.9)	0.379
Cocaine	48 (11.4)	5 (8.2)	0.441	6 (3.4)	47 (15.4)	<b>&lt;0.001</b>
Crack cocaine	7 (1.7)	0 (0)	0.308	3 (1.7)	4 (1.3)	0.721
Speedball	8 (1.9)	0 (0)	0.275	0 (0)	8 (2.6)	<b>0.031</b>
Amphetamines	33 (7.9)	4 (6.6)	0.711	13 (7.4)	24 (7.9)	0.868
Methamphetamines	138 (32.9)	16 (26.2)	0.284	56 (32.0)	98 (32.1)	0.990
Benzodiazepines	5 (1.2)	0 (0)	0.390	1 (0.6)	4 (1.3)	0.444
Diazepam	5 (1.2)	0 (0)	0.390	0 (0)	5 (1.6)	0.089
Rivotril	92 (21.9)	18 (29.5)	0.197	21 (12.0)	89 (29.2)	<b>&lt;0.001</b>
Leponex	6 (1.4)	2 (3.3)	0.295	2 (1.2)	6 (1.9)	0.499
Atarax	2 (0.5)	0 (0)	0.588	0 (0)	2 (0.6)	0.284
Marijuana	96 (22.9)	3 (4.9)	<b>0.001</b>	53 (30.3)	46 (15.1)	<b>&lt;0.001</b>
Cannabinoid	94 (22.4)	8 (13.1)	0.093	65 (37.1)	37 (12.1)	<b>&lt;0.001</b>
Laughing gas	4 (1.0)	0 (0)	0.442	4 (2.4)	0 (0)	<b>0.008</b>

Similar trends were observed when comparing substance use by serologic status for HCV. Individuals seropositive for anti-HCV antibodies demonstrated significantly higher rates of methadone, cocaine, and neuroleptic (e.g., Rivotril) use. These substances are often associated with injection or high-risk consumption patterns, which are well-established risk factors for HCV transmission. In contrast, those who tested negative for anti-HCV antibodies were significantly more likely to report recreational use of marijuana and cannabinoids, substances not typically associated with blood routes of transmission. These findings highlight the strong correlation between injecting drug use and seropositivity for both HIV and HCV. The higher prevalence of methadone use among seropositive individuals may reflect both past opioid dependence and current participation in substitution programs. Conversely, the prevalence of non-injecting drug use among seronegative persons may suggest a behavioural profile of lower risk with respect to blood-borne infections. The data underline the importance of targeted prevention and intervention strategies which account for substance use patterns. For seropositive populations, particularly those who engage in high-risk drug use, integrated care approaches combining substance use treatment with infectious disease management are essential. In addition, harm reduction services, including needle and syringe programs, opioid

substitution therapy, and counselling, must be scaled and adapted to reflect the specific needs of these subgroups.

### Frequency of illicit drug use

In addition to identifying the types of psychoactive substances used, the survey instrument was specifically designed to collect detailed information on the frequency of drug use and injection practices among participants. This allowed for a more nuanced understanding of behavioural patterns associated with substance use, particularly among individuals seropositive for antibodies to HIV and hepatitis C virus (HCV).

Analysis of the data revealed that HIV-positive respondents most commonly reported using or injecting drugs between one and three times per day, with once per day or two to three times per day being the predominant patterns. These findings suggest a high level of substance dependence and sustained drug seeking, which may contribute to an ongoing risk of disease transmission and complicate adherence to treatment regimens.

A similar trend was observed among individuals who tested positive for anti-HCV antibodies. The most commonly reported frequency of drug use and injecting in this group was two to three times per day (reported by 34.7% for drug use and 27.0% for injecting) and once per day (reported by 34.4% for drug use and 25.9% for injecting). These high rates of daily use and injecting are indicative of chronic, heavy substance use behaviour which is strongly associated with increased risk of both infection and transmission of HCV.

**Table 9.** Distribution among groups testing positive for HIV/hepatitis C antibodies versus frequency of use/injecting.

Frequency of use/injecting	HIV (+)	HIV (+)	HCV (+)	HCV (+)
	Use (n=61) n (%)	Injecting (n=53) n (%)	Use (n=305) n (%)	Injecting (n=270) n (%)
1 time in the past month	1 (1.6)	3 (5.7)	5 (1.6)	13 (4.8)
2-3 times in the past month	3 (4.9)	2 (3.8)	13 (4.3)	9 (3.3)
1 time per week	1 (1.6)	0 (0)	3 (1.0)	7 (2.6)
2-3 times per week	7 (11.4)	8 (15.1)	30 (9.8)	27 (10)
4-5 times per week	1 (1.6)	0 (0)	6 (1.9)	4 (1.6)
1 time per day	20 (32.8)	15 (28.3)	105 (34.4)	70 (25.9)
2-3 times per day	20 (32.8)	12 (22.6)	106 (34.7)	73 (27.0)
4 or more times per day	8 (13.1)	2 (3.8)	35 (11.5)	13 (4.8)
No answer	0 (0)	11 (20.7)	2 (0.8)	54 (20)

These findings highlight the critical need for harm reduction interventions – such as needle and syringe exchange programs, opioid substitution therapy, and comprehensive addiction treatment services – particularly tailored to individuals with high rates of drug use. In addition, frequent drug injection requires enhanced infection control education, regular screening, and linkage to care for those living with or at risk for HIV and HCV.

By accounting for both substance type and frequency of use, the study highlights not only the prevalence of high-risk behaviours in seropositive populations, but also the urgency of targeted

public health interventions aimed at reducing the burden of blood-borne infections and improving outcomes among people who use drugs.

### Knowledge about HIV/AIDS

We further analysed the knowledge of participants with a positive HIV/AIDS antibody test result to determine whether their knowledge differed from the overall sample.

**Table 10.** Distribution among participants regarding questions on HIV/AIDS knowledge.

HIV/AIDS knowledge questions	HIV (+) (n=61)	HIV (-) (n=419)	p-value
<b>Do you personally know someone who is infected with HIV or has died from AIDS?</b>			
Yes	52 (85.2)	267 (63.7)	<b>0.046</b>
No	9 (14.8)	120 (28.6)	
No answer	0 (0)	32 (7.7)	
<b>Can condom use reduce the risk of contracting HIV/AIDS?</b>			
Yes	50 (82.0)	350 (83.5)	0.390
No	6 (9.8)	20 (4.8)	
Don't know	5 (8.2)	49 (11.7)	
<b>Can the risk of HIV/AIDS be reduced by having sex with only one regular, faithful and healthy partner?</b>			
Yes	45 (73.8)	311 (74.2)	0.165
No	10 (16.4)	68 (16.2)	
Don't know	6 (9.8)	14 (3.3)	
No answer	0 (0)	26 (6.3)	
<b>Can a person become infected with HIV/AIDS if they eat from the food of someone who is infected?</b>			
Yes	5 (8.2)	92 (21.9)	<b>0.007</b>
No	50 (82.0)	278 (66.3)	
Don't know	6 (9.8)	22 (5.2)	
No answer	0	27 (6.6)	
<b>Can a person protect themselves from HIV/AIDS by not using other people's needles, syringes, caps, etc.?</b>			
Yes	52 (85.2)	347 (82.8)	0.755
No	7 (11.5)	31 (7.3)	
I don't know	2 (3.3)	14 (3.3)	
No answer	0 (0)	27 (6.6)	
<b>Can an injecting drug user protect themselves from HIV/AIDS by starting to take drugs in another way (e.g. on foil) or switching to non-injecting drugs?</b>			
Yes	47 (77.0)	308 (73.5)	0.801
No	9 (14.8)	44 (10.5)	
Don't know	5 (8.2)	41 (9.8)	
No answer	0 (0)	26 (6.2)	
<b>Is it possible for a pregnant woman infected with HIV/AIDS to transmit the virus to her unborn child?</b>			
Yes	44 (72.1)	294 (70.2)	<b>0.038</b>
No	8 (13.1)	27 (6.4)	
Don't know	5 (8.2)	56 (13.4)	
No answer	4 (6.6)	42 (10)	

<b>Can a mother infected with HIV/AIDS transmit the virus to her baby through breastfeeding?</b>			
Yes	31 (50.8)	206 (49.2)	
No	15 (24.6)	72 (17.2)	0.568
Don't know	15 (24.6)	141 (33.6)	
<b>Have you ever been tested for HIV/AIDS?</b>			
Yes	54 (88.5)	292 (69.7)	
No	6 (9.8)	100 (23.9)	<b>0.019</b>
No answer	1 (1.7)	27 (6.4)	
<b>Have you ever heard of PrEP before?</b>			
Yes	3 (5.0)	8 (1.9)	
No	52 (85.2)	284 (67.8)	0.324
No answer	6 (9.8)	127 (30.3)	

Analysis of the data revealed several differences between HIV positive and HIV negative individuals, particularly in terms of personal experience with HIV, knowledge and perceptions of transmission. One finding was that a statistically significantly higher proportion of HIV-positive persons reported personally knowing someone who was infected with HIV or had died of AIDS compared to HIV-negative respondents (85.2% vs. 63.7%, respectively;  $p=0.046$ ). This suggests that direct or indirect exposure to the epidemic may be more prevalent in the social networks of persons living with HIV, potentially influencing their risk awareness, emotional burden, and healthcare-seeking behaviour.

In terms of HIV-related misconceptions, the data revealed important knowledge gaps in both groups, although these manifested differently. A higher proportion of HIV-negative individuals mistakenly believed that HIV could be transmitted by eating food prepared or touched by someone infected (21.9% vs. 8.2% among HIV-positive individuals;  $p=0.007$ ). This finding highlights the persistence of myths and misinformation about accidental transmission in the general population, which may contribute to stigma and discrimination.

In contrast, a statistically significantly higher proportion of HIV-positive respondents had the misconception that an HIV-positive pregnant woman cannot transmit the virus to her unborn child (13.1% vs. 6.4% among HIV-negative individuals;  $p=0.038$ ). This misconception is particularly concerning given the critical importance of preventing mother-to-child transmission through timely interventions, such as antiretroviral therapy during pregnancy.

As expected, a higher proportion of HIV-positive participants reported ever being tested for HIV/AIDS compared to HIV-negative participants (88.5% vs. 69.7%;  $p=0.019$ ), likely reflecting both increased risk perception and diagnostic confirmation following exposure or symptoms. However, the fact that nearly one-third of HIV-negative participants had never been tested underlines the continued need to promote routine testing and increase awareness, particularly among at-risk groups or those with limited access to healthcare services.

Overall, the findings indicate both strengths and gaps in HIV-related knowledge and experience across serogroups. They highlight the need for tailored educational interventions that not only correct widespread misconceptions but also address specific gaps among people living with HIV. Furthermore, these insights can inform targeted public health messages and stigma

reduction strategies, thereby helping to create a more informed and supportive environment for those affected by or vulnerable to HIV.

### Knowledge about hepatitis B and hepatitis C

Similarly to the analysis of knowledge about HIV/AIDS, we also analysed knowledge about blood-borne infections (Hepatitis B and Hepatitis C) among respondents in terms of their serologic status for Hepatitis C.

**Table 11.** Distribution among respondents regarding questions on hepatitis B and hepatitis C knowledge versus hepatitis C serological status

Hepatitis B and hepatitis C knowledge questions	HCV (+) (n=305)	HCV (-) (n=175)	p-value
<b>Have you ever heard of the hepatitis B virus?</b>			
Yes	268 (87.9)	108 (61.7)	<b>&lt;0.001</b>
No	36 (11.8)	63 (36)	
No answer	1 (0.3)	4 (2.3)	
<b>Is there a vaccine available for hepatitis B?</b>			
Yes	139 (45.6)	57 (32.6)	0.522
No	36 (11.8)	9 (5.1)	
Don't know	93 (30.5)	42 (24.6)	
No answer	37 (12.1)	66 (37.7)	
<b>Can hepatitis B be transmitted through used needles and syringes?</b>			
Yes	221 (72.4)	90 (51.4)	0.761
No	15 (4.9)	7 (4.0)	
Don't know	29 (9.5)	11 (6.3)	
No answer	40 (13.2)	67 (38.3)	
<b>Can a person get hepatitis B from sexual contact</b>			
Yes	205 (67.2)	84 (48)	0.878
No	24 (8.0)	8 (4.6)	
Don't know	38 (12.4)	16 (8.5)	
No answer	38 (12.4)	67 (38.3)	
<b>Have you ever been tested for hepatitis B</b>			
Yes	211 (69.2)	53 (30.3)	<b>&lt;0.001</b>
No	48 (15.7)	52 (29.7)	
No answer	46 (15.1)	70 (40)	
<b>Can hepatitis B be transmitted by sharing personal items such as razors and toothbrushes?</b>			
Yes	225 (73.8)	84 (48)	0.174
No	13 (4.3)	12 (6.8)	
Don't know	28 (9.2)	11 (6.3)	
No answer	39 (12.7)	68 (38.9)	
<b>Can a woman infected with hepatitis B transmit the virus to her child during pregnancy?</b>			
Yes	154 (50.5)	59 (33.7)	0.815
No	22 (7.2)	8 (4.6)	
Don't know	88 (28.8)	40 (22.8)	
No answer	41 (13.5)	68 (38.9)	
<b>Have you ever heard of the hepatitis C virus?</b>			
Yes	291 (95.4)	99 (56.6)	<b>&lt;0.001</b>
No	11 (3.6)	72 (41.1)	
	3 (1.0)	4 (2.3)	

No answer			
<b>Is there a treatment for hepatitis C?</b>			
Yes	271 (88.8)	81 (46.3)	<b>0.002</b>
No	10 (3.3)	10 (5.7)	
Don't know	24 (7.9)	84 (48)	
<b>Can a person get hepatitis C from sexual contact?</b>			
Yes	234 (76.7)	84 (48)	0.096
No	37 (12.1)	6 (3.4)	
Don't know	21 (6.9)	11 (6.3)	
No answer	13 (4.3)	74 (42.3)	
<b>Have you ever been tested for hepatitis C?</b>			
Yes	262 (86)	57 (32.6)	<b>&lt;0.001</b>
No	28 (9.1)	42 (24)	
No answer	15 (4.9)	76 (43.4)	
<b>Can a person get hepatitis C from shaking hands or sharing food?</b>			
Yes	35 (11.5)	19 (10.8)	<b>0.017</b>
No	241 (79)	70 (40)	
Don't know	15 (4.9)	12 (6.9)	
No answer	14 (4.6)	74 (42.3)	
<b>Can a woman infected with hepatitis C transmit the virus to her child during pregnancy?</b>			
Yes	179 (58.7)	66 (37.7)	0.243
No	35 (11.5)	7 (4.0)	
Don't know	78 (25.6)	28 (16)	
No answer	13 (4.2)	74 (42.3)	

Analysis of participants' knowledge and practices related to the hepatitis B virus (HBV) and hepatitis C virus (HCV) stratified by HCV serologic status revealed several notable and statistically significant differences. These differences highlight the influence of personal experience with the disease on health awareness and behaviour.

As expected, individuals who tested positive for anti-HCV antibodies demonstrated significantly higher hepatitis B awareness. Specifically, 87.9% of HCV-seropositive individuals reported having heard of HBV, compared with only 61.7% among those who tested negative for HCV ( $p < 0.001$ ). This increased awareness among HCV-positive persons likely reflects increased exposure to health services and educational materials post diagnosis, as well as greater concern regarding the risks of coinfection, which are clinically significant because of shared modes of transmission between HBV and HCV. In addition to awareness, HCV-positive individuals were more than twice as likely to be tested for hepatitis B – 69.2% reported previous testing, compared with only 30.3% among HCV-negative participants ( $p < 0.001$ ). This disparity further illustrates the impact of an existing diagnosis on proactive healthcare-seeking behaviour and engagement in preventive services.

A similar trend was observed for knowledge of hepatitis C. Almost all HCV-positive individuals (95.4%) reported having heard of the virus, in stark contrast to only 56.6% of HCV-negative respondents ( $p < 0.001$ ). This significant difference is consistent with the assumption that

personal diagnosis catalyses greater information seeking and interaction with health professionals.

Perhaps most striking is the gap in knowledge about the availability of treatment for hepatitis C. Among HCV-positive individuals, 88.8% were aware that treatment options existed, compared with only 46.3% of HCV-negative individuals ( $p=0.002$ ). This gap in knowledge is critical as it may influence individuals' willingness to undergo screening and seek care. Awareness of treatment options is a key motivator for testing, early diagnosis and linkage to care.

These findings underline the broader significance that awareness and health practices are strongly influenced by disease status. Individuals who are seropositive for HCV are more likely to engage in informed health behaviours, including seeking information, getting tested for related infections, and understanding treatment options. Conversely, the relatively low levels of awareness and testing among HCV-negative individuals underline the need for expanded public health education efforts, particularly targeting populations at risk for HCV who remain undiagnosed and unaware.

Overall, these results call for comprehensive awareness campaigns and outreach initiatives which encourage testing and disseminate accurate information about hepatitis B and C, especially among those who may not yet be diagnosed but are vulnerable due to behavioural or demographic risk factors. Increasing the knowledge of the general population can not only help with earlier detection and treatment, but also help reduce transmission through informed prevention practices.

Key findings, identified issues and recommendations from a report from an epidemiological study of biological and behavioural indicators of HIV prevalence among a group of PWUD in the city of Sofia

## CONCLUSIONS

- HIV prevalence in the study group of PWUD was 12.7%
- Direct association between drug use patterns and HIV status – significantly higher prevalence of anti-HIV antibodies among PWID
- Almost one-fifth of participants reported never being tested for HIV
- Nearly one-third of HIV-negative participants had also never been tested
- A statistically significant association between PWID and HIV positivity, highlighting the increased vulnerability of people who inject drugs to HIV infection due to factors such as needle sharing and limited access to harm reduction services
- Direct or indirect exposure to the epidemic may be more prevalent in the social networks of people living with HIV, potentially influencing their risk awareness, emotional strain and healthcare-seeking behaviour
- The prevalence of hepatitis C in the study group of PWUD was 63.5%.
- Lower age of persons infected with hepatitis C was registered

- Existing cumulative nature of risk with increasing age, potentially associated with long-term exposure to transmission routes (e.g., intravenous drug use or unscreened blood transfusions at an earlier age)
- The mean age of onset of drug use among study subjects was 17 years and the mean age of first injection was 20 years, reflecting a trajectory of escalating drug use severity
- Individuals with a positive anti-HIV antibody test were significantly more likely to report methadone use
- Marijuana use is significantly more prevalent among HIV-seronegative individuals
- Participants who were seropositive for anti-HCV antibodies demonstrated significantly higher rates of methadone, cocaine, and neuroleptic (e.g., Rivotril) use, whereas subjects who were negative for anti-HCV antibodies reported recreational marijuana and cannabinoid use-i.e., substances which are not injected
- Heroin use, although no longer the most dominant substance reported, remains serious and continues to pose significant risks to users, particularly in the context of injection-related complications and blood-borne infections
- An increase in methamphetamine use, particularly among PWID, which increases the risk of co-occurring physical and psychiatric illnesses and contributes to increased levels of infectious disease transmission due to riskier injection practices
- Presence of high-risk behaviours among PWUD, related to both types and frequency of drug use
- Increased frequency of drug use, between 2-3 times a day, including injecting
- 4.3% of PWID reported consistently using previously used injecting equipment – either "every time" or "at least half of the time" – in the past month, and 6.9% used prefilled syringes, contributing to the transmission of blood-borne pathogens
- 57.7% of individuals surveyed reported receiving treatment for a substance use disorder at some point in their lives, currently, with 27.5% indicating they were actively engaged in treatment at the time of data collection
- The most commonly reported form of treatment was opioid substitution therapy, cited by 82.3% of those who were in treatment
- The most frequently used services by PWUD were: harm reduction services, methadone maintenance therapy and HIV testing, with a smaller proportion of participants using drop-in centres and counselling.

## **KEY CHALLENGES AND ISSUES**

- Strong epidemiological association between injecting drug use and blood-borne viral infections
- Lack of sufficient information and knowledge about HIV, hepatitis B and C, and syphilis (including modes of transmission, symptoms, and treatment options) is critical as it may influence people's willingness to undergo screening and seek care. Knowledge of treatment options is a key motivator for testing, early diagnosis and linkage to medical and social services

- The impact of an existing diagnosis on proactive healthcare-seeking behaviour and engagement with preventive services by people who use drugs
- Different behavioural risk profiles in men and women
- Existing barriers to accessing appropriate sexual health services which include stigma, limited health infrastructure and lack of perceived risk
- Very low levels of knowledge about the availability of HIV prevention measures, such as pre-exposure prophylaxis (PrEP)
- Specific risks and needs of women who use drugs: increased susceptibility to gender-based violence, risk of exploitation and entry into human-trafficking networks, barriers to accessing care and higher biological vulnerability to blood-borne infections
- Different substance use profiles between HIV-seropositive and seronegative study participant groups
- The need to account for both substance type and frequency of use. The study highlights not only the prevalence of high-risk behaviours in seropositive populations, but also the urgency of targeted public health interventions aimed at reducing the burden of blood-borne infections and improving outcomes among people who use drugs.

## RECOMMENDATIONS

- Develop a network of activities and services to promote routine testing and increase disease awareness among groups at risk or with limited access to health services
- Need for enhanced harm reduction interventions, including increased access to sterile injecting equipment, improved outreach testing, improved access to treatment and social support services
- Raising awareness and providing health education activities (including those aimed at informing and motivating consistent condom use) targeting populations at higher risk of infection (behavioural, demographic, socio-economic)
- Implementation of comprehensive awareness campaigns and outreach initiatives which encourage testing and disseminate accurate information on HIV, hepatitis B and C, STIs;
- Strengthening sexual health education, improving access to STI testing and treatment services, and addressing the specific needs of both men and women in populations with high rates of substance use and the associated health vulnerabilities
- Developing specialised health and social services targeting women who use drugs and women (including pregnant women and mothers) living with HIV
- Need to develop inclusive sexual health services which meet the needs of individuals across the spectrum of sexual orientations
- Need for tailored information, training and education interventions which not only correct widespread misconceptions about the prevalence of HIV, but also address specific knowledge gaps among people living with HIV
- Implementing interventions to prevent, inform, counsel and reduce harm from drug use which take into account differences in patterns of drug use

- Developing activities to create and disseminate targeted public health messages and stigma reduction strategies to create a more informed and supportive environment for those affected by or vulnerable to HIV
- Increase awareness and access to HIV pre-exposure prophylaxis (PrEP)
- Development of long-term support activities (social, health, education, etc.) for persons with dependence and persons living with HIV
- Need to develop adaptive, evidence-based public health responses which address both traditional substances such as heroin and emerging issues such as increases in methadone and methamphetamine use, frequency of daily use, and combined substance use
- Need to expand the network of methamphetamine dependence treatment services
- Need to develop comprehensive services which effectively meet the multifaceted needs of people who use drugs
- Future studies should seek to differentiate between newly diagnosed and previously known cases to better assess transmission dynamics and the effectiveness of public health measures.

## References

1. Aghaei, Ardavan Mohammad, et al. "Prevalence of injecting drug use and HIV, hepatitis B, and hepatitis C in people who inject drugs in the Eastern Mediterranean region: a systematic review and meta-analysis." *The Lancet Global Health* 11.8 (2023): e1225-e1237.
2. Altawalrah, Haya, et al. "Hepatitis B virus, hepatitis C virus and human immunodeficiency virus infections among people who inject drugs in Kuwait: a cross-sectional study." *Scientific reports* 9.1 (2019): 6292.
3. Altuğlu, Imre, et al. "HBsAg, anti-HCV and anti-HIV seroprevalence among drug users: a retrospective assessment." *Archives of Neuropsychiatry* 56.3 (2019): 186.
4. Artenie, Adelina, et al. "Incidence of HIV and hepatitis C virus among people who inject drugs, and associations with age and sex or gender: a global systematic review and meta-analysis." *The lancet gastroenterology & hepatology* 8.6 (2023): 533-552.
5. Cai, Yilin, et al. "Risk factors associated with infection of blood-borne virus among people who used methamphetamine." *BMC Infectious Diseases* 20 (2020): 1-11.
6. Hope, Vivian D., et al. "Prevalence of, and risk factors for, HIV, hepatitis B and C infections among men who inject image and performance enhancing drugs: a cross-sectional study." *BMJ open* 3.9 (2013): e003207.
7. HPSC, HPSC. "Drug-Related Blood-borne Viruses in Ireland." HSE, editor (2018).
8. Liang, T. Jake, and John W. Ward. "Hepatitis C in injection-drug users-a hidden danger of the opioid epidemic." *New England Journal of Medicine* 378.13 (2018): 1169-1171.
9. Lourenço, Lillian, et al. "The hepatitis C epidemic in Canada: an overview of recent trends in surveillance, injection drug use, harm reduction and treatment." *Canada Communicable Disease Report* 47.12 (2021): 561.
10. Sanvisens, Arantza, et al. "HIV Infection and Viral Hepatitis in Drug Abusers." *Current Perspectives in HIV Infection*. IntechOpen, 2013.
11. Schwarz, Tanja, et al. "Interventions to increase linkage to care and adherence to treatment for hepatitis C among people who inject drugs: A systematic review and practical considerations from an expert panel consultation." *International Journal of Drug Policy* 102 (2022): 103588.
12. Verleva, T, Raicheva C, Naseva E, Yakimova C, Georgieva V, Zamfirova M, Taskov H. Petrunov, B, "Report of an integrated biological and behavioural surveillance of HIV among injecting drug users in the period 2004-2012", Sofia 2015, ISBN 978-619-7288-02-5.
13. World Health Organization. "Guidance on prevention of viral hepatitis B and C among people who inject drugs." *Guidance on prevention of viral hepatitis B and C among people who inject drugs*. 2012.
14. Zaba, Basia, et al. "The role of behavioral data in HIV surveillance." *Aids* 19 (2005): S39-S52.