MAPPING AND SIZE ESTIMATION OF PEOPLE WHO USE DRUGS (PWUD) AND DETERMINATION OF THEIR RISKS TO HIV AND VIRAL HEPATITIS INFECTIONS IN RWANDA

STUDY REPORT
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Conducted by Rwanda NGOs Forum on HIV/AIDS and Health Promotion (RNGOF on HIV/AIDS & HP) in Collaboration with the Rwanda Biomedical Centre (RBC) under the support of Expertise France and Global Fund

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List of abbreviations

PWUD: People Who Use Drugs

HIV: Human Immunodeficiency Virus

USA: United States of America

IDU: Injection Drug Use

UNAIDS: The Joint United Nations Programme on HIV/AIDS

MSM: Men who have Sex with Men

FSW: Female Sex Workers

NGO: Non-Governmental Organization

HBV:Viral Hepatitis B

HCV: Viral Hepatitis C

RDS: Respondent-Driven Sampling

ID: identification

RNEC: Rwanda National Ethic Committee

RBC: Rwanda Biomedical Center

Executive Summary

Background

People who inject drugs (PWID) face significantly higher risks of HIV and viral hepatitis infections globally, with an estimated 22-fold increased likelihood of HIV compared to the general population. In Rwanda, while HIV prevalence among adults aged 15-64 has stabilized at 3.0%, progress among PWID lags due to limited data, lack of tailored programs. Unfortunately, unlike other HIV epidemiological evidence, data characterizing people who inject drugs and their burden of HIV are limited in Rwanda.

Methods

A six-month mixed-methods study was conducted across 10 districts, including Kirehe, Kayonza, Gasabo, Kicukiro, Nyarugenge, Muhanga, Huye, Rusizi, Rubavu and Musanze, using a quantitative cross-sectional design. Respondent-Driven Sampling (RDS) was employed to recruit 1,200 self-reported PWID aged 18+ who consented to participate. Data collection involved structured questionnaires on sociodemographic, drug use, and risk behaviors, alongside HIV and Hepatitis B/C testing at selected 10 health facilities.

Results

A total of 1,114 PWID, mostly male (86%), with an average age of 29.6 years were recruited. Findings show that Heroin was the most injected drug (95.3%), with 78.4% injecting within the last month. Risky behaviors included 34% not using sterile needles at last injection and 46.3% never reusing needles, though 23.6% shared needles with 3-5 people. HIV testing uptake was 76.5%, with 12.3% testing positive, while Hepatitis B and C awareness was 58.3% and 51.8%, respectively, with low testing rates (37.4% for HBV, 15.4% for HCV) and prevalence of 1.6 distributed across the population. Overdose incidents occurred in 26.8% of participants, and 61% attempted to reduce drug use, yet awareness of treatment options like Naloxone was minimal

(1.9%). Social challenges included 39.3% rating their quality of life as poor and 24.6% reporting suicidal attempts.

Conclusion

This study estimates a significant PWUD population in Rwanda with a high burden of HIV (12.3%), hepatitis B (HBV) and C (HCV) and substantial risk behaviors, including needle sharing and inconsistent condom use, exacerbating HIV and Hepatitis transmission risks. The lack of PWUD-specific programs, coupled with stigma and criminalization, hinders access to HIV and Hepatitis prevention and treatment services.

1. Background

People who inject drugs (PWID) refers to **people who inject non-medically sanctioned psychotropic (or psychoactive) substances**. These drugs include, but are not limited to, opioids, amphetamine-type stimulants, cocaine, hypno-sedatives and hallucinogens. Injection may be through intravenous, intramuscular, subcutaneous or other injectable routes. People who inject drugs (also known as PWUD) are among the groups most vulnerable to HIV and other blood borne infections including viral Hepatitis[1]. It is estimated that people who inject drugs are 22 times more likely to acquire HIV than the rest of the population. Drug use now accounts for an ever-growing proportion of those living with HIV. On average one in ten new HIV infections are caused by the sharing of needles. It is estimated that 25% of new infections outside of sub-Saharan Africa are among injecting drug users. In addition to this, it is thought that there are approximately 11.8 million people who inject drugs worldwide, and 13.1% of them are thought to be living with HIV. Three countries account for nearly half of all people who inject drugs globally - China, Russia and the United States of America (USA). In Eastern Europe and Central Asia, which saw a 29% increase in new HIV infections between 2010 and 2017, the burden is particularly high among people who inject drugs. In 2017, 39% of new HIV cases in the region were among this group. Despite the increased risk of HIV for people who inject drugs they are among those with the least access to HIV prevention, treatment and healthcare, simply because drug use remains often criminalized and stigmatized in many countries[2]. Here we are missing data for regional countries for e.g: Kenya and Ouganda etc…

The high risk of HIV among PWUD can be explained by individual factors like needle sharing, and structural factors including stigma and discrimination, criminalization, high exposure to human rights abuses; and a paucity of harm reduction programs. These structural-level factors limit PWUD engagement in prevention and treatment services, resulting in PWUD having poorer HIV outcomes compared to other adults. PWUD additionally face significant social and economic challenges, as often demonstrated by their high burdens of homelessness, unstable housing, and

incarceration rates. Finally, PWID have overlapping sexual risks with high levels of inconsistent condom use at multiple exposures. While the needs of PWUD have been widely explored and documented in high-income countries, limited data exist for countries across Sub-Saharan Africa. However, a review of Injection Drug Use (IDU) in six African countries found a remarkable existence of high-risk behaviors including needle sharing and inconsistent condom use among PWID. In addition to the limited evidence to guide programming, few PWUD-centered programs exist[3].

In neighboring Nairobi, Kenya, the prevalence of HIV among adults in the general population in 2012 was 5.6%, compared to 18.7% among people with substance use (PWSU) (Tun et al., 2014). Kurth et al. (2015) reported a similar prevalence of 19.5% in PWSU in Nairobi and Mombasa, Kenya. They estimated an annual HIV incidence of 2.5% among PWSU after averaging over the first five years of injecting and adjusting for the estimated prevalence before injecting began.

In Rwanda, HIV prevalence among reproductive age adults aged 15-64 years has stabilized at 3.0% for the last decade and Rwanda is one of the few countries to have achieved the UNAIDS 90-90-90 target by 2020[4]. However, despite successful progress towards controlling the HIV epidemic in the general population, similar progress has yet to be seen among PWUD. While there is a minimum package of services proposed for other key population groups including Men who have Sex with Men (MSM) and Female Sex Workers (FSW) in the national HIV guidelines, there is no minimum designed package for PWID in Rwanda[1]. This lack of PWID-focused national programming, coupled with the criminalization of drug use or possession, further complicates programming in Rwanda. Thus, understanding, defining and addressing specific needs of PWUD in Rwanda remains imperative to achieve sustained HIV epidemic control.

Unfortunately, unlike other HIV epidemiological evidence, data characterizing people who inject drugs and their burden of HIV are limited in Rwanda. Few available studies were limited and only

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restricted to Kigali and didn't attempt to estimate the overall burden of drug use and intravenous drug use (IDU) in Rwanda.

In neighboring Nairobi, Kenya, the prevalence of HIV among adults in the general population in 2012 was 5.6%, compared to 18.7% among people with substance use (PWSU) (Tun et al., 2014). Kurth et al. (2015) reported a similar prevalence of 19.5% in PWSU in Nairobi and Mombasa, Kenya.

A cross-sectional study by Twahirwa et al, conducted in Kigali City in October 2020, on 307 PWUD has shown that HIV prevalence among PWUD is 9.5 % and revealed high prevalence of needle reuse and sharing practices as a significant risk to the acquisition of HIV, viral hepatitis and other blood-borne infections[3]. However, considering the limitations associated with the methodology used to select participants and collect information, the researcher would not be able to infer the whole country.

A pilot study by Workman et al, conducted in one health center of Kigali using cross-sectional survey and voluntary HIV testing among PWUD at a single health center in Kigali found that the most frequently used drugs were heroin (100%), marijuana (87%), benzodiazepines (81%), and cocaine (38%). The study also revealed that half of the participants used needles multiple times daily; 44% reported sharing equipment. Nearly all (88%) reported actively seeking drug treatment. Fifteen participants were tested for HIV, and all tested negative[5]. We can also include data from the baseline study on substance use practices and HIV risk among PWUD/PWID in City of Kigali, conducted by RNGO Forum.

Hence an urgent need to conduct further research to fuel the data driven advocacy and to inform national health programming for PWUD. It is against this fact that in collaboration of the coalition of the civil society organizations working on a project that aiming to advocate for harm reduction for people who use drugs in Rwanda in collaboration with Rwanda Biomedical Center (RBC) with the support from other development partners in HIV and mental health conducted a study

to map out People Who Inject Drugs by estimating the population size of people who inject drugs in Rwanda, and determine their risks for HIV and Hepatitis transmissions. On top of Kigali with high burden of HIV and HBV prevalence and other risk behaviors, the selected districts are most likely to have increased risks for drugs use, given their geographical locations to the country borders, rapid urbanization and to have the whole country representation.

2. Objectives

2.1 Main objective

The primary objective of this study was to estimate the population size of people who inject drugs (PWUD) in Rwanda while comprehensively assessing their specific risk factors, vulnerabilities, and behavioral patterns associated with HIV and Hepatitis transmission. This assessment aimed to serve as a foundational step for developing evidence-based programs and targeted interventions to address these risks, ultimately enhancing the health outcomes and well-being of PWUD in Rwanda through improved prevention strategies and support systems.

2.2 Specific Objectives

This study aimed to provide comprehensive understanding of people who use drugs (PWID) in Rwanda by estimating their population size and characterizing their social and demographic profiles, while determining the prevalence of HIV and Hepatitis B and C within this group. The study aimed to identify the risk behaviors contributing to the transmission of HIV and Hepatitis B and C among PWUD, shedding light on the specific practices and circumstances that heighten their vulnerability. It sought to uncover the unique needs and barriers faced by PWID in accessing HIV and Hepatitis prevention services, with the intent of informing tailored interventions to address these challenges and improve health outcomes in Rwanda.

3. Methodology

3.1 Study description and design

A 6 months mixed method study using quantitative and qualitative approach was carried out in the City of Kigali (3 districts) and other 7 selected districts in Rwanda. Participants to this study were self-reported people who use drugs and were selected and reached using respondent-driven sampling (RDS) technique. The quantitative aspect used a cross-sectional design to gather data on drug use and estimate their population size. The qualitative component used In-depth baseline Information on people who used drugs and engaged with key stakeholders Involved In drug response. This dual-method approach will enable a comprehensive understanding of the various factors related to drug use and associated health risks in Rwanda. Study was carried out in Gasabo, Nyarugenge, Kicukiro Muhanga, Musanze, Rubavu, Rusizi, Huye, Kayonza and Kirehe districts.

3.2 Study populations

The study reached out to self-reported people who inject drugs (PWUD) from selected districts in Rwanda. The selection criteria for participants included self-reported use of injectable drugs, being aged 18 or older, and having demonstrated voluntary willingness to participate, while those unable or unwilling to provide informed consent, or who were severely affected by drugs such as presenting with mental disorders or aggressive toward the study team, were excluded

3.3 Sampling method

Respondent-driven sampling method (RDS)[6] was used to select study participants. RDS combines snowball sampling with a mathematical model that weights the sample to compensate. RDS is an advanced sampling method especially in sampling hard to reach populations including people who inject drugs[7].

This sampling method overcomes some limitations of other methods for recruiting vulnerable and hidden populations, including PWUD. As PWUD is a hidden population and to explore more of their networks, seeds were given a number of coupons and sent out to recruit and refer others from their networks to the selected health centers from the selected Districts of the Study. Every eligible recruit present to districts of City of Kigali and secondary cities and are found eligible and consent for interview and testing were also be given a number of coupons as to continue the recruitment using respondent-driven sampling (RDS), a referral-based peer-recruitment sampling method.

3.4 Study Procedure of Enrolment

We selected a convenient and accessible health facility acceptable to study participants in the districts of the City of Kigali and secondary cities where participants were recruited using respondent-driven sampling (RDS) that began with identifying and recruiting 24 eligible individuals through referral and outreach among small PWID groups to serve as seeds, who completed questionnaires, interviews, and provided biological specimens for HIV and Hepatitis B&C testing, subsequently helping to recruit peers in a chain-like process across multiple waves until the sample size was achieved or the sampling period ended. Data collection involved pre-designed paper questionnaires administered by trained staff, with participants first being informed about the study's aims, screened for eligibility, and, upon signing consent forms, undergoing structured face-to-face interviews in Kinyarwanda covering sociodemographic details, PWID history, and drug injection practices over the prior six months, while HIV and Hepatitis B&C testing—following national guidelines—was conducted at selected health centers for consenting eligible participants, alongside a behavioral questionnaire administered during rapid diagnostic testing by a lab technician or nurse, with each interview lasting approximately 20-30 minutes; those testing positive were linked to health facilities for further management, and all participants received harm reduction information

3.5 Sample size

The sample for this study was respondent driven sample (RDS). The recruitment process started with 24 PWID seeds. These seeds were selected from small groups of PWUD already working with RNGOF and other RNGOF members working with Key Population. From these seed chains and waves were formed using mathematical modeling with the help of Stata software to obtain the weighted sample size of PWUD. 1200 PWUD were expected to be reached from all the 10 health centres in selected 10 d istricts of Rwanda, such as Gasabo (Remera HC), Nyarugenge (Biryogo HC), Kicukiro (Gikondo HC), Musanze (Muhoza HC), Rubavu (Gisenyi HC), Kirehe (Kirehe HC), Muhanga (Gitarama HC), Huye (Huye HC), Rusizi (Gihundwe HC), Kayonza (Mukarange HC).

3.6 Data analysis

Data was exported to STATA Version 18 for data analysis. Descriptive analysis was conducted, and results displayed in frequency and proportions for categorical variables. Results for continuous variables are presented using mean either means or median depending on the normality of distribution together with standard deviation and percentile or interquartile ranges. Data that show a trend of time are presented using a graphical representation. The pairwise analysis was carried out using a chi-square test. The multivariable analysis was done using logistic regression. All data analysis tasks were performed using Stata 18.0 with 5% significance level.

3.7 Ethical considerations

The study was approved by the Rwanda Biomedical Centre (RBC), HIV, STI, Viral Hepatitis and Other Viral Diseases Control Division , and Rwanda National Ethics Committee (RNEC), using consent forms in English and Kinyarwanda, and opted for verbal consent to protect anonymity due to minimal risk and the illegality of drug use in Rwanda. Trained staff used finger pricks for HIV, Hepatitis C (HCV), and TB tests, minimizing physical risks. Self-reported injection

drug users were referred to health facilities, received free test results and counseling, and, if positive, were linked to treatment. Participants received 3,000 RWF for transport and time.

4. Results

Table 1 Social Demographic characteristics of Participants

Table 1: Social Demographic Characteristics of Participants, Rwanda PWUD IBBSS 2024		
Average Age in Years [N = 1,114]	**Frequency**	**% [95% CI]**
Age group (Average 29 Years)		
18-24	324	29.6 [28.7 - 30.5]
25-34	**550**	**48.3 [47.3 - 49.2]**
35+	240	22.2 [21.3 - 23.0]
Sex at Birth [N = 1,114]	**Frequency**	**% [95% CI]**
Male	**977**	**86.0 [85.3 - 86.7]**
Female	137	14.0 [13.3 - 14.7]
Gender Identity [N = 1,113]	**Frequency**	**% [95% CI]**
Male	**963**	**84.8 [84.1 - 85.5]**
Female	141	14.2 [13.5 - 14.9]
Transgender	9	1.0 [0.8 - 1.2]
Self Description of Gender [N = 1,111]	**Frequency**	**% [95% CI]**
Straight	**1023**	**93.4 [92.9 - 93.9]**
Bisexual	45	3.4 [3.1 - 3.8]
Homosexual(Gay)Lesbian	35	2.7 [2.4 - 3.1]
Other	7	0.4 [0.3 - 0.5]
Prefer Not To Answer	1	0.0 [0.0 - 0.1]
Current marital status [N = 1, 111]	**Frequency**	**% [95% CI]**
Single	927	83.4 [81.2 - 85.6]
Married	77	7.3[6.8 - 7.9]
Separated	56	5.4[4.9 - 5.8]

Cohabitating	39	3.5[3.1 - 3.8]
Widow	11	1.0[0.8 - 1.2]
Prefer Not To Answer	1	0.1[0.1 - 0.2]
Education level [N = 1,114]	**Frequency**	**% [95% CI]**
Secondary	**482**	**41.8 [40.8 - 42.8]**
Primary	**435**	**40.8 [39.8 - 41.8]**
University	99	7.7 [7.2 - 8.3]
No formal education	89	9.0 [8.4 - 9.5]
Vocational training	9	0.7 [0.5 - 0.9]
Source of Income [N =1,114]	**Frequency**	**% [95% CI]**
Casual workers	275	27.0 [26.2 - 27.9]
Unemployed	214	18.1 [17.3 - 18.8]
Vocational worker	181	13.8 [13.1 - 14.5]
Business owner	123	11.1 [10.4 - 11.7]
Other(specify)	113	9.3 [8.7 - 9.8]
Private sector employee	111	10.2 [9.6 - 10.8]
Street vendor	91	9.7 [9.2 - 10.3]
Civil servant	3	0.5 [0.4 - 0.6]
Don't know	2	0.2 [0.1 - 0.3]
NGO	1	0.1 [0.1 - 0.2]
Stable Housing in the Last 3 Months [N = 1,112]	**Frequency**	**% [95% CI]**
Yes	**1079**	**97.4 [97.1 - 97.7]**
No	33	2.6 [2.3 - 2.9]
Current District [N = 1,109]	**Frequency**	**% [95% CI]**
Nyarugenge	260	22.3 [21.5 - 23.1]
Rubavu	165	14.9 [14.2 - 15.6]
Kicukiro	134	11.6 [10.9 - 12.2]
Huye	110	9.9 [9.3 - 10.5]
Musanze	99	8.7 [8.2 - 9.3]
Kayonza	92	8.1 [7.6 - 8.7]
Rusizi	88	7.7 [7.2 - 8.2]

Gasabo	88	9.5 [8.9 - 10.1]
Muhanga	38	3.4 [3.0 - 3.7]
Kirehe	35	3.1 [2.8 - 3.5]
Last time injection [N = 1,114]	**Frequency**	**% [95% CI]**
Less than 1 month ago	**889**	**78.4 [77.5 - 79.2]**
1 or more months ago but less than 12 months ago	225	21.6 [20.8 - 22.5]

Table 1 shows the social demographic characteristics of participants in the study indicate that the majority were young adults, with nearly half (48.3%) aged 25–34 years and an average age of 29. Most participants were male at birth (86.0%) and identified as male (84.8%), with a small proportion identifying as female (14.2%) or transgender (1.0%). Regarding sexual orientation, the majority (93.4%) self-identified as straight. A large portion of participants were single (83.4%), and educational attainment was fairly evenly split between secondary (41.8%) and primary (40.8%) education, while only 7.7% had university education. Casual labor (27.0%) was the most common source of income, followed by unemployment (18.1%) and vocational work (13.8%). Notably, 97.4% reported having stable housing in the past three months. Geographically, participants were distributed across several districts, with the highest representation from Nyarugenge (22.3%). Additionally, a significant majority (78.4%) had injected drugs within the past month, underscoring recent drug use activity.

Table 2 Alcohol and Drug Use

Table 2: Alcohol and Drug Use		
Frequency of Alcohol Use [N = 1,114]	**Frequency**	**% [95% CI]**
2-3 times a week	**357**	**34.4 [33.4 - 35.3]**
never	260	23.0 [22.2 - 23.8]
4 or more times a week	226	20.1 [19.3 - 20.9]
2-4 times a month	140	11.9 [11.3 - 12.5]
monthly or less	128	10.4 [9.8 - 11.0]

prefer not to answer	3	0.3 [0.2 - 0.4]
Used drugs for non-medical reasons in the last 6 months [N=1114]	**Frequency**	**% [95% CI]**
Yes	**975**	**88.4 [87.7 - 89.0]**
No	132	11.1 [10.5 - 11.7]
Prefer not to answer	5	0.4 [0.3 - 0.6]
Don't know	2	0.1 [0.0 - 0.2]
Frequency of drug use in the last 6 months [N=1082]	**Frequency**	**% [95% CI]**
2 to 3 times a day, almost every day	245	21.8 [21.0 - 22.6]
2 to 3 times a week	217	21.5 [20.7 - 22.3]
4 to 6 times a week	216	18.7 [18.0 - 19.5]
about once a day	77	6.8 [6.3 - 7.3]
1 to 3 times a month	73	7.8 [7.3 - 8.3]
less than once a month	67	6.2 [5.8 - 6.7]
prefer not to answer	63	5.3 [4.9 - 5.8]
4 or more times a day, almost every day	55	5.3 [4.8 - 5.7]
about once a week	46	4.6 [4.2 - 5.0]
don't know	23	1.9 [1.7 - 2.2]
First-time injecting drug use type [N=1113]	**Frequency**	**% [95% CI]**
Heroin	**1026**	**92.3 [91.8 - 92.8]**
Cocaine	67	6.2 [5.7 - 6.7]
Don't know	11	0.8 [0.6 - 1.0]
Other	6	0.4 [0.3 - 0.5]
Mixture of heroin with other drug	2	0.2 [0.1 - 0.3]
Opioid other than heroin (opium or morphine)	1	0.1 [0.0 - 0.1]
Age at first use (Average age 22 years)	**Frequency**	**% [95% CI]**
Under 18	186	16.7[14.5 - 18.9]
19-35	759	68.1[65.4 - 70.8]
35+	169	15.2[13.1 - 17.3]

Who injected in the First time injecting drug use [N=1112]	Frequency	% [95% CI]
Relative	**951**	**85.2 [84.5 - 85.9]**
Dealer	53	4.5 [4.1 - 4.9]
Sexual partner	51	4.5 [4.1 - 5.0]
I injected myself	47	4.7 [4.3 - 5.1]
Other	7	0.9 [0.7 - 1.1]
prefer not to answer	3	0.2 [0.1 - 0.3]

Injection Frequency in the last month [N=1114]	Frequency	% [95% CI]
2-7 times per week, once a day	**352**	**31.2 [30.3 - 32.1]**
1-4 times per month	283	27.3 [26.4 - 28.1]
2 to 3 times per day	219	18.1 [17.3 - 18.9]
not in the last month	179	16.1 [15.4 - 16.8]
5 or more times per day	44	3.7 [3.4 - 4.1]
less than once per month	30	3.0 [2.7 - 3.4]
don't know	4	0.3 [0.2 - 0.4]
prefer not to answer	3	0.2 [0.1 - 0.3]

Injection Frequency for Opioids in the last month [N=927]	Frequency	% [95% CI]
2-7 times per week, once a day	**282**	**31.1 [30.2 - 32.0]**
1-4 times per month	238	27.4 [26.5 - 28.3]
2 to 3 times per day	185	18.9 [18.2 - 19.7]
Never	154	14.9 [14.2 - 15.6]
5 or more times per day	37	3.8 [3.4 - 4.2]
Less than once per month	22	2.6 [2.3 - 3.0]
Don't know	6	0.9 [0.7 - 1.0]
Prefer not to answer	3	0.3 [0.2 - 0.4]

Injection Frequency for Heroin in the last month [N=925]	Frequency	% [95% CI]
2-7 times per week, once a day	**359**	**38.5 [37.5 - 39.4]**
1-4 times per month	250	29.2 [28.3 - 30.1]
2 to 3 times per day	205	19.9 [19.2 - 20.7]

5 or more times per day	41	4.4 [4.0 - 4.8]
Never	40	4.2 [3.8 - 4.6]
Less than once per month	23	2.8 [2.5 - 3.2]
Don't know	6	0.8 [0.6 - 1.0]
Prefer not to answer	1	0.1 [0.1 - 0.2]
Frequency of injecting Opioids for non-medical purposes in the last month [N=923]	**Frequency**	**% [95% CI]**
2-7 times per week, once a day	**271**	**30.1 [29.2 - 31.0]**
1-4 times per month	224	25.9 [25.1 - 26.8]
2 to 3 times per day	183	18.5 [17.7 - 19.3]
Never	167	16.5 [15.7 - 17.2]
5 or more times per day	36	4.2 [3.8 - 4.6]
Less than once per month	23	2.6 [2.3 - 2.9]
Don't know	15	1.5 [1.3 - 1.8]
Prefer not to answer	4	0.7 [0.5 - 0.8]
Injecting drug combinations/mixing drugs in the last month [N=927]	**Frequency**	**% [95% CI]**
No	**702**	**77.5 [76.7 - 78.3]**
Yes	208	21.3 [20.5 - 22.1]
Don't know	10	0.7 [0.6 - 0.9]
Prefer not to answer	7	0.5 [0.4 - 0.7]
Frequency of injecting drug combinations/mixing drugs in the last month [N=928]	**Frequency**	**% [95% CI]**
Never	**658**	**73.3 [72.5 - 74.2]**
1-4 times per month	69	7.6 [7.0 - 8.1]
2-7 times per week, once a day	69	6.6 [6.1 - 7.0]
2 to 3 times per day	68	7.0 [6.5 - 7.4]
5 or more times per day	21	2.1 [1.9 - 2.4]
Don't know	18	1.5 [1.2 - 1.7]
Less than once per month	14	1.0 [0.8 - 1.2]
prefer not to answer	11	1.0 [0.8 - 1.2]

Injection Frequency for Crack in the last month [N=926]	Frequency	% [95% CI]
Never	823	90.8 [90.2 - 91.4]
1-4 times per month	36	3.4 [3.1 - 3.8]
don't know	27	2.2 [1.9 - 2.5]
less than once per month	12	0.8 [0.6 - 0.9]
2 to 3 times per day	12	1.1 [0.9 - 1.3]
2-7 times per week, once a day	7	0.6 [0.4 - 0.7]
prefer not to answer	6	0.9 [0.7 - 1.0]
5 or more times per day	3	0.2 [0.1 - 0.3]
Most injected drugs in the past month [N=926]	**Frequency**	**% [95% CI]**
Heroin	**883**	**95.3 [94.9 - 95.7]**
Cocaine	25	2.7 [2.4 - 3.0]
Opioid other than heroin (opium or morphine)	6	0.8 [0.6 - 0.9]
Prefer not to answer	5	0.6 [0.5 - 0.8]
Don't know	3	0.2 [0.1 - 0.3]
Other	2	0.1 [0.0 - 0.2]
Mixture of heroin with other drug(s)	1	0.1 [0.0 - 0.1]
Local drug	1	0.2 [0.1 - 0.3]

Table 2 shows a significant proportion of participants reported frequent alcohol use, with 34.4% consuming alcohol 2–3 times a week and an additional 20.1% drinking four or more times weekly. This indicates that over half (54.5%) of participants engage in regular alcohol consumption, which may be reflective of social normalization of alcohol use or co-occurring substance use behaviors. Drug use for non-medical purposes was notably high, with 88.4% of respondents reporting use within the last six months. The frequency of use among drug users is equally striking. Over 21% reported using drugs 2–3 times daily, and nearly 19% used them 4–6 times weekly, indicating a pattern of heavy and potentially dependent use. The primary substance used during initial injection was heroin (92.3%), and this trend persists, as 95.3% reported heroin as the most injected drug in the past month. These figures suggest that heroin is the dominant injectable substance. Early

initiation of drug use was also prevalent; 16.7% reported initiating use before the age of 18, with 68.1% between 19 and 35 years old, underscoring the need for targeted preventive interventions among adolescents and young adults. Injection practices further support the severity of substance use in this group. Over 31% reported injecting drugs 2–7 times per week, with 18.1% injecting 2–3 times per day, and 3.7% injecting five or more times per day. A high frequency of opioid and heroin injection was observed, with heroin being injected once daily or more by 38.5% of users. Concerningly, the practice of mixing drugs was reported by over 21% of participants, with 13.6% engaging in this practice at least weekly. Polydrug use increases the risk of overdose and other health complications, including infectious disease transmission through shared equipment. The data also reveal social dynamics in initiation. A large majority (85.2%) indicated that their first injection was administered by a relative, highlighting the role of close social networks in the onset of injecting drug use.

Table 3 Use of Safe and Sterile Injection

Table 3: Use of Safe and Sterile Injection		
Source of sterile needles in the last month [N=927]	**Frequency**	**% [95% CI]**
Chemist/Pharmacy	**643**	**67.2 [66.3 - 68.1]**
Personal source (friend etc)	116	15.0 [14.3 - 15.7]
Other	52	6.1 [5.6 - 6.6]
I did not get new (sterile) needles	35	3.2 [2.8 - 3.5]
Drug dealer	35	4.2 [3.8 - 4.6]
Prefer not to answer	34	2.8 [2.4 - 3.1]
Vending	8	1.1 [0.9 - 1.3]
Don't know	2	0.3 [0.2 - 0.4]
Needle syringe program, including outreach	2	0.2 [0.1 - 0.3]
Availability of sterile needles in the last month [N=926]	**Frequency**	**% [95% CI]**
Half of the time	**463**	**46.7 [45.7 - 47.7]**
Most of the time	289	34.1 [33.1 - 35.0]
Never	161	17.8 [17.0 - 18.5]
Not in the last month	5	0.5 [0.3 - 0.6]
Prefer not to answer	4	0.6 [0.4 - 0.7]

Don't know	4	0.4 [0.3 - 0.5]
Frequency of using new needles in the last month [N=927]	**Frequency**	**% [95% CI]**
Some of the time	**380**	**37.8 [36.9 - 38.8]**
Most of the time	263	32.4 [31.5 - 33.3]
Never	169	18.3 [17.6 - 19.1]
Half of the time	105	10.4 [9.8 - 11.0]
Don't know	6	0.5 [0.4 - 0.7]
Prefer not to answer	4	0.5 [0.4 - 0.7]
Use of a sterile needle in the last time a drug was injected [N=927]	**Frequency**	**% [95% CI]**
Yes	**609**	**65.0 [64.1 - 65.9]**
No	311	34.0 [33.1 - 34.9]
Don't know	6	0.7 [0.6 - 0.9]
Prefer not to answer	1	0.3 [0.2 - 0.3]
Frequency of using a needle or syringe after it was used by someone [N=924]	**Frequency**	**% [95% CI]**
Never	**397**	**46.3 [45.4 - 47.3]**
Half of the time	222	21.9 [21.1 - 22.7]
Most of the time	148	14.5 [13.8 - 15.2]
Rarely	123	12.9 [12.2 - 13.5]
Always	27	3.3 [2.9 - 3.6]
Don't know	4	0.4 [0.3 - 0.5]
Prefer not to answer	3	0.7 [0.5 - 0.8]
How many different people used the needle before you in the last month [N=926]	**Frequency**	**% [95% CI]**
Prefer not to answer	**240**	**28.4 [27.5 - 29.2]**
3 to 5 people	227	23.6 [22.7 - 24.4]
2 people	175	17.4 [16.7 - 18.2]
More than 5 people	105	10.1 [9.5 - 10.7]
Don't know	99	11.6 [11.0 - 12.2]
1 person	80	8.9 [8.4 - 9.5]

Equipment shared with someone else in the last month [N=926]	Frequency	% [95% CI]
Didn't share any of the above	**339**	**36.6 [35.7 - 37.6]**
Did not share any equipment	303	32.7 [31.8 - 33.7]
Water	150	16.2 [15.4 - 16.9]
Prefer not to answer	43	4.8 [4.4 - 5.2]
Filter	33	3.1 [2.8 - 3.4]
Spoon	28	3.0 [2.6 - 3.3]
Drug solution	15	1.6 [1.3 - 1.8]
Don't know	15	2.0 [1.7 - 2.3]
Police confiscating injected equipment in the past 12 months [N=926]	**Frequency**	**% [95% CI]**
No	**731**	**80.8 [80.0 - 81.6]**
Yes	192	18.8 [18.0 - 19.6]
Don't know	3	0.4 [0.3 - 0.5]

Table 3 indicates that while most participants (67.2%) obtained sterile needles from pharmacies, very few used harm reduction services like needle syringe programs (0.2%). Access to sterile needles was inconsistent, with only 34.1% reporting availability most of the time, and 17.8% never having access in the past month. Only 65% used a sterile needle during their last injection, and over half reported reusing needles previously used by others. Specifically, 23.6% indicated sharing needles with 3–5 people, and 10.1% with more than 5 people. Sharing of other equipment such as water (16.2%) and filters (3.1%) was also reported. Additionally, 18.8% experienced police confiscation of injection equipment, which may contribute to unsafe practices.

Table 4 Sharing Injections

Table 4: Sharing Injections		
The awareness of drug treatment programs in the city [N = 978]	**Frequency**	**% [95% CI]**
No	**752**	**78.7 [77.9 - 79.5]**
Yes	212	19.8 [19.0 - 20.5]

don't know	14	1.5 [1.3 - 1.8]
Failed attempt drug treatment in the past 6 months [N = 226]	**Frequency**	**% [95% CI]**
No	**157**	**70.7 [69.8 - 71.6]**
Yes	69	29.3 [28.4 - 30.2]
Ever prescribed Methadone for drug cessation [N = 83]	**Frequency**	**% [95% CI]**
Never	**54**	**66.3 [65.4 - 67.2]**
Yes in the past	22	26.5 [25.6 - 27.4]
Yes am on it now	3	2.9 [2.6 - 3.3]
Don't know	3	4.3 [3.9 - 4.7]
Ever prescribed Buprenorphine for drug cessation [N = 83]	**Frequency**	**% [95% CI]**
Never	**70**	**82.7 [82.0 - 83.5]**
Don't know	10	14.1 [13.4 - 14.8]
Yes in the past	3	3.1 [2.8 - 3.5]
Ever prescribed combination of Buprenorphine and Naloxone for drug cessation [N = 83]	**Frequency**	**% [95% CI]**
Never	**70**	**83.4 [82.7 - 84.2]**
Don't know	9	12.9 [12.2 - 13.5]
Yes in the past	4	3.7 [3.3 - 4.1]
Ever had other drug treatment or therapy history [N = 83]	**Frequency**	**% [95% CI]**
Never	**54**	**65.9 [65.0 - 66.8]**
Yes in the past	25	29.1 [28.2 - 30.0]
Don't know	4	5.0 [4.6 - 5.4]
Any attempt to reduce drug use in the past 6 months [N = 1,111]	**Frequency**	**% [95% CI]**
Yes	**667**	**61.0 [60.0 - 61.9]**
No	442	38.8 [37.9 - 39.8]
Prefer not to answer	1	0.1 [0.0 - 0.1]
don't know	1	0.1 [0.0 - 0.2]

Table 4 shows the awareness of drug treatment programs was low, with only 19.8% of participants knowing about such services in their city. Among those who sought treatment in the past 6 months, nearly 30% reported failed attempts. Prescription of opioid substitution therapies was rare. Most participants had never been prescribed Methadone (66.3%), Buprenorphine (82.7%), or the Buprenorphine-Naloxone combination (83.4%). Only a small proportion had any prior treatment history (29.1%). Despite limited access to formal treatment, 61% reported trying to reduce drug use in the past six months, indicating a strong willingness to change but possibly lacking sufficient support or resources.

Table 5 Drug Overdose

Table 5: Drug Overdose		
Ever had a drug Overdose in the past 12 months [N = 1,114]	**Frequency**	**% [95% CI]**
No	755	70.8 [69.9 - 71.7]
Yes	**330**	**26.8 [26.0 - 27.7]**
Don't know	29	2.3 [2.0 - 2.6]
Knowledge on access to Naloxone [N = 1,112]	**Frequency**	**% [95% CI]**
No	**983**	**89.4 [88.8 - 90.0]**
Don't know	100	8.7 [8.1 - 9.2]
Yes	28	1.9 [1.6 - 2.1]
prefer not to answer	1	0.1 [0.0 - 0.1]
Carrying Naloxone [N = 1,113]	**Frequency**	**% [95% CI]**
No	**1094**	**98.0 [97.7 - 98.3]**
don't know	11	1.4 [1.2 - 1.7]
yes	7	0.5 [0.4 - 0.6]
prefer not to answer	1	0.1 [0.0 - 0.1]

Table 5 shows over one-quarter of participants (26.8%) reported experiencing a drug overdose in the past 12 months, highlighting a significant public health concern among this population. A

majority (70.8%) reported no overdose, while 2.3% were unsure. Despite this high rate of overdose, awareness and access to overdose-reversal medication appear critically low. Nearly 90% of respondents (89.4%) did not know how to access Naloxone, and only 1.9% reported knowing how to obtain it. Actual carrying of Naloxone was even less common, with just 0.5% indicating they currently carry the medication, while 98% reported not carrying it at all. These findings suggest a serious gap between overdose risk and preparedness, underscoring the urgent need for expanded education, distribution, and access to Naloxone among high-risk groups.

Table 6 Severity of Injectable Drug Use

Table 6: Severity of Injectable Drug Use		
Misuse of Prescription of an injectable drug in the past 3 months [N = 1,114]	**Frequency**	**% [95% CI]**
No	**1045**	**93.8 [93.3 - 94.3]**
Yes	62	5.4 [5.0 - 5.9]
Don't know	7	0.8 [0.6 - 0.9]
Failed to control or cut down/stop use of injectable drugs in the past 3 months [N = 1,111]	**Frequency**	**% [95% CI]**
No	**607**	**53.1 [52.1 - 54.1]**
Yes	498	46.2 [45.2 - 47.2]
Don't know	5	0.3 [0.2 - 0.5]
Prefer not to answer	1	0.3 [0.2 - 0.4]
Has anyone expressed concern about your injectable drug use in the past 3 months [N = 1,111]	**N**	**% [95% CI]**
Yes	**554**	**47.7 [46.8 - 48.7]**
No	525	49.1 [48.1 - 50.1]
don't know	32	3.2 [2.8 - 3.5]
Had a persistent desire to reduce injectable drug use in the past 12 months [N = 696]	**Frequency**	**% [95% CI]**
Yes	**554**	**78.1 [77.3 - 78.9]**
No	132	20.6 [19.8 - 21.4]
Don't know	9	1.1 [0.9 - 1.3]

Prefer not to answer	1	0.3 [0.2 - 0.4]
Had reduced activities due to injectable drug use in the past 12 months[N = 696]	**Frequency**	**% [95% CI]**
Yes	**492**	**68.3 [67.4 - 69.2]**
No	202	31.5 [30.6 - 32.4]
Don't know	1	0.1 [0.0 - 0.1]
Prefer not to answer	1	0.2 [0.1 - 0.2]
Had hazardous injectable drug use situations in the past 12_months [N = 696]	**Frequency**	**% [95% CI]**
Yes	**518**	**72.6 [71.8 - 73.5]**
No	174	26.8 [26.0 - 27.7]
Don't know	3	0.2 [0.1 - 0.3]
Prefer not to answer	1	0.3 [0.2 - 0.4]
Continued injectable drug use despite health problems in the past 12 months [N = 696]	**Frequency**	**% [95% CI]**
Yes	**619**	**88.3 [87.6 - 88.9]**
No	75	11.5 [10.9 - 12.1]
Prefer not to answer	1	0.1 [0.1 - 0.2]
Don't know	1	0.1 [0.0 - 0.2]
Had increased amounts of injectable drugs to achieve desired effect in the past 12 months (Tolerance) [N = 696]	**Frequency**	**% [95% CI]**
Yes	**508**	**70.0 [69.1 - 70.9]**
No	188	30.0 [29.1 - 30.9]

Table 6 shows several indicators highlight the severity of injectable drug use among participants. Although only a small proportion (5.4%) reported misusing prescription injectable drugs in the past three months, nearly half (46.2%) were unable to control or reduce their injectable drug use during that period. Social concern was also prevalent, with 47.7% reporting that someone had expressed worry about their drug use. Among those assessed over the past 12 months, a substantial majority (78.1%) had a persistent desire to reduce their use, yet 68.3% reported reduced engagement in daily activities due to their drug use. Risky use was common, with 72.6%

experiencing hazardous situations related to injection drug use. Alarmingly, 88.3% continued using despite known health problems, and 70% reported developing tolerance, needing increased amounts to achieve the desired effect. These patterns suggest entrenched dependence and significant health and social consequences, indicating a critical need for targeted interventions and support services.

Table 7 Self-Reported Sexually Transmitted Infections

Table 7: Self-Reported Sexually Transmitted Infections		
Have knowledge of where to go for a sexual health check-up/Treatment of an STI [N = 1,111]	**Frequency**	**% [95% CI]**
Yes	**962**	**86.4 [85.8 - 87.1]**
No	148	13.4 [12.8 - 14.1]
Don't know	1	0.1 [0.1 - 0.2]
Have had abnormal penis discharge in the past 12 months [N = 834]	**Frequency**	**% [95% CI]**
No	747	90.0 [89.4 - 90.5]
Yes	**83**	**9.6 [9.0 - 10.2]**
Don't know	4	0.4 [0.3 - 0.6]
Have had ulcer on or near penis in past 12 months [N = 834]	**Frequency**	**% [95% CI]**
No	747	90.0 [89.4 - 90.5]
Yes	**83**	**9.6 [9.0 - 10.2]**
Don't know	4	0.4 [0.3 - 0.6]
Have had painful urination in the past 12 months [N = 52]	**Frequency**	**% [95% CI]**
Yes	**36**	**76.5 [75.7 - 77.3]**
No	16	23.5 [22.7 - 24.3]

Table 7 shows a high proportion of participants (86.4%) reported knowing where to access sexual health services for STI testing or treatment, suggesting strong general awareness. However, self-reported symptoms of sexually transmitted infections remain notable. Among those assessed, 9.6%

reported experiencing abnormal penile discharge and a similar proportion (9.6%) reported having genital ulcers in the past 12 months, both of which are indicative of potential STIs. Painful urination, another symptom commonly associated with infections, was reported by 76.5% of a smaller subgroup (N = 52). These findings indicate that despite good knowledge of where to seek care, STI symptoms persist at a concerning rate, pointing to potential barriers in access, utilization, or timely treatment of sexual health services.

Table 8 Hepatitis B and C

Table 8: Hepatitis B and C		
Have you ever heard of hepatitis B [N = 1,114]	**Frequency**	**% [95% CI]**
Yes	**640**	**57.5 [54.5–60.4]**
No	469	41.3 [40.4 - 42.3]
Don't know	5	0.4 [0.2 - 0.5]
Have ever received Hepatitis B vaccine as an adult [N = 642]	**Frequency**	**% [95% CI]**
No	**397**	**64.0 [63.1 - 65.0]**
Yes	232	34.5 [33.6 - 35.4]
Don't know	12	1.3 [1.1 - 1.5]
Prefer not to answer	1	0.2 [0.1 - 0.2]
Have ever tested for Hepatitis B Virus [N = 642]	**Frequency**	**% [95% CI]**
No	385	61.4 [60.5 - 62.4]
Yes	**249**	**37.4 [36.5 - 38.4]**
Don't know	8	1.1 [0.9 - 1.4]
Recent Hepatitis B test_date [N = 252]	**Frequency**	**% [95% CI]**
More than five years ago	99	39.6 [38.6 - 40.6]
More than 12 months and less than	58	22.8 [22.0 - 23.6]
Less than 12 months ago	48	16.8 [16.0 - 17.5]
Prefer not to answer	25	12.1 [11.4 - 12.7]
Don't know	22	8.8 [8.2 - 9.3]
Have ever heard of hepatitis C [N = 1,113]	**Frequency**	**% [95% CI]**

Yes	**579**	**51.8 [50.8 - 52.8]**
No	528	47.7 [46.7 - 48.7]
Don't know	6	0.5 [0.4 - 0.6]
Knowledge that Hepatitis C can be spread by injections used by others [N = 1,114]	**Frequency**	**% [95% CI]**
Yes	416	36.4 [35.5 - 37.4]
No	**374**	**33.1 [32.2 - 34.1]**
Don't know	**322**	**30.3 [29.4 - 31.2]**
Prefer not to answer	2	0.2 [0.1 - 0.2]
Have ever tested for Hepatitis C Virus[N = 1,112]	**Frequency**	**% [95% CI]**
No	**894**	**81.3 [80.5 - 82.0]**
Yes	178	15.4 [14.7 - 16.1]
Don't know	37	3.2 [2.8 - 3.5]
Prefer not to answer	3	0.2 [0.1 - 0.3]
Reason for Not testing for Hepatitis C[N = 937]	**Frequency**	**% [95% CI]**
Do not think I need to be tested	**369**	**39.6 [38.6 - 40.5]**
Don't know	**300**	**32.6 [31.7 - 33.5]**
Other	201	20.7 [19.9 - 21.5]
The doctor never said to get tested	31	3.8 [3.4 - 4.1]
Clinic too far, transport costs too high	20	2.0 [1.7 - 2.2]
Costs at clinic too high	8	0.7 [0.5 - 0.9]
Clinic does not offer tests	5	0.4 [0.3 - 0.6]
Poor service at clinic	3	0.2 [0.1 - 0.3]
Last Hepatitis C test location [N = 190]	**Frequency**	**% [95% CI]**
General practitioner or medical center	89	47.6 [46.7 - 48.6]
Hospital or outpatient clinic	60	32.1 [31.2 - 33.0]
Prefer not to answer	16	7.8 [7.2 - 8.3]
Prison	14	7.9 [7.4 - 8.4]
Opioid treatment	6	2.5 [2.2 - 2.8]
Other (specify) ahandi (tanga ubusobanuro)	3	1.4 [1.2 - 1.6]
Don't know	2	0.7 [0.6 - 0.9]
Have ever been treated for Hepatitis C [N = 34]	**Frequency**	**% [95% CI]**

No	23	77.3 [76.5 - 78.1]
Yes	9	20.0 [19.2 - 20.8]
Prefer not to answer	2	2.7 [2.4 - 3.0]
No	23	77.3 [76.5 - 78.1]
Yes	9	20.0 [19.2 - 20.8]
Prefer not to answer	2	2.7 [2.4 - 3.0]
What is your current Hepatitis C Status [N = 23]	**Frequency**	**% [95% CI]**
Don't know	**17**	**79.4 [78.6 - 80.2]**
Cleared the virus	3	11.6 [11.0 - 12.2]
Prefer not to answer	2	5.2 [4.8 - 5.7]
Have hepatitis C	1	3.8 [3.4 - 4.1]

Table 8 shows awareness and testing for hepatitis B and C remain limited among participants, with important implications for public health. Just over half (57.5%) had heard of hepatitis B, and even fewer (51.8%) were aware of hepatitis C. Among those familiar with hepatitis B, only 34.5% had ever received the vaccine as adults, and 37.4% reported ever being tested. Recent testing was uncommon, only 16.8% had been tested within the last 12 months. Knowledge of hepatitis C transmission through shared injections was low, with only 36.4% correctly identifying this risk. Testing for hepatitis C was particularly limited, with just 15.4% reporting they had ever been tested. Among those who had not been tested, the most common reasons included a perceived lack of need (39.6%) and uncertainty (32.6%), while logistical and financial barriers were cited far less frequently. Of those who had been tested for hepatitis C, nearly half were tested at a general practitioner's office (47.6%), followed by hospitals or clinics (32.1%). However, treatment rates were low, only 20% of those diagnosed reported receiving treatment. Moreover, among participants aware of their status, the majority (79.4%) did not know their current hepatitis C status,

suggesting significant gaps in both follow-up care and patient education.

Table 9 Service Uptake

Table 9: Service Uptake		
Ever tested for HIV to learn of status [N = 1,048]	**Frequency**	**% [95% CI]**
Yes	**790**	**76.5 [75.7 - 77.3]**
No	257	23.4 [22.6 - 24.2]
Don't know	1	0.1 [0.0 - 0.2]
Reasons for Never Testing for HIV [N = 271]	**Frequency**	**% [95% CI]**
Fear of positive result	98	8.8 [7.1-10.5]
Comfort	48	4.3 [3.1-5.5]
No time to get tested	30	2.7 [1.7-3.7]
I feel I am not at risk for HIV; fear of positive	26	2.3 [1.4-3.2.2]
I Feel I Am Not at Risk For HIV	25	2.2 [1.3-3.1.1]
Other	19	1.7 [0.9-2.5.5]
Prefer Not to Answer	18	1.6 [0.9-2.3.3]
Fear Of Positive Result; No Time to Get Tested	7	0.6 [0.1-1.1.1]
Last HIV test location [N = 791]	**Frequency**	**% [95% CI]**
I went there	**728**	**92.0 [91.5 - 92.6]**
They came to me	33	4.1 [3.7 - 4.5]
I tested myself	26	3.3 [2.9 - 3.6]
Don't know	2	0.3 [0.2 - 0.4]
Prefer not to answer	2	0.3 [0.2 - 0.4]
Last/Most recent HIV test date [N = 790]	**Frequency**	**% [95% CI]**
In the last 6 months	**339**	**39.2 [38.2 - 40.2]**
More than 12 months ago	**302**	**42.2 [41.3 - 43.2]**

Between 7-12 months ago	143	17.8 [17.1 - 18.6]
Don't know	5	0.6 [0.4 - 0.7]
Prefer not to answer	1	0.2 [0.1 - 0.2]

Table 9 shows a majority of participants (76.5%) reported having ever tested for HIV, indicating relatively strong uptake of HIV testing services. However, nearly one-quarter (23.4%) had never been tested, and a small fraction (0.1%) were unsure of their testing status. Among those who had never tested (N = 271), the most commonly cited barrier was fear of a positive result (8.8%), followed by comfort with not knowing (4.3%) and lack of time (2.7%). A notable portion also reported low perceived risk, either alone (2.2%) or combined with fear (2.3%). This suggests that emotional and psychological barriers, as well as misperceptions of risk, may be influencing testing behaviors. Among those who had tested (N = 791), most sought testing proactively, with 92.0% indicating they went to a testing location. In terms of recency, 39.2% had tested within the past 6 months, while 42.2% had last tested over a year ago. This points to a need not only for increased first-time testing but also for promoting regular retesting in alignment with ongoing risk.

Table 10 PEP and PrEP

Table 10: PEP and PrEP		
Have ever heard of PrEP [N = 1,114]	**Frequency**	**% [95% CI]**
No	**933**	**84.5 [83.8 - 85.2]**
Yes	170	14.6 [13.9 - 15.3]
Don't know	10	0.9 [0.7 - 1.1]
Prefer not to answer	1	0.1 [0.0 - 0.1]
Have ever heard of PEP [N = 1,113]	**Frequency**	**% [95% CI]**
No	**917**	**82.5 [81.8 - 83.3]**
Yes	187	16.4 [15.6 - 17.1]
Don't know	8	1.0 [0.8 - 1.2]
Prefer not to answer	1	0.1 [0.0 - 0.1]

Table 10 shows that awareness of HIV prevention methods such as pre-exposure prophylaxis (PrEP) and post-exposure prophylaxis (PEP) remains notably low among participants. Only 14.6% reported having ever heard of PrEP, while an even smaller proportion (16.4%) were aware of PEP. The vast majority of respondents (84.5% for PrEP and 82.5% for PEP) indicated they had never heard of these biomedical prevention strategies. Additionally, approximately 1% in both cases responded with "Don't know," and a negligible proportion preferred not to answer. These findings highlight a significant gap in public awareness and knowledge regarding critical HIV prevention tools, which may hinder efforts to reduce new infections. Addressing this gap through targeted education and outreach initiatives is essential for expanding the uptake and impact of PrEP and PEP.

Table 11 Quality of Life, Stigma and Discrimination

Table 11: Quality of Life, Stigma and Discrimination		
Quality of life rating [N = 1,114]	**Frequency**	**% [95% CI]**
Poor	**437**	**39.3 [38.4 - 40.3]**
Neither poor nor good	**425**	**36.6 [35.6 - 37.5]**
Very poor	180	17.8 [17.1 - 18.6]
Good	66	5.9 [5.4 - 6.3]
Very good	6	0.4 [0.3 - 0.5]
How satisfied are you with your health [N = 1,112]	**Frequency**	**% [95% CI]**
Dissatisfied	**432**	**39.2 [38.3 - 40.2]**
Neither dissatisfied nor satisfied	423	36.6 [35.6 - 37.5]
Very dissatisfied	132	13.2 [12.6 - 13.9]
Satisfied	121	10.8 [10.2 - 11.4]
Very satisfied	4	0.1 [0.1 - 0.2]
Physical abuse as a PWUD in past 12 months [N = 1,111]	**Frequency**	**% [95% CI]**
Never	**826**	**74.9 [74.0 - 75.7]**
Often	125	10.6 [10.0 - 11.2]
Once	79	7.3 [6.8 - 7.8]
A few times	74	6.5 [6.0 - 7.0]

Does not apply because no one knows i am a PWUD	5	0.5 [0.4 - 0.7]
Don't know	2	0.2 [0.1 - 0.3]
Experienced Forces Sex/RAPE as a PWUD in the past 12 months [N = 1,111]	**Frequency**	**% [95% CI]**
Never	**1008**	**92.4 [91.8 - 92.9]**
Once	53	3.9 [3.5 - 4.2]
A few times	38	2.8 [2.5 - 3.1]
Often	11	0.9 [0.7 - 1.1]
Prefer not to answer	1	0.1 [0.0 - 0.1]
Avoided getting services due to discrimination as a PWUD in past 12months [N = 1,112]	**Frequency**	**% [95% CI]**
Never	**821**	**73.9 [73.1 - 74.8]**
Often	137	12.5 [11.8 - 13.1]
Once	72	5.9 [5.4 - 6.3]
A few times	69	6.5 [6.1 - 7.0]
Does not apply because no one knows I am a PWUD	7	0.6 [0.4 - 0.7]
Prefer not to answer	4	0.4 [0.3 - 0.6]
Don't know	2	0.2 [0.1 - 0.3]

Table 11 shows the overall quality of life and health satisfaction among participants appears to be low, with substantial reports of stigma, discrimination, and violence. Nearly four in ten respondents (39.3%) rated their quality of life as poor, while an additional 17.8% described it as very poor. Similarly, 39.2% reported being dissatisfied with their health, and 13.2% were very dissatisfied—highlighting significant unmet needs in wellbeing and healthcare. Reports of physical abuse in the past 12 months were concerning, with 25% experiencing abuse at least once, including 10.6% who reported it happening often. Forced sex or rape was reported by 7.6% of participants, underscoring vulnerabilities to sexual violence. Additionally, 26.1% of respondents reported avoiding healthcare or social services due to discrimination linked to their identity as people who use drugs (PWUD), with 12.5% doing so often. These findings reflect a challenging environment for PWUD, marked by poor health outcomes, limited quality of life, and frequent experiences of stigma and abuse, all of which pose serious barriers to accessing care and support.

Table 12 Social Support

Table 12: Social Support		
Have a trusted person for Support [N = 1,114]	**Frequency**	**% [95% CI]**
Sometimes	**355**	**33.1 [32.2 - 34.0]**
Never	**310**	**27.4 [26.5 - 28.3]**
Rarely	281	25.7 [24.8 - 26.5]
Always	86	6.9 [6.4 - 7.4]
Often	80	6.9 [6.4 - 7.3]
Prefer not to answer	2	0.1 [0.1 - 0.2]
Have a trusted advisor for personal problems [N = 1,114]	**Frequency**	**% [95% CI]**
Sometimes	384	38.1 [37.1 - 39.0]
Never	286	24.0 [23.2 - 24.9]
Rarely	281	23.8 [23.0 - 24.6]
Always	86	6.9 [6.4 - 7.4]
Often	76	7.2 [6.7 - 7.7]
Don't remember	1	0.1 [0.0 - 0.1]
Have a support person when bedridden [N = 1,112]	**Frequency**	**% [95% CI]**
Sometimes	389	37.9 [37.0 - 38.9]
Never	282	24.0 [23.2 - 24.9]
Rarely	277	24.5 [23.7 - 25.4]
Always	90	7.7 [7.2 - 8.3]
Often	74	5.7 [5.3 - 6.2]
Have a person to provide transport to the doctor [N = 1,112]	**Frequency**	**% [95% CI]**
Sometimes	398	38.7 [37.7 - 39.6]
Rarely	246	20.7 [19.9 - 21.5]
Never	233	20.4 [19.6 - 21.1]
Often	130	11.3 [10.7 - 11.9]
Always	104	8.8 [8.3 - 9.4]
Prefer not to answer	1	0.1 [0.0 - 0.1]
Have a person to provide love and affection [N = 1,114]	**Frequency**	**% [95% CI]**

Sometimes	427	40.4 [39.4 - 41.4]
Rarely	262	22.8 [22.0 - 23.6]
Never	213	19.2 [18.4 - 19.9]
Often	110	9.4 [8.9 - 10.0]
Always	99	8.0 [7.5 - 8.6]
Don't remember	2	0.1 [0.0 - 0.2]
Prefer not to answer	1	0.1 [0.0 - 0.2]
Have an enjoyable activity partner [N = 1,113]	**Frequency**	**% [95% CI]**
Sometimes	476	45.0 [44.0 - 46.0]
Rarely	258	23.1 [22.3 - 24.0]
Never	174	14.9 [14.2 - 15.6]
Often	113	9.6 [9.0 - 10.2]
Always	92	7.3 [6.8 - 7.8]

Table 12 shows levels of perceived social support among participants appear generally limited, with many reporting only intermittent or minimal access to trusted individuals or support systems. A third (33.1%) said they “sometimes” have a trusted person for support, while over half reported either "never" (27.4%) or "rarely" (25.7%) having such a person. Similar trends were observed across various forms of social support. For example, only 6.9% “always” had someone to confide in about personal problems, and just 7.7% reported consistently having help when bedridden. In practical support domains, such as transport to medical appointments, only 8.8% said they “always” had someone to assist, with 20.4% stating they “never” did. Emotional support was also lacking: while 40.4% “sometimes” received love and affection, 19.2% reported never having such support. When it came to social companionship, less than one in ten (7.3%) always had a partner for enjoyable activities. These findings underscore a pervasive gap in consistent, dependable social support, which may contribute to or exacerbate vulnerabilities among participants—particularly in health, wellbeing, and resilience against stigma or isolation.

Table 13 Suicide Ideation and Attempts

Table 13: Suicide Ideation and Attempts		
Have ever had suicidal thoughts or attempts [N = 1,114]	**Frequency**	**% [95% CI]**
No I have never attempted it	**815**	**74.7 [73.9 - 75.6]**
Yes I have attempted it	290	24.6 [23.7 - 25.4]
Don't remember	7	0.5 [0.4 - 0.6]
Prefer not to answer	2	0.2 [0.1 - 0.3]
Suicidal thoughts frequency in the last year [N = 1,112]	**Frequency**	**% [95% CI]**
Never	**840**	**75.6 [74.7 - 76.4]**
Rarely	131	12.0 [11.3 - 12.6]
Often	65	5.5 [5.0 - 5.9]
Sometimes	59	5.5 [5.0 - 5.9]
Prefer not to answer	10	1.0 [0.8 - 1.2]
Don't remember	4	0.3 [0.2 - 0.4]
Always	3	0.2 [0.1 - 0.3]
Have had intentional overdose with injectable drugs to attempt suicide [N = 1,110]	**Frequency**	**% [95% CI]**
No	**935**	**85.8 [85.1 - 86.4]**
Yes	154	12.3 [11.6 - 12.9]
Don't know	12	1.0 [0.8 - 1.2]
Prefer not to answer	9	0.9 [0.8 - 1.1]
Have had a suicide plan in last 12 months [N = 1,111]	**Frequency**	**% [95% CI]**
No	**903**	**80.8 [80.0 - 81.6]**
Yes	183	16.1 [15.3 - 16.8]
Don't know	14	2.0 [1.7 - 2.3]
Prefer not to answer	11	1.1 [0.9 - 1.3]

Table 13 shows suicidal ideation and behavior are alarmingly prevalent among participants. Nearly one in four individuals (24.6%) reported having attempted suicide at some point, while 75.6% reported experiencing no suicidal thoughts in the past year. However, a significant minority still reported varying levels of recent ideation, with 12.0% indicating they "rarely" had such thoughts, and another 11% experiencing them "sometimes" or "often." Intentional overdose using injectable drugs as a method of suicide was reported by 12.3% of participants, highlighting a particularly

high-risk behavior among people who use drugs. Moreover, 16.1% reported having made a suicide plan in the last 12 months. These data reflect substantial mental health challenges within this population and point to an urgent need for targeted psychosocial interventions, access to mental health services, and suicide prevention efforts tailored to the unique vulnerabilities of people who use drugs.

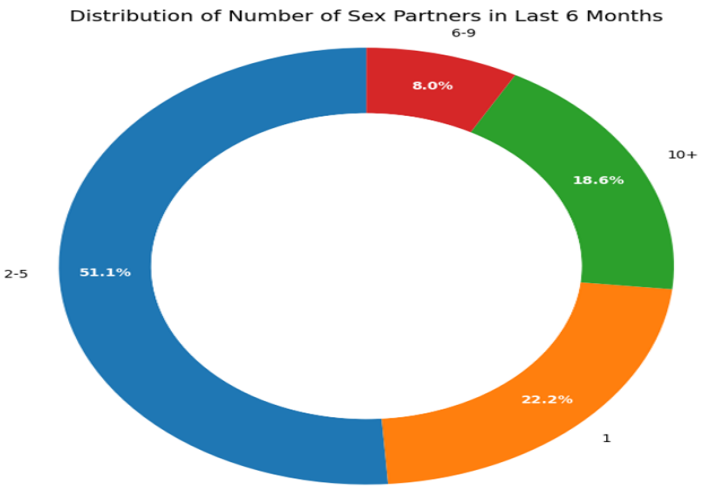
Table 14: Sexual History and Behaviour

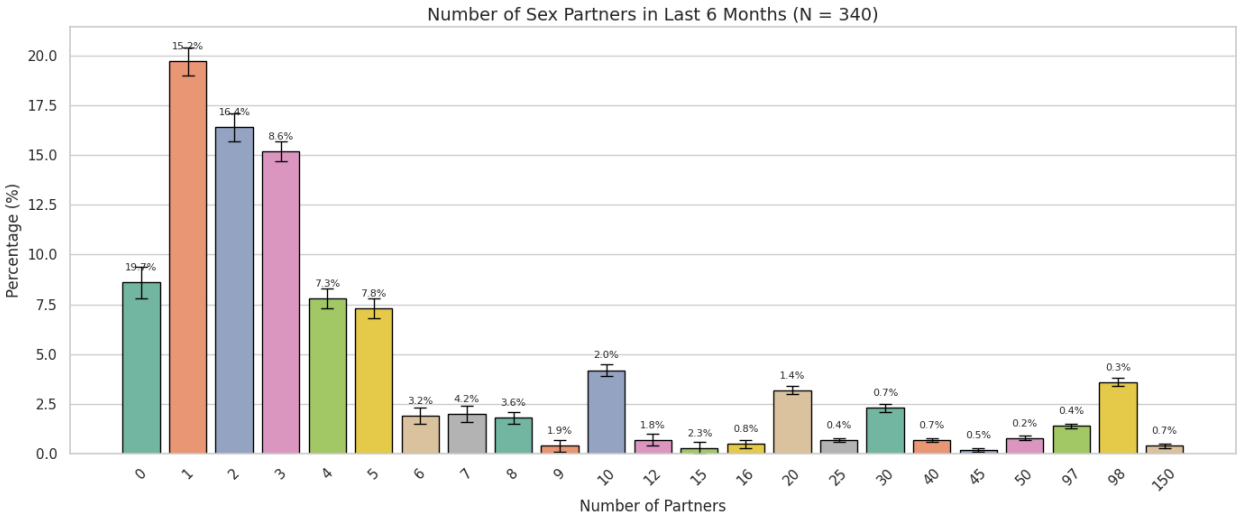
Table 14: Sexual History and Behaviour		
Have ever had vaginal sex (Men) [N = 977]	**Frequency**	**% [95% CI]**
Yes	**926**	**95.0 [94.5 - 95.4]**
No	50	4.9 [4.5 - 5.3]
Prefer not to answer	1	0.1 [0.1 - 0.2]
Have ever had anal sex with woman [N = 978]	**Frequency**	**% [95% CI]**
No	**920**	**93.9 [93.4 - 94.4]**
Yes	54	5.6 [5.1 - 6.0]
Don't know	3	0.4 [0.3 - 0.5]
Prefer not to answer	1	0.1 [0.1 - 0.2]
Have ever had insertive anal sex with_man [N = 979]	**Frequency**	**% [95% CI]**
No	**903**	**92.7 [92.2 - 93.2]**
Yes	71	6.5 [6.1 - 7.0]
Prefer not to answer	3	0.5 [0.4 - 0.7]
Don't know	2	0.2 [0.1 - 0.3]
Ever had receptive anal sex with man [N = 909]	**Frequency**	**% [95% CI]**
No	**889**	**97.4 [97.1 - 97.7]**
Don't know	8	1.2 [1.0 - 1.5]
yes	8	0.7 [0.5 - 0.8]
prefer not to answer	4	0.7 [0.5 - 0.8]
Condom use during last sex [N = 1,111]	**Frequency**	**% [95% CI]**
No	**756**	**67.8 [66.9 - 68.8]**
Yes	328	29.7 [28.8 - 30.6]

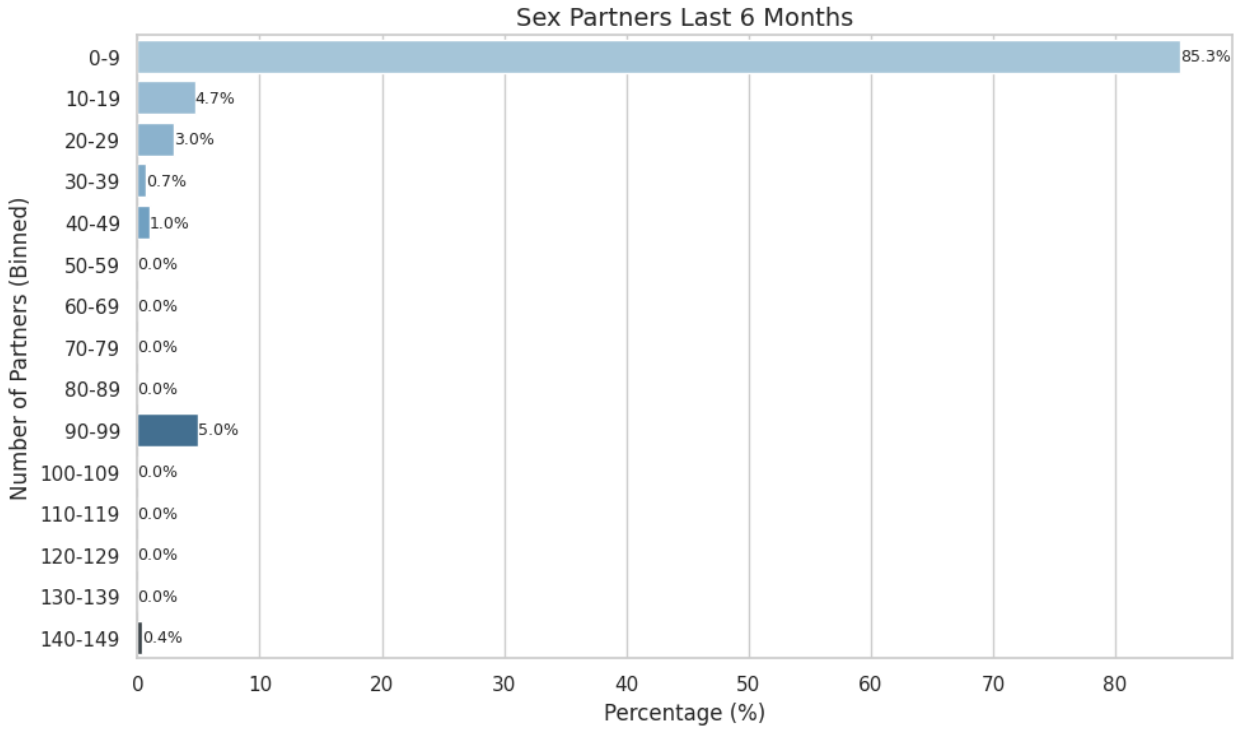
Prefer not to answer	16	1.3 [1.1 - 1.5]
Don't know	11	1.1 [0.9 - 1.3]

Table 14 shows the majority of male participants reported a history of vaginal sex (95.0%), with a smaller proportion having engaged in anal sex with women (5.6%). A notable minority reported same-sex sexual experiences: 6.5% had ever had insertive anal sex with another man, and 0.7% reported having had receptive anal sex. These figures suggest a degree of sexual diversity that may be underreported or stigmatized, particularly given the small number preferring not to answer or indicating uncertainty. Condom use during last sexual intercourse was low, with only 29.7% reporting use, while 67.8% did not use a condom. This low rate of condom use, coupled with the range of sexual behaviors, indicates elevated risk for HIV and other STIs. These findings underscore the need for comprehensive sexual health education, harm reduction strategies, and targeted interventions to promote safer sex practices, particularly among populations at higher risk.

Number of sex partners in last six months (N=340)



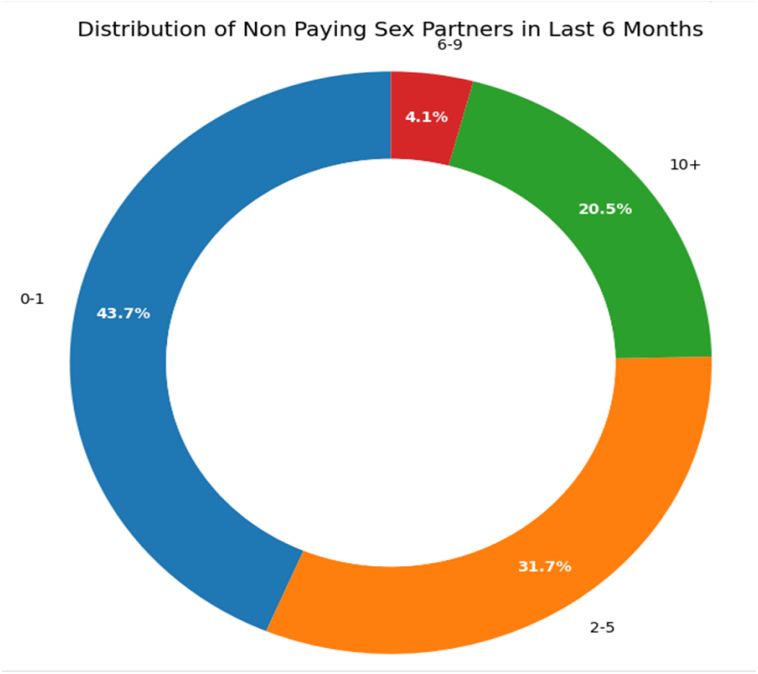


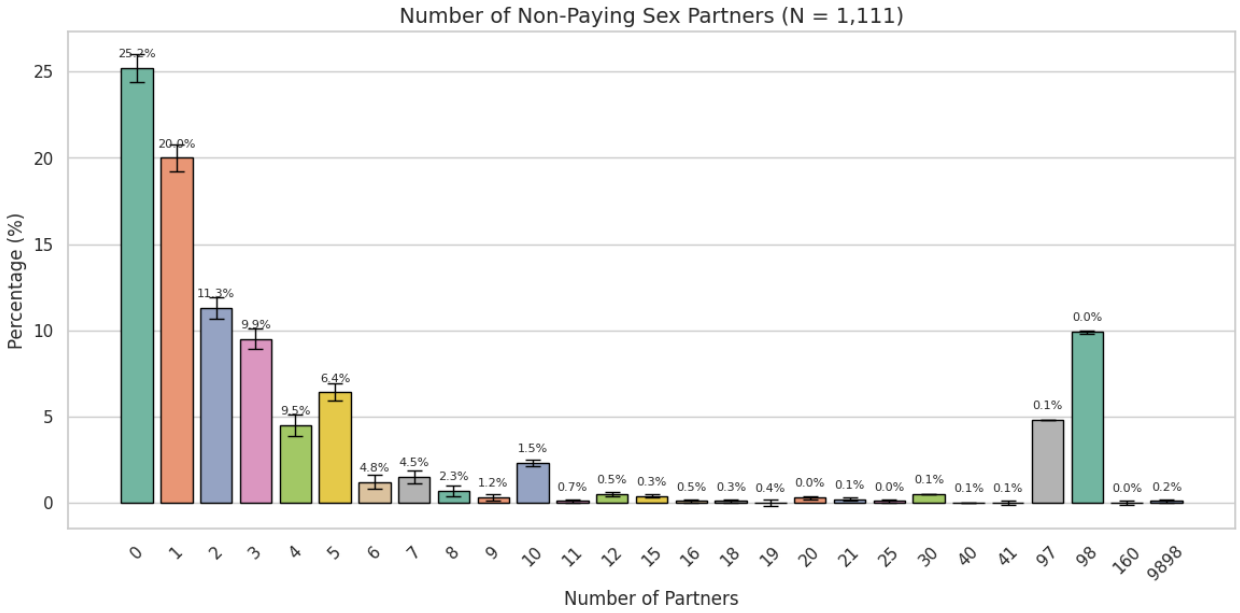


The data reveal a significant variation in the number of sexual partners reported by PWUD in the past six months, highlighting the complexity and diversity of sexual behaviors within this population. A substantial proportion of participants reported having multiple sexual partners, with

15.2% indicating three partners, 16.4% reporting two partners, and 19.7% reporting only one partner. Notably, a small but concerning subset reported extremely high numbers, such as 20 (3.2%), 30 (2.3%), and even 98 partners (3.6%). This distribution suggests that while many individuals may engage in relatively low-risk sexual behavior, a notable minority may be participating in high-risk sexual activity, which has important implications for the spread of sexually transmitted infections, including HIV. The high variance also points to the need for tailored harm reduction strategies that consider not only drug use but also the sexual health behaviors of this population.

Number of Non-Paying Sex partners in last six months





Analysis of the data on non-paying sexual partners over the past six months reveals that a significant portion of PWUD are engaged in sexual activity outside of transactional contexts. Approximately one-quarter of participants (25.2%) reported having no non-paying sexual partners, while a notable 20.0% reported having one partner, and 11.3% reported two. Interestingly, there are also reports of extremely high partner counts, including 98 partners (9.9%), which may indicate either highly active sexual behavior or data anomalies. These findings suggest that while a substantial number of PWUD may maintain relatively low numbers of non-paying partners, a considerable subset report multiple or high numbers of such partners, which could contribute to increased vulnerability to STIs and HIV transmission. This variability highlights the need for sexual health interventions within harm reduction services to be flexible and inclusive of diverse relationship and sexual behavior patterns among PWUD.

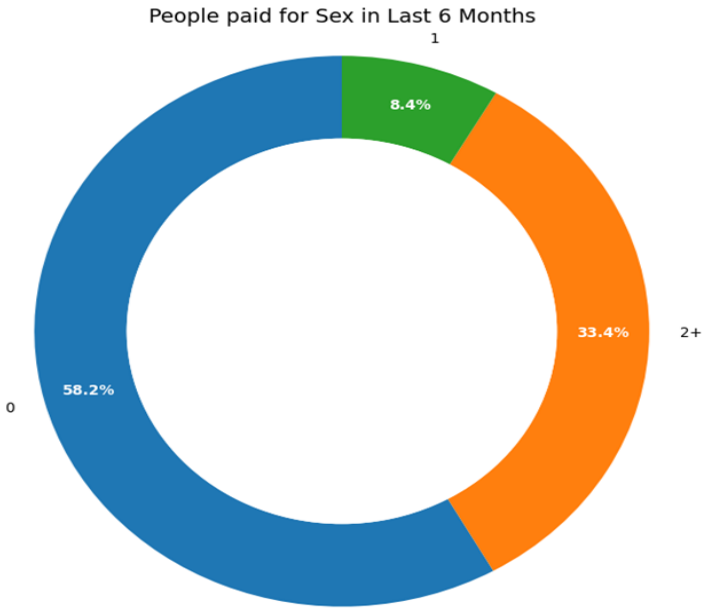
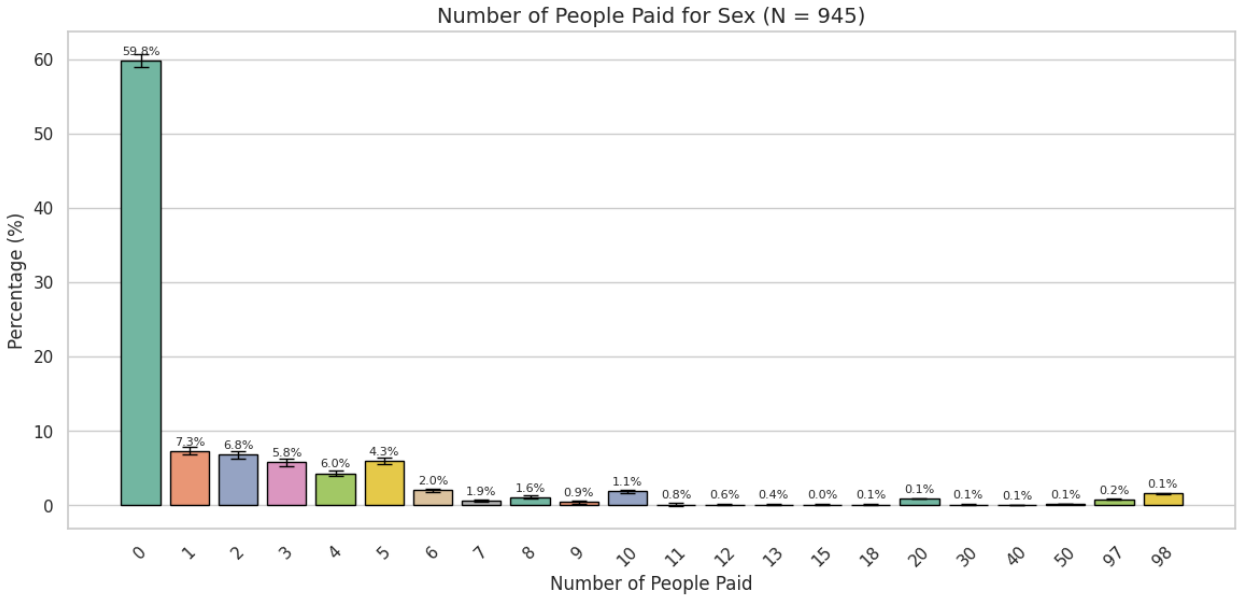
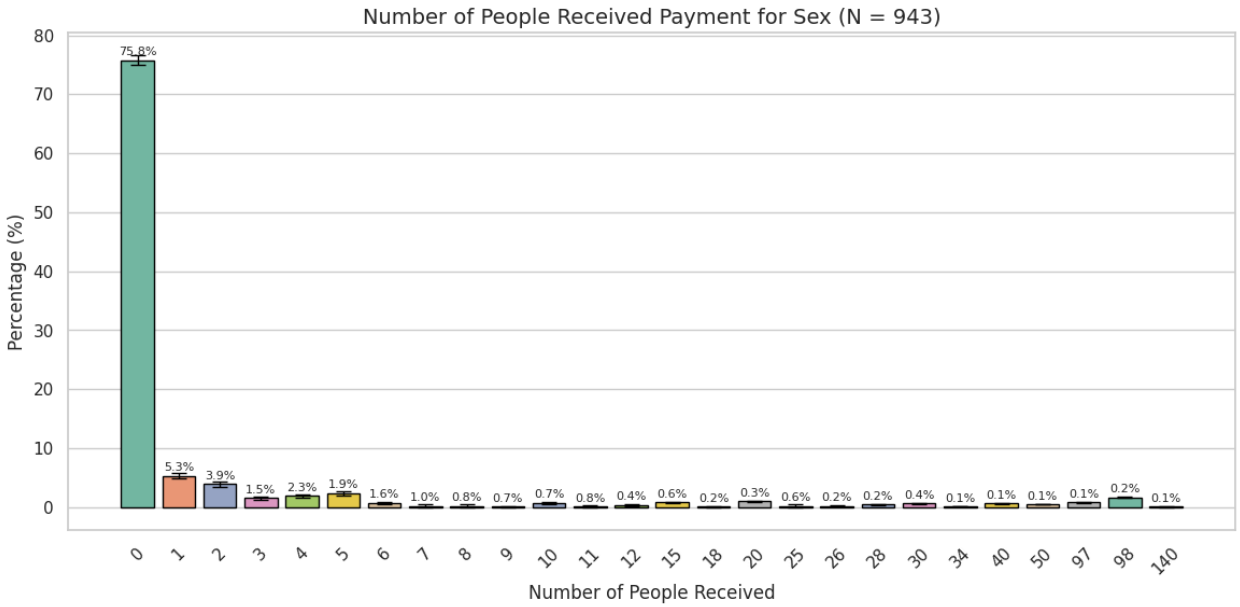


Figure 3 Number of Paying Sex partners in last six months





Transactional sex, both paying for and receiving payment for sexual services, was reported by a notable segment of the PWUD population, highlighting important aspects of economic vulnerability and sexual health risk. Among the 945 individuals surveyed, 40.2% reported paying someone for sex in the past six months. While the majority (59.8%) did not engage in this behavior, 7.3% paid one person, and smaller percentages paid multiple partners, with some extreme values such as 98 partners (1.6%). On the receiving end, 24.2% of the 943 participants reported receiving payment for sex, with 5.3% indicating one paying partner and others reporting multiple. The most frequently cited counts suggest ongoing engagement in sex work by a substantial minority, which may be driven by economic necessity, substance use, or both. These transactional dynamics emphasize the need for targeted sexual health interventions, including STI prevention, condom distribution, and linkage to social and economic support services for PWUD engaged in sex work or transactional sex.

5. Overview Of Size Estimation Methods

We apply a network-based likelihood approach to estimate the population size of People Who

Inject Drugs (PWID) in Rwanda. The method is grounded in the probability of inclusion for each participant based on their reported network size.
Likelihood Function

$$l(N) = \prod_{i=1}^{n} \frac{d_i}{N}\left(\frac{N-i}{N}\right)$$

$$log\ log\ l(N) = \sum_{i=1}^{n} log\left(\frac{d_i}{N}\right) + log\ log\ (\frac{N-i}{N})$$

Likelihood= i=1nlog dij=indj. N-iN

- di = degree (network size) of participant i
- N = total population size (the unknown we estimate)
- n = sample size
- $\frac{N-i}{N}$ = Probability of being selected at stage

The estimated population size of PWID in Rwanda is approximately: **3,418 individuals,**

The Estimate 95% CI for the population size (3291, 3542)

Table 14 Population size estimate by Province

Province	Surveyed PWID	Share of Sample (%)	Estimated PWID
City of Kigali	482	43.3	1479
East	130	11.7	399
North	99	8.9	304
South	148	13.3	454
West	255	22.9	782

Table 15 Population size estimate by Age group

Age Group	Surveyed PWID	Share of Sample (%)	Estimated PWID
18–24	324	29.1	994
25–34	550	49.4	1688
35+	240	21.5	736

Table 16 PSE by District

District	Surveyed PWID	Share of Sample (%)	Estimated PWID
Gasabo	155	13.9	476
Huye	110	9.9	338
Kayonza	94	8.4	288
Kicukiro	119	10.7	365
Kirehe	36	3.2	110
Muhanga	37	3.3	114
Musanze	99	8.9	304
Nyarugenge	208	18.7	638
Rubavu	167	15	512
Rusizi	89	8	273

Table 17 Prevalence of HIV and Hepatitis B and C Co-infections

Condition	Frequency (N)	% Unweighted	% Weighted	95% CI
HIV	121	10.88%	**13.46%**	[10.7 - 16.22]
HBV	34	3.06%	**2.59%**	[1.22 - 3.97]
HCV	69	6.21%	**3.02%**	[1.95 - 4.08]

HIV / HBV	5	0.45%	**0.68%**	[0 - 1.72]
HIV / HCV	5	0.45%	**0.2%**	[0 - 0.4]
HIV / HBV / HCV	1	0.09%	**0.07%**	[0 - 0.22]

Table 18 Predictors of HIV|HBV Co-Infection in PWUD

	Characteristics	Frequency	Prevalence (%)	Crude OR	95% CI	p-Value	aOR	aOR 95% CI	aOR p-Value
Age Group	18-24	12	3.72						
	25-34	70	12.75	3.92	0.88-17.35	0.072	4.45	0.9-22.01	0.067
	35+	68	28.33	12.55	2.78-56.75	0.001	16.26	3.0-88.02	0.001
Gender	female	60	43.8	-	-	-	-	-	-
	male	90	9.23	0.11	0.04-0.26	0.000	0.09	0.03-0.25	0.000
Marital Status	Married	20	25.97						
	Separated	17	30.36	1.68	0.29-9.8	0.564	0.81	0.11-6.01	0.835
	Single	102	10.98	0.32	0.09-1.12	0.075	0.46	0.11-2.0	0.300
	Widow	4	36.36	0.95	0.06-14.16	0.968	0.58	0.02-14.44	0.739
	cohabitating	7	17.95	0.28	0.03-2.72	0.272	0.33	0.03-3.91	0.379
education level	no formal education	26	29.21	-	-	-	-	-	-
	primary school	69	15.86	0.55	0.19-1.61	0.275	1.29	0.33-4.94	0.714
	secondary school	42	8.75	0.36	0.15-0.89	0.027	0.39	0.17-0.93	0.032
	university	12	12.12	0.4	0.05-3.44	0.405	1.29	0.1-16.86	0.848
	vocational trainings	1	11.11	0.17	0.0-37.56	0.516	0.13	0.0-38.08	0.477

Drug Use Frequency	1-4 times per month	44	15.66	-	-	-	-	-	-
	2 to 3 times per day	20	9.13	0.59	0.13-2.55	0.475	0.57	0.1-3.14	0.515
	2-7 times per week, once a day	58	16.48	1.51	0.57-4.05	0.409	1.02	0.32-3.23	0.979
	5 or more times per day	4	9.09	0.57	0.02-16.78	0.743	0.41	0.01-16.52	0.635
	don't know	1	25	2.74	0.01-628.69	0.716	12.56	0.04-4225.92	0.394
	less than once per month	6	20	2.34	0.35-15.48	0.379	2.19	0.26-18.65	0.472
	not in the last month	16	8.94	0.47	0.18-0.92	0.038	0.42	0.16-0.93	0.029
	prefer not to answer	1	33.33	2.44	0.01-835.01	0.765	0.5	0.0-573.93	0.847
Availability of sterile needles	don't know	1	25	-	-	-	-	-	-
	half of the time	60	12.99	0.38	0.0-130.86	0.748	1.16	0.0-5563.01	0.973
	most of the time	39	13.49	0.46	0.0-158.38	0.794	0.98	0.0-4756.56	0.997
	not last month	1	20	0.85	0.0-2758.35	0.968	5.38	0.0-275130.67	0.761

	never	30	18.75	0.6	0.0-209.4	0.864	1.29	0.0-6309.81	0.954
	prefer not to answer	1	25	2.48	0.0-2900.33	0.801	1.99	0.0-28820.08	0.888
New needle use	Most of the time	39	14.89	-	-	-	-	-	-
	Never	30	17.75	1.19	0.37-3.8	0.775	1.12	0.29-4.39	0.869
	Other	20	10.15	0.52	0.16-1.73	0.285	0.48	0.12-1.92	0.296
	Sometimes	61	12.6	0.52	0.26-0.98	0.041	0.45	0.21-0.95	0.036
Use of a sterile needle	no	52	16.35	-	-	-	-	-	-
	yes	80	13.18	0.71	0.3-1.71	0.451	0.95	0.34-2.69	0.930
Using a needle or syringe after it was used	always	4	16						
	don't know	2	11.11	1.78	0.02-135.02	0.794	1.37	0.01-158.6	0.896
	half of the time	26	15.38	2.57	0.11-59.66	0.557	1.97	0.06-66.92	0.705
	most of the time	13	9.56	0.92	0.03-28.4	0.960	0.35	0.01-17.75	0.598
	never	68	15.96	2.64	0.13-54.09	0.529	1.07	0.03-32.84	0.969
	prefer not to answer	1	50	160.8	0.0-15501635.42	0.386	38.53	0.0-43726509.47	0.608
	rarely	18	12.08	2.05	0.09-49.03	0.658	1.14	0.03-40.92	0.943
Equipment shared with	did not share any equipment	28	9.27						

someone else	didn't share any of the above	60	17.7	2.92	0.91-9.36	0.072	2.15	0.55-8.4	0.269
	don't know	2	13.33	0.63	0.0-169.63	0.873	1.12	0.0-621.02	0.972
	drug solution	2	13.33	3.04	0.14-67.94	0.483	2.51	0.07-89.0	0.613
	filter	6	18.18	2.95	0.2-42.95	0.428	3	0.15-59.25	0.470
	prefer not to answer	7	16.28	2.25	0.18-28.1	0.530	3.75	0.2-68.83	0.374
	spoon	6	21.43	3.04	0.3-31.17	0.348	3.64	0.24-55.92	0.354
	water	21	14.09	1.89	0.41-8.67	0.415	2.17	0.37-12.62	0.389
Misuse of Prescription of an injectable drug in past 3month	no	139	13.24	-	-	-	-	-	-
	yes	11	17.74	1.17	0.19-7.18	0.868	1.17	0.14-10.14	0.884
Failed to control	no	92	15.06						
	yes	58	11.65	0.74	0.32-1.7	0.481	0.82	0.32-2.11	0.676
hazardous injectable drug	no	88	14.79						
	yes	62	11.99	0.84	0.37-1.92	0.687	1.2	0.46-3.09	0.709
increased amounts of	no	108	14.25						

injectable drugs	yes	42	11.86	0.76	0.3-1.95	0.574	1.31	0.44-3.88	0.631
Knowledge SH Checkup	no	14	9.21						
	yes	136	14.17	2.17	0.64-7.34	0.215	1.58	0.41-6.08	0.502
abnormal penis discharge	no	142	13.8						
	yes	8	9.64	0.5	0.08-3.07	0.458	1.03	0.15-6.96	0.979
ulcer on or near penis	no	147	13.69						
	yes	3	7.89	0.45	0.02-8.35	0.595	0.82	0.04-16.5	0.895
painful urination	no	148	13.75						
	yes	2	5.56	0.28	0.01-11.34	0.502	0.52	0.01-22.53	0.734
Heard of Hepatitis B	no	44	9.28						
	yes	106	16.61	2.4	1.03-5.6	0.042	1.5	0.57-3.91	0.408
Heard of Hepatitis C	no	60	11.24						
	yes	90	15.57	1.71	0.77-3.78	0.185	1.41	0.57-3.5	0.462
Physical Abuse	never	114	13.83						
	yes	36	12.5	0.93	0.36-2.42	0.882	1.2	0.41-3.56	0.741
Forced Sex	no	124	12.33						
	yes	26	24.53	2.44	0.8-7.4	0.117	1.66	0.45-6.15	0.447
Age first sex male	<15	5	45.45						
	15-17	12	41.38	0.19	0.01-6.04	0.349	0.06	0.0-653.25	0.555
	18+	21	36.84	0.28	0.01-6.72	0.435	0.06	0.0-555.06	0.550
insertive anal	no	145	13.93						
	yes	5	7.04	1.11	0.18-6.84	0.911	1.99	0.28-14.03	0.488
	no	92	11.73						

Condom use	yes	58	17.68	1.47	0.64-3.36	0.366	1.05	0.39-2.8	0.925
sex partners 6 months	0	5	17.24						
	1	5	7.25	1.61	0.03-80.0	0.812	1	0.01-86.41	0.998
	>1	47	19.42	3.26	0.1-109.21	0.510	2.41	0.04-134.21	0.668
N° received payment for sex	0	77	10.8						
	1	10	19.61	3.52	0.65-19.21	0.146	3.01	0.4-22.42	0.283
	>1	53	29.94	5.69	2.3-14.06	0.000	3.12	1.24-7.89	0.015

Table 19 Predictors of HIV|HCV Co-Infection in PWUD

	Characteristics	Frequency	Prevalence (%)	Crude OR	95% CI	p-Value	aOR	aOR 95% CI	aOR p-Value
Age Group	18-24	19	5.88						
	25-34	99	18.03	4.33	1.04-18.07	0.0442	4.53	1.02-20.15	0.0473
	35+	67	27.92	10.83	2.5-46.92	0.0015	12.09	2.55-57.27	0.0017
Gender	Female	62	44.29						
	Male	121	12.56	0.12	0.05-0.28	0	0.35	0.15-0.83	0.016
	transgender	2	22.22	0.54	0.01-21.33	0.7448	1.73	0.02-193.6	0.8201
Marital Status	Married	16	20.78						
	Separated	18	32.14	2.04	0.33-12.43	0.4402	1.09	0.14-8.27	0.9309
	Single	139	14.96	0.46	0.12-1.7	0.2424	0.68	0.15-3.03	0.616
	Widow	4	36.36	1.21	0.08-18.55	0.8933	0.8	0.03-18.59	0.8888
	cohabitating	8	20.51	0.48	0.06-4.06	0.5008	0.61	0.06-5.98	0.6693
Education Level	No formal	24	26.97						
	primary school	65	14.94	0.58	0.2-1.73	0.332	1.36	0.36-5.22	0.6511
	secondary school	71	14.79	0.4	0.18-0.89	0.025	0.41	0.19-0.89	0.027
	university	24	24.24	0.66	0.1-4.53	0.6758	2.37	0.24-23.13	0.4591
	vocational trainings	1	11.11	0.18	0.0-40.52	0.5334	0.13	0.0-38.11	0.4839
Frequency of Drug Use	1-4 times per month	40	14.23						
	2 to 3 times per day	39	17.81	0.95	0.27-3.42	0.9408	1.08	0.25-4.61	0.9207
	2-7 times per week, once a day	73	20.74	1.47	0.55-3.93	0.4381	1	0.32-3.11	0.994

	5 or more times per day	8	18.18	0.77	0.04-15.48	0.8664	0.63	0.02-16.79	0.7845
	Never	2	28.57	2.54	0.05-139.74	0.6486	2.43	0.02-347.6	0.7264
	less than once per month	6	20	1.89	0.27-13.37	0.5249	1.73	0.2-14.97	0.6179
	not in the last month	17	9.5	0.56	0.21-0.96	0.038	0.39	0.17-0.91	0.032
Availability Of Sterile Needles	No	21	10.71						
	half of the time	73	15.8	1.52	0.51-4.54	0.4509	2.18	0.62-7.61	0.2215
	most of the time	59	20.42	2.03	0.64-6.42	0.2297	2.32	0.62-8.64	0.2088
	not last month	1	20	3.07	0.01-932.31	0.7008	9.08	0.01-6356.34	0.5093
	never	31	19.38	1.95	0.56-6.81	0.2979	1.95	0.47-8.11	0.3591
Frequency of Using New Needles	Half of the time	13	12.38						
	Most of the time	58	22.14	1.72	0.32-9.2	0.5271	1.32	0.19-8.99	0.7768
	Never	49	13.39	1.01	0.2-5.16	0.9858	0.67	0.1-4.32	0.677
	some of the time	65	17.15	1.25	0.55-2.83	0.174	0.59	0.26-1.34	0.12
Equipment sharing	No	146	16.46						
	drug solution	2	13.33	1.69	0.09-32.99	0.7304	1.54	0.05-45.32	0.8019
	filter	6	18.18	3.45	1.05-11.32	0.041	4.07	1.08-15.30	0.038
	spoon	5	17.86	1.23	0.12-12.82	0.8608	1.34	0.1-18.82	0.8276
	water	26	17.45	1.2	0.37-3.93	0.7641	1.54	0.4-5.9	0.5283
Shared equipment	did not share any equipment	46	15.23						
	didn't share any of the above	67	19.76	2.25	0.76-6.62	0.1413	1.49	0.43-5.09	0.5275

	don't know	2	13.33	0.08	0.0-36777.09	0.7008	0.08	0.0-53291.93	0.7162
	drug solution	2	13.33	2.31	0.11-50.08	0.5929	1.65	0.05-54.88	0.7792
	filter	6	18.18	3.45	1.05–11.32	0.041	4.07	1.08–15.30	0.038
	prefer not to answer	12	27.91	2.22	0.22-22.84	0.5014	2.89	0.21-40.18	0.4293
	spoon	5	17.86	1.69	0.14-19.97	0.6766	1.43	0.09-23.42	0.8018
	water	26	17.45	1.64	0.4-6.82	0.4928	1.66	0.33-8.26	0.5363
Misuse of Prescription of an injectable drug in past 3month	No	174	16.57						
	Yes	11	17.74	1.06	0.17-6.59	0.952	1.06	0.13-8.7	0.9572
Failed To Control Injectable Use	No	96	15.64						
	Yes	89	17.87	1	0.45-2.19	0.992	1.17	0.48-2.85	0.733
hazardous injectable drug	No	93	15.63						
	Yes	92	17.79	1.06	0.48-2.32	0.8868	1.51	0.61-3.73	0.372
	No	94	15.54						

hazardous injectable drug	Yes	91	17.95	1.01	0.46-2.23	0.9756	1.73	0.68-4.42	0.2493
increased amounts of injectable drugs	No	94	15.54						
	Yes	91	17.95	1.01	0.46-2.23	0.9756	1.73	0.68-4.42	0.2493
Knowledge SH Checkup	No	12	7.89						
	Yes	173	18.02	2.47	0.72-8.54	0.152	1.91	0.5-7.31	0.3419
abnormal penis discharge	No	173	16.81						
	Yes	12	14.46	0.43	0.07-2.78	0.3763	0.8	0.11-5.56	0.8199
ulcer on or near penis	No	180	16.76						
	Yes	5	13.16	0.45	0.03-7.71	0.5803	0.73	0.04-13.31	0.8292
painful urination	No	181	16.82						
	Yes	4	11.11	0.29	0.01-10.03	0.4926	0.48	0.01-17.42	0.6858
Heard of Hepatitis C	No	58	10.86						
	Yes	127	21.97	2.83	1.31–6.12	0.008	2.42	1.01–5.80	0.047
Knowledge Of HCV Transmissio n Through	No	90	12.91						

N° of People Received Payment for Sex	0	101	14.17						
	1	8	15.69	2.74	0.47-16.08	0.2638	2.13	0.27-16.61	0.4707
	>1	62	35.03	4.87	1.92-12.34	0.001	3.52	1.24-10.17	0.019

Shared Needles	Yes	95	22.89	1.77	0.8-3.9	0.1583	1.83	0.74-4.55	0.1921
Physical Abuse As PWUD	No	141	16.97						
	Yes	27	13.57	0.73	0.23-2.33	0.5926	0.91	0.25-3.27	0.8848
	once	16	20.25	1.31	0.29-5.91	0.7296	1.29	0.23-7.17	0.7694
forced sex	No	1	25						
	a few times	18	47.37	1.28	0.01-202.84	0.9251	0.99	0.0-272.56	0.998
	never	152	15.11	0.34	0.0-42.99	0.6607	0.27	0.0-54.07	0.6258
	often	3	27.27	0.41	0.0-134.78	0.7654	0.07	0.0-38.84	0.4132
	once	11	20.75	0.65	0.0-105.01	0.8668	0.4	0.0-108.04	0.7477
Age At First Sex (With Woman)	<18	1	10						
	18+	7	15.56	1.63	0.01-259.35	0.8504	2.01	0.01-369.2	0.7923
Insertive Anal Sex With Man	No	176	16.91						
	Yes	9	12.68	1.35	0.25-7.27	0.7273	2.28	0.38-13.67	0.3665
Condom Use During Last Sex	No	110	14.03						
	Yes	75	22.87	1.79	0.81-3.98	0.1533	1.41	0.56-3.53	0.467
Number Of Sex Partners	0	11	37.93						
	1	9	13.04	1.72	0.06-52.19	0.7556	1.27	0.03-52.67	0.9009
	>1	56	23.14	2.85	0.13-62.49	0.5056	2.28	0.08-66.21	0.6325

6. Discussions

Table 18 : Presents the predictors of HIV/HBV co-infection among People Who Inject Drugs (PWUD). Adjusted Odds Ratios (aOR) show the strength of independent associations after controlling for confounding variables.

1. Age ≥35 years was strongly associated with co-infection (aOR=16.26), reflecting cumulative risk exposure.

2. Males were significantly less likely to be co-infected than females (aOR=0.09), suggesting increased vulnerability among female PWID.

3. Secondary education appeared protective (aOR=0.39), likely due to improved health literacy and access to safer practices.

4. Participants not injecting in the last month had reduced odds of co-infection (aOR=0.42), showing recent injection as a key risk factor.

5. Inconsistent use of new needles was still protective (aOR=0.45), reinforcing the importance of harm reduction programs.

6. Awareness of hepatitis B was positively associated with co-infection (aOR=2.07), possibly due to diagnostic bias (reverse causality).

7. Engaging in transactional sex more than once increased the odds of co-infection (aOR=3.12), underlining the intersection of sexual and injection-related risks.

Table 19 : Presents the predictors of HIV/HCV co-infection among People Who Inject Drugs (PWUD). Adjusted Odds Ratios (aOR) show the strength of independent associations after controlling for confounding variables.

1. Age ≥35 years was strongly associated with co-infection (aOR=12.09), reflecting cumulative exposure to injection-related and sexual risk over time.

2. Males were significantly less likely to be co-infected than females (aOR=0.35), highlighting increased vulnerability among female PWID.

3. Secondary education appeared protective (aOR=0.41), possibly due to better knowledge and use of harm reduction practices.

4. Not injecting in the last month reduced the odds of co-infection (aOR=0.39), suggesting that recent injection behavior is a key driver of HCV acquisition.

5. Sharing filters used to prepare injections was associated with higher odds of co-infection (aOR=4.07), emphasizing the importance of addressing all shared injection equipment.

6. Awareness of hepatitis C was positively associated with co-infection (aOR=2.42), potentially due to reverse causality — those infected are more likely to be informed.

7. Receiving payment for sex more than once increased the odds of co-infection (aOR=3.52), demonstrating the intersection of economic vulnerability, sexual exposure, and injecting risk.

7. Advocacy to the program

1. **Expand Harm Reduction Programs**

   The high prevalence of risky injection practices among PWUD in Rwanda, with 34% not using sterile needles at their last injection and 23.6% sharing needles with 3-5 people, underscores the urgent need for expanded harm reduction programs. Needle and syringe programs, along with other harm reduction strategies, are critical to reducing the transmission of HIV and viral hepatitis.

2. **Increase Access to HIV Testing and Treatment**
   With only 76.5% of PWUD having ever tested for HIV and a 12.3% prevalence rate among those tested, alongside 14.2% of diagnosed individuals not taking antiretroviral therapy (ART), there is a critical need to enhance HIV testing and treatment access for PWUD in Rwanda.

3. **Improve Hepatitis B and C Awareness and Testing**
   Awareness of Hepatitis B and C among PWUD is alarmingly low, at 57.5% and 51.8%, respectively, with testing rates even lower (37.4% for HBV, 15.4% for HCV) (Table 8). This gap contributes to the undetected spread of these infections, with prevalence rates of 2.59% for HBV and 3.02% for HCV. National campaigns to educate PWUD about hepatitis risks, coupled with accessible testing services at health facilities and community levels, are essential.

4. **Address Stigma and Discrimination**
   Stigma and discrimination significantly hinder PWUD from accessing health services, with 12.5% often avoiding services due to fear of discrimination and 39.3% rating their quality of

life as poor (Table 11). These social barriers exacerbate health disparities and limit engagement with prevention and treatment programs. Advocacy efforts should focus on public education campaigns and training for healthcare providers to reduce stigma.

5. **Enhance Access to Overdose Prevention**
   The report reveals that 26.8% of PWUD experienced a drug overdose in the past year, yet only 1.9% were aware of Naloxone, a life-saving overdose reversal drug (Table 5). Increasing the availability and awareness of Naloxone through community distribution, training for PWUD and healthcare providers, and integration into harm reduction programs is critical. This intervention can prevent fatal overdoses and address the significant public health risk posed by the high overdose incidence among PWUD in Rwanda.

6. **Provide Targeted Interventions for Women**
   Female PWUD face a disproportionately higher risk of HIV/HBV and HIV/HCV co-infections, with males being significantly less likely to be co-infected (aOR=0.09 for HIV/HBV, aOR=0.35 for HIV/HCV) (Tables 2, 3). This vulnerability, likely tied to social and economic factors like transactional sex, calls for gender-specific interventions. Programs tailored to women, including safe spaces, economic empowerment, and targeted health services, are essential to address these disparities and reduce infection rates among female PWUD.

7. **Promote Condom Use and Sexual Health Education**
   Inconsistent condom use, with 67.8% of PWUD not using a condom during their last sexual encounter, and the association of transactional sex with higher HIV/hepatitis co-infection odds (aOR=3.12 for HIV/HBV, aOR=3.52 for HIV/HCV) highlight the need for robust sexual health interventions (Tables 14, 2, 3). Distributing free condoms, coupled with education on safe sex practices, can reduce HIV and STI transmission risks. Community-based programs should target PWUD to address barriers like substance use during sex, which contributes to low condom use.

8. **Support Mental Health and Suicide Prevention**

   The mental health crisis among PWUD is evident, with 24.6% reporting suicide attempts and 12.3% having intentionally overdosed to attempt suicide (Table 13). These alarming rates underscore the need for integrated mental health services within PWUD care programs.

Advocacy should focus on establishing counseling services, peer support groups, and suicide prevention initiatives tailored to PWUD, addressing the psychological toll of drug use, stigma, and social marginalization to improve their overall well-being.

9. **Develop PWUD-Specific National Programs**
   Despite Rwanda's success in achieving the UNAIDS 90-90-90 targets for the general population, the absence of a minimum package of services for PWUD in national HIV guidelines hinders targeted interventions Developing PWUD-specific programs, similar to those for MSM and FSW, is critical to address the high HIV prevalence (12.3%) and risk behaviors like needle sharing and inconsistent condom use. Advocacy should push for policy inclusion of PWUD-focused strategies, including harm reduction, testing, and treatment services, to achieve equitable health outcomes.

8. Conclusion

This study estimates a significant PWUD population in Rwanda with a high burden of HIV (12.3%) and substantial risk behaviors, including needle sharing and inconsistent condom use, exacerbating HIV and Hepatitis transmission risks. The lack of PWUD-specific programs, coupled with stigma and criminalization, hinders access to prevention and treatment services. Urgent action is needed to expand harm reduction initiatives, increase testing and treatment access, and address social determinants like housing and discrimination to achieve sustained epidemic control in Rwanda. These findings provide a critical evidence base for targeted national health programming

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